Southeast Asian Journal of Islamic Education
Volume 07, No. 02, December 2024
E-ISSN: 2621-5861, P-ISSN: 2621-5845
https://doi.org/10.21093/sajie.v7i2.9052

The Influence of Digital Leadership Toward Digital Transformation of Education

Suratman[1], Joel Mayo Torres[2], Mohammad Salehudin[3], Sri Susmiyati[4], Sugiyono[5]
[1345]Sultan Aji Muhammad Idris State Islamic University Samarinda, Indonesia
[2]Central Luzon State University, Philippines
[1] suratman.pambudi@gmail.com, [2] joel_torres@clsu.edu.ph, [3]moh.salehudin@uinsi.ac.id,
[4]susatri70@gmail.com, [5]sugiyono@uinsi.ac.id

Article History:

Received: August 30th, 2024 *Accepted: December 26th, 2024* *Published: December 27th, 2024*

Abstract

Digital leadership faces challenges in transformation, including inadequate internet access, limited funding, and low teacher digital competence. Moreover, institutions struggle to maintain learning quality and safeguard digital privacy. Organizational culture remains unprepared for digitalization, with insufficient strategies to adapt to change. These issues create anxiety among principals and teachers in integrating technology, while a lack of understanding of digital leadership within institutions hinders innovation and performance improvement. This study aimed to analyze the effect of digital leadership on educational digital transformation using a quantitative approach. The population consisted of all school principals and teachers at Madrasah Aliyah in Samarinda, totaling 120 individuals. The sampling technique employed the Harry King Nomogram table with a 5% margin of error, resulting in a sample size of 92 participants. Data were collected through questionnaires and analyzed using linear correlation and t-tests. The results showed that digital leadership significantly impacts digital transformation, enhancing infrastructure, training, digital content, student engagement, creativity, and performance measurement. Digital transformation in education is achieved through integrating technology into learning processes and improving school management efficiency. This underscores the critical role of digital leadership in addressing technological challenges and fostering innovation in educational institutions.

Keywords: digital leadership, digital transformation, education

* **Correspondence Address**:
Email Address: *suratman.pambudi@gmail.com*

Citation: Suratman, S., Torres, J. M., Salehudin, M., Susmiyati, S., & Sugiyono, S. (2024). The Influence of Digital Leadership Toward Digital Transformation of Education. *Southeast Asian Journal of Islamic Education*, *7(2),* 139–153. https://doi.org/10.21093/sajie.v7i2.9052

A. Introduction

Inadequate internet access for digital learning, limited funding and digital resources, and low competence among teachers and the community pose significant challenges to digital leadership (Syam et al., 2023). Learning prospects and digital privacy security remain uncertain (Lukita et al., 2022). Organizational culture continues to assume that digitalization can be implemented without considering appropriate adaptations to necessary changes (Liu et al., 2018). Consequently, poorly designed structural changes often fail to adjust organizational culture during digital transformation (Schaft et al., 2022).

This situation affects school principals and teachers, who experience anxiety when integrating information technology and computer-based learning (Jogezai et al., 2022). It also impacts data-driven decision-making (Gertzen et al., 2022) despite the availability of accurate data processing devices. Institutions that fail to recognize the value of digital leadership risk suffering from non-renewable institutional performance (Wujarso et al., 2023). Additionally, misunderstandings surrounding digital transformation persist, resulting in job losses and stifling innovations, which play crucial roles in human resource development (Hizir, 2022).

Therefore, establishing patterns and principles on the importance of digital technology training for school principals is essential (Kashif & Ali, 2019). Such training equips them to manage tasks virtually, adapt to changes in the digital environment, and optimize limited funding while ensuring the security of digital learning data (Adeyemo, 2023). Digital leadership is defined as a leader's proficiency in influencing staff using electronic devices, characterized by communication skills, expertise in information technology, collaboration, and strategic thinking to achieve digital transformation goals (Gilli et al., 2023). Digital transformation introduces a new paradigm that inspires institutions through mediation and consensus-building (Fernandez-Vidal et al., 2022).

Educators participating in digital transformation require a strong understanding of computer technology, the capacity to integrate technology into learning, and adaptability. The digital transformation of 21st-century learning enhances education quality through teacher training focused on implementing learning technologies (Sulaiman & Ismail, 2020; Salim et al., 2020).

Referring to these theories, current digital leadership is pivotal for adapting to the digital transformation in education and advancing the learning process (Wahyuni, 2022). The school principal is critical in motivating, guiding, and directing staff (Taufikurrahman, 2021). Digital leadership embodies the complexity of digital transformation and is essential for upgrading 21st-century skills to produce competitive outcomes (Mutohhari et al., 2022). Consequently, a learning environment supported by educational technology and innovative policymaking is imperative (Yuting et al., 2022).

Recent research on digital leadership has explored its influence on employee creativity and its trending role in university contexts (Ehlers, 2020). Digital leadership is implemented holistically, driving digital transformation (Lorentzen, 2022). This approach enhances work motivation (Hanandeh et al., 2023) and mitigates negative impacts on the community and environment (Kraus et al., 2021). Thus, digital leadership is vital for realizing the digital revolution (Tulungen et al., 2022), emphasizing its role in fostering digital strategy, policy-making, and transformation (Yao et al., 2023). Adopting digital transformation also supports

policy, social impacts, and insights, although awareness remains limited when reliant on traditional media like television and news (Huong & Duc, 2023).

Drawing from previous research, which lacked integration of digital leadership behavior into the educational digital transformation, this study identifies the critical role of school principals in creating innovative learning environments, professional learning opportunities, effective communication, and institutional branding. To succeed, robust technology infrastructure, comprehensive teacher training, digital capacity building, student engagement, performance evaluation, and innovation are needed. This study explores how significantly digital leadership influences educational digital transformation and whether digital leadership positively and significantly impacts educational digital transformation.

B. Literature Review

A review of the literature related to digital leadership (DL) and the digital transformation of education (DTE) in the teaching and learning process is presented in this section as the conceptual basis supporting both variable components in this study.

1. Digital Leadership

Digital leadership provides opportunities for leaders to adapt to advances in information technology through seven central pillars of digital leadership that are integrated into learning practices, covering various important aspects. Namely, the use of technology, modification of the learning environment, teacher professional development, effective communication, community and stakeholder involvement, branding, and consistent development of resources in a sustainable manner (Sheninger, 2023). Recent research on digital leadership in school transformation found that integrating technology in teacher professional development can improve the quality of learning. Other research shows that communication via social media significantly expands a school's reach and strengthens community engagement (Weber et al., 2022). In addition, identifying strong branding strategies can improve the school's reputation and attract the interest of students and parents (Chwen-Li et al., 2022a).

Digital leadership must possess awareness and knowledge of the importance of technology in implementing digital technology and structure understanding as the basis for digital transformation (Olanipekun & Sutrisna, 2021). A leader in the digital era must acknowledge how the digital system works and understand that digital technology will help the institution grow and develop better. Leadership in the new era is characterized by digital dexterity, through modification, as an effort to encounter the more complex challenges that appeared in digital transformation and digital initiatives. The impacts of digital leadership can be seen vertically in development, which will be directly affected by superiors; meanwhile, horizontally, within cooperation with partners, it has more significant influence than supervisors (Saputra & Nugroho, 2021). Digital leadership understands technology insight is essential to digital transformation (Kokot et al., 2023). Digital leadership and digital transformation demand capability in achieving strategy, vision, communication, employee involvement, and digital governance with adjustment on cultural diversity as the sign of successful digital transformation (Raza & Palle, 2023).

2. Digital Transformation of Education

Digital transformation is needed to combine technology with learning process enhancement, more efficient and faster school management, and public service

improvement (Susilawati & Windijanto, 2021). Digital transformation must be addressed nimbly, changing creative ideas and innovation to become accurate outputs through aggressive strategy (Bounfour et al., 2023). Education institutions are required to provide work platforms that adjust digital transformation development on learning practice involving students as an effort to share insight and the future (Niță & Guțu, 2023), considering the digital transformation impacts on lower cost, escalation of productivity and innovation, and increasing cost on institution management (Zhang et al., 2022).

The role of a leader in managing an institution must have agility in an organization that increases digital transformation (AlNuaimi et al., 2022). The digital transformation of education is focused on technology infrastructure, considering the availability of internet access, software, and hardware that adapt digital technology to learning services (Huda, 2023). Thus, a curriculum that supports students in developing confidentially is a prerequisite (Philip & Aguilar, 2022). To support digital training through teacher participation in e-learning training that promotes digital resources, learning technology mastery, and implementing a technology-based learning strategy (Antón-Sancho et al., 2021) can be executed by fulfilling digital content.

Improving students' digital skills uses the integration of artificial intelligence technology (Wu et al., 2023) to provide innovative new insights into achieving digital transformation. Content creation needs a community that supports digital participation (Reuter et al., 2021). A leader manages digital learning sources, digital learning media, and technology-based curriculum integration to boost 21st-century competencies for achieving more effective objectives (Wu et al., 2023) within digital transformation that orients to team, training, and knowledge, as well as awareness, attitude, and approach (Zulu et al., 2023). Digital transformation is carried out through student behavior changes and stakeholders in student learning (Thi et al., 2022).

Student engagement in learning, digital platform utilization, and digital skill development through sustainable product innovation have become essential elements for the future (Sreenivasan & Suresh, 2023). Innovation and creativity involve components of innovative project implementation, support for creative ideas development, and involvement from all school stakeholders (Javed, 2023), which will color learning culture and innovative behavior (Aboobaker, 2021). Digital evaluation is conducted within data utilization for improvement, parent involvement, learning management system, learning platform, and digital learning (Abdurrahman et al., 2024). Digital transformation demands strategical action, such as a) digital education of culture and skill, digital culture and talent, b) infrastructure and technology that confirm the necessity of information, interaction, and artificial intelligence, c) ecosystem that manifested in vision, partnership, and quality of life (Brunetti et al., 2020).

C. Method

1. Research Design

This study adopts a quantitative research design, including details on the research type, population and sampling techniques, data collection methods, validity and reliability testing, and data analysis procedures. Prerequisite tests for data analysis, such as linearity and normality tests, are conducted to ensure the appropriateness of the data for hypothesis testing. The data analysis techniques are

applied to evaluate the proposed research hypothesis. The constellation of issues addressed in this study is illustrated in the following diagram:

Figure 1. Research design of the digital leadership effect on education digital transformation research

The research design above, as pictured, describes how digital leadership impacts the digital transformation of education. This research proposed a hypothesis that digital leadership positively and significantly affects education digital transformation.

2. Population and samples

This study involved all principals and teachers from Madrasah Aliyah in Samarinda, totaling 120 individuals. The sample size was determined using the Harry King Nomogram table. With a population size of 120 and a 5 percent margin of error, a sample of 92 participants was selected (Sugiono, 2013).

3. Research Instrument

This study utilized questionnaires as the primary research instrument. The research instrument's items were derived from each research variable's indicators. The digital leadership variable is based on the theory of digital leadership, encompassing seven indicators: student involvement, learning outcomes, innovative learning spaces and environments, professional learning, communication, public relations, and branding and opportunity (Huong & Duc, 2023). The digital transformation of education variable draws from the theory of digital transformation in education. It comprises six indicators: technology infrastructure, teacher training, digital content, student engagement, performance measurement and evaluation, and innovation and creativity (AlNuaimi, 2022). The indicators from both variables were developed into sixteen instrument items. Respondents provided their answers using a range of agreement scores as follows: strongly agree (4), agree (3), disagree (2), and strongly disagree (1). For negatively phrased statements, the scoring scale was reversed: strongly agree (1), agree (2), disagree (3), and strongly disagree (4). This approach ensures that the research instrument accurately captures the dimensions of digital leadership and educational digital transformation, facilitating a comprehensive analysis of the relationships between these variables.

4. Data Collection Technique

Data on digital leadership and the digital transformation of education were collected through questionnaires distributed to all school principals and teachers at the research site. For the digital leadership variable, 16 statements were derived from seven indicators. Similarly, 16 statements were developed based on six indicators for the digital transformation of education variables.

5. Validity and Reliability

The validity of each research variable was tested using the product moment formula. Questionnaires from 92 respondents, with a 5 percent fault rate, were analyzed and compared to the r-table value, where r-count > 0.207 indicated validity (Sujarweni, 2015). Additionally, a pilot test was conducted with a group outside the primary sample to verify the instrument's consistency and accuracy. The results from

this external group further confirmed the validity of the research instrument before its application in the main study. In the meantime, the Alpha Cronbach formula was used to test the reliability of each variable. Both instruments from both variables are stated to be valid if the value of alpha $\geq$ 0.7. To test the data normality, the researcher applied the Kolmogorov-Smirnov Z test, with the term, if the significance value > 0.05, then it is assumed that the residual value was distributed normally. On the other hand, if the significance value < 0.05, the distribution of residual value is abnormal (Wahana, 2009). The linearity test is examined using deviation from linearity, if $F_{count} \leq F_{table,}$ or by applying a level of significance, if the value of significance probability $\geq$ value of significance probability 0.05$\geq$ significance, implying that there is an undeviating connection between free variable and reliant variable, or vice versa (Ridwan & Sunarto, 2009).

6. Data Analysis

Data analysis is conducted on both instruments to ensure validity, reliability, and normality. The test was performed in SPSS version 20 (Sujarweni, 2015). The magnitude of influence of X toward Y is measured using the summary r model and determination coefficient R^2. The hypothesis is examined through simple linear regression with the term if the level of significance probability $\leq$ 0.05, then the regression model can be applied to predict the influence. Criteria of Ha is accepted when the significance value < 0.05, and Ho is rejected if the sig value > 0.05. The significance test implements criteria for when the sig. Value: 0.000 < 0.005 confirms the significant influence with the rate of fault of 5%.

D. Findings

In this section, the researcher discusses the terms of data analysis based on the validity, reliability, linearity, and normality tests. Having fulfilled the statistical criteria, hypothesis testing was done using simple linear correlation. The phases are as follows:

1. Validity and reliability test

The research result on digital leadership variables (DL) and digital transformation of education (DTE) is displayed in the table below.

Table 1. Scores of Validity and Reliability tests on variables of digital leadership and digital transformation of education

No.	Correlations	No.	Correlations
DL1	0.63	DTE1	0.64
DL2	0.35	DTE2	0.83
DL3	0.52	DTE3	0.68
DL4	0.42	DTE4	0.92
DL5	0.73	DTE5	0.62
DL6	0.94	DTE6	0.77
DL7	0.89	DTE7	0.78
DL8	0.74	DTE8	0.67
DL9	0.35	DTE9	0.67
DL10	0.81	DTE10	0.77
DL11	0.89	DTE11	0.67
DL12	0.85	DTE12	0.92
DL13	0.89	DTE13	0.67

No.	Correlations	No.	Correlations
DL14	0.9	DTE14	0.74
DL15	0.89	DTE15	0.83
DL16	0.63	DTE16	0.98

The validity test result in Table 1 stated that the validity score for all instruments of variable DL and DTE revealed a correlation score or r-count > 0.178, implying that all instrument items are valid. The result of the reliability test for both variables, DL and DTE, is presented in Table 2 as follows:

Table 2. Result of Reliability Test

	Reliability Statistics		
Variable	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
DTE	.977	.977	16
DL	.964	.969	16

As shown in the table above, the DL variable results in Alpha Cronbach's score of α 0.96 > 0.7, and the score for the DTE variable is α 0.98 > 0.7, which indicates that both research variables possess very high reliability.

2. Data Normality Testing

The Kolmogorov-Smirnov test was utilized on one sample with a variable list test of Unstandardized Residual to test the data normality. The following table will show the result:

Table 3. Kolmogorov-Smirnov Normality Test

		Unstandardized Residual
N		92
Normal Parameters A,b	Mean	.0000000
	Std. Deviation	9.16764256
Most Extreme Differences	Absolute	.115
	Positive	.115
	Negative	-.103
Kolmogorov-Smirnov Z		1.102
Asymp. Sig. (2-tailed)		.176

a. Test distribution is Normal.
b. Calculated from data.

Referring to the table above, Kolmogorov-Smirnov Z obtained a significance value of 0.176 > 0.05, suggesting the data were normally administered. Consequently, considering the normality test result, the linearity test can be conducted in the next step.

3. Linearity Testing

ANOVA table was applied for linearity testing of the digital transformation of the education and digital leadership variables. The result of the test is shown in the following table:

Table 4. Linearity Testing on Digital Transformation of Education toward Digital Leadership

ANOVA Table							
			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Y * X	Between Groups	(Combined)	13206.561	31	426.018	5,801	.000
		Linearity	9965.094	1	9965.094	135.681	.000
		Deviation from Linearity	3241.467	30	108.049	1.471	.102
	Within Groups		4406.689	60	73.445		
	Total		17613.250	91			

Based on the result of deviation from linearity as shown in Table 4, it is obtained the significance value 0.102 > 0.05, likewise on the degree of freedom (df = n-k; 92-2 = 90), with a fault rate of 5%, it results in t_{count} 1.47 < t_{table} 1.662, implying linearity between data of digital transformation of education and digital leadership.

4. Hypothesis Testing

The components of the data analysis requirements are carried out after all prerequisite tests are met. Afterward, hypothesis testing was carried out by using SPSS version 20. The result of simple linear regression is displayed in the table below:

Table 5. Correlation Score of Product Moment Measures of Association

	R	R Squared	Eta	Eta Squared
Y * X	.752	.566	.866	.750

As seen in Table 5, the R-value is obtained at 0,752 with a determinant score of 0,566. The magnitude of the influence of digital leadership on the digital transformation of education is 56.6%, and the other 43.4% was affected by different factors. Then, the result of hypothesis testing using simple linear correlation is shown in the table below. The table below also displays the result of significance testing using a T-test as the following:

Table 6. T-test on variable DL toward DTE

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	19.700	4.495		4.383	.000
	DL	.713	.066	.752	10.829	.000

a. Dependent Variable: DTE

Based on Table 6, it is obtained sig. 0,000 < 0, 005, indicating a positive and significant effect. It confirms digital leadership's positive and significant influence on education digital transformation.

E. Discussion

The hypothesis testing result has confirmed that digital leadership has positively and significantly impacted education digital transformation, about 56.6%, and the other 43.4% are affected by different factors. Previous research approves this

finding. Especially in learning, as the trigger of digital transformation can be conducted through training and innovations (Oliveri et al., 2023). Digital leadership contributes to growing group cooperation, responsibility, and fair distribution of workload, primarily through vertical e-leadership in independent learning skills (Yilmaz et al., 2020a).

This condition is crucial for school principals to conduct in the reinforcement of qualified learning in the digital era. For that reason, teacher competence in this global era has become a vital element in enhancing the quality of learning, which correlates positively and significantly to teacher learning skills in the 21st century (Tican & Deniz, 2019). Besides, digital leadership encourages teacher performance (Kousar et al., 2022). Digital leadership improves teacher competence in era 4.0 (Zamroni et al., 2023). This issue is essential, considering that digital leadership retains positive impacts on creativity, employee job suitability, employee diligence, and workload (Zhu et al., 2022). Furthermore, digital leadership increases communication effectiveness and interpersonal trust (Kashive et al., 2022) in digital education management and has become urgently needed in the global change era.

The educational institution must take precautions against information threats, including network, network resources, and periodic training for education personnel to boost the Reliability of Digital Information Systems (Gapsalamov et al., 2020). Education programs must apply digital principles within instructional leadership that support online learning, proactive engagement, and virtual school management (Nurabadi et al., 2022). Digitalization has become necessary in education and student attraction, followed by the fulfillment of learning materials and training for strengthening commitment through technology development determined by digital transformation (Abad-Segura et al., 2020). Digitalization is the answer to education transformation in digital, along with the challenges.

The challenge of digital transformation in terms of the impact of digital learning is to adopt constructivist learning to minimize the negative effects of digital technology developments. Educational institutions in the learning process need to carry out digital transformation according to current demands and developments (Akour & Alenezi, 2022). This condition can be achieved by changing the ecosystem and the level of student skills by optimizing resources, financial support, and the role of society to make it more effective (Dzerve et al., 2023).

The contribution of this research's results helps clarify the concept of digital leadership and how its implementation can influence the digital transformation process in education. This provides a strong theoretical basis for further research (Kahai et al., 2017). These findings provide practical guidance for leaders and decision-makers in the education sector to adopt and develop digital leadership competencies. As a result, in the institutions they lead, they can be more successful in implementing digital change (Chen, 2023)

By highlighting the importance of digital leadership, this research supports efforts to improve the quality of education through digital transformation. Effective leadership can accelerate technology adoption, enhance learning, and improve educational outcomes (Liu et al., 2022). Digital transformation's success depends not only on the technology used but also on leadership that can inspire and empower all educational stakeholders, including teachers, students, and parents (Harish et al., 2023). A foundation upon which policymakers can build plans and regulations to encourage the digital transformation of the education industry. Evidence-based

policies like this can increase the effectiveness and efficiency of implementing digital programs in schools and other educational institutions (Tang et al., 2020).

F. Conclusion

Based on the results of hypothesis testing, it was concluded that digital leadership had a positive and very significant influence on the digital transformation of education. Digital leadership is a determining factor in educational transformation. Real action is needed through multi-directional communication, high enthusiasm for seeking information, and support from all school members in digital transformation. How education is transformed helps students develop digital behaviors as members of a digital generation that favors digital learning in line with current trends and demands. Future research prospects can be created through the factors that determine the success of digital transformation, such as increasing the digital competency of teachers and education personnel and changing the educational digital ecosystem effectively and efficiently.

References

Abad-Segura, E., González-Zamar, M.-D., Infante-Moro, J. C., & Ruipérez García, G. (2020). Sustainable Management of Digital Transformation in Higher Education: Global Research Trends. *Sustainability*, *12*(5), Article 5. https://doi.org/10.3390/su12052107

Abdurrahman, A., Idie, D., Songbes, A. M. H., Arrang, R., Wahyudi, M., & Manuhut, M. A. (2024). Peran Teknologi dalam Transformasi Pendidikan: Perspektif dari Studi Kepustakaan. *Journal on Education*, *6*(2), Article 2. https://doi.org/10.31004/joe.v6i2.4932

Aboobaker, N., & KA, Z. (2021). Digital learning orientation and innovative behavior in the higher education sector: Effects of organizational learning culture and readiness for change. *International Journal of Educational Management*, *35*(5), 1030–1047. https://doi.org/10.1108/IJEM-09-2019-0345

Adeyemo, K. S. (2023). The Status of Digital Innovation and Data Security in South African Higher Education. *South African Journal of Higher Education*, *37*(2), 26–39. https://doi.org/10.20853/37-2-5001

Akour, M., & Alenezi, M. (2022). Higher Education Future in the Era of Digital Transformation. *Education Sciences*, *12*(11), Article 11. https://doi.org/10.3390/educsci12110784

AlNuaimi, B., Singh, S., Ren, S., Budhwar, P., & ... (2022). Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *Journal of Business …*, *Query date: 2023-04-30 06:06:19*. https://www.sciencedirect.com/science/article/pii/S0148296322002727

Antón-Sancho, Á., Vergara, D., Lamas-Álvarez, V. E., & Fernández-Arias, P. (2021). Digital Content Creation Tools: American University Teachers' Perception. *Applied Sciences*, *11*(24), Article 24. https://doi.org/10.3390/app112411649

Bounfour, A., Housel, T., Silkey, T., & Nonnis, A. (2023). Digital transformation and strategic agility during the COVID-19 crisis: The role of the intangible capital

conversion. *Digital Transformation and Society*, *2*(3), 257–275. https://doi.org/10.1108/DTS-09-2022-0048

Brunetti, F., Matt, D. T., Bonfanti, A., De, L. A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: Strategies emerging from a multi-stakeholder approach. *The TQM Journal*, *32*(4), 697–724. https://doi.org/10.1108/TQM-12-2019-0309

Chen, Y. (2023). How do religious and political beliefs predict COVID-19 vaccination behavior among US college students? A study using the health belief model. *American Journal of Health Promotion*, *Query date: 2024-06-09 20:54:10*. https://doi.org/10.1177/08901171231160666

Chwen-Li, C., Arisanti, I., Octoyuda, E., & Insan, I. (2022a). E-Leadership Analysis during Pandemic Outbreak to Enhanced Learning in Higher Education. *TEM Journal*, *Query date: 2023-04-30 06:13:04*. https://www.ceeol.com/search/article-detail?id=1046603

Dzerve, B., Spilbergs, A., Innuse, G., Ozolina, S., Stonane, A., & Maditinos, D. (2023). A Shift in Paradigm: The Financial Education Under the Influence of Digital Transformation. In S. Grima, E. Thalassinos, M. Cristea, M. Kadłubek, D. Maditinos, & L. Peiseniece (Eds.), *Digital Transformation, Strategic Resilience, Cyber Security and Risk Management* (Vol. 111A, pp. 61–82). Emerald Publishing Limited. https://doi.org/10.1108/S1569-37592023000111A005.

Ehlers, U.-D. (2020). Digital leadership in higher education. *Journal of Higher Education Policy and Leadership Studies*, *1*(3), 6–14.

Fernandez-Vidal, J., Antonio Perotti, F., Gonzalez, R., & Gasco, J. (2022). Managing digital transformation: The view from the top ----. *Journal of Business Research*, *152*, 29–41. https://doi.org/10.1016/j.jbusres.2022.07.020

Gapsalamov, A. R., Akhmetshin, E. M., Sharipov, R. R., Vasilev, V. L., & Bochkareva, T. N. (2020). Approaches to Information Security in Educational Processes in the Context of Digitalization. *TEM Journal*, 708–715. https://doi.org/10.18421/TEM92-38

Gertzen, W. M., van, der L. E., & Steyn, H. (2022). Goals and benefits of digital transformation projects: Insights into project selection criteria. *South African Journal of Economic and Management Sciences*, *25*(1), 4158. https://doi.org/10.4102/sajems.v25i1.4158

Gilli, K., Nippa, M., & Knappstein, M. (2023). Leadership competencies for digital transformation: An exploratory content analysis of job advertisements. *German Journal of Human Resource Management: Zeitschrift Für Personalforschung*, *37*(1), 50–75. https://doi.org/10.1177/23970022221087252

Hanandeh, A., Altaher, A. M., Halim, M., Rezk, W., Mahfoudh, N., Hammouri, Q., & Darawsheh, S. R. (2023). The effects of digital transformation, digital leadership, and entrepreneurial motivation on business decision making and business process performance: Evidence from greater Amman municipality. *International Journal of Data and Network Science*, *7*(2), 575–582. https://doi.org/10.5267/j.ijdns.2023.3.014

Harish, V., Mansurali, A., & Krishnaveni, D. (2023). Digital Transformation for Business: Enablers, Framework and Challenges. In A. Saini & V. Garg (Eds.), *Transformation*

for Sustainable Business and Management Practices: Exploring the Spectrum of Industry 5.0 (pp. 203–218). Emerald Publishing Limited. https://doi.org/10.1108/978-1-80262-277-520231015

Hizir, Z. (2022). Digital transformation: "Jobocolypse" or empowerment? *Strategic HR Review*, *21*(1), 6–9. https://doi.org/10.1108/SHR-10-2021-0047

Huda, M. (2023). Between accessibility and adaptability of digital platform: Investigating learners' perspectives on digital learning infrastructure. *Higher Education, Skills and Work-Based Learning*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/HESWBL-03-2022-0069

Huong, P. T., & Duc, N. L. (2023). The Perceptions of Prospective Digital Transformation Adopters: An Extended Diffusion of Innovations Theory. *TEM Journal*, 459–469. https://doi.org/10.18421/TEM121-56

Javed, F. (2023). Transformative Learning Strategies for Successful Teaching and Learning in the Transforming Higher Education. In M. D. Lytras (Ed.), *Active and Transformative Learning in STEAM Disciplines* (pp. 125–152). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83753-618-420231007.

Jogezai, N. A., Ismail, S. A. M. M., & Baloch, F. A. (2022). Head teachers' change facilitation styles and teachers' concerns about ICT integration. *Management in Education*, *36*(2), 82–93. https://doi.org/10.1177/0892020620932365

Kahai, S., Avolio, B. J., & Sosik, J. J. (2017). E-Leadership. In *The Wiley Blackwell Handbook of the Psychology of the Internet at Work* (pp. 285–314). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119256151.ch14

Kashif, M., & Ali, M. (2019). E-Leadership: Secondary school heads and contemporary needs. *International Journal of Distance Education …*, *Query date: 2023-04-30 06:13:04*. http://irigs.iiu.edu.pk:64447/ojs/index.php/IJDEEL/article/view/575

Kokot, K., Đunđek Kokotec, I., & Klačmer Čalopa, M. (2023). Digital Leadership and Maturity as a Key to Successful Digital Transformation: Country Case Study of Croatia. *TEM Journal*, 192–199. https://doi.org/10.18421/TEM121-25

Kousar, N., Kanwal, W., Mehmood, K., Bibi, S., & ... (2022). Effect of E-Leadership Practices on the Performance of Teachers. *Journal of Management …*, *Query date: 2023-04-29 19:49:49*. http://www.global-jws.com/ojs/index.php/global-jws/article/view/135.

Kashive, N, V. Khanna, and L. Powale, "Virtual team performance: E-leadership roles in the era of COVID-19," J. Manag. …, no. Query date: 2023-04-29 19:49:49, 2022, doi: 10.1108/JMD-05-2021-0151.

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3), 21582440211047576. https://doi.org/10.1177/21582440211047576

Liu, C., Ready, D., Roman, A., Wart, M. V., & ... (2018). E-leadership: An empirical study of organizational leaders' virtual communication adoption. *… Development Journal*, *Query date: 2023-04-29 19:49:49*. https://doi.org/10.1108/LODJ-10-2017-0297

Liu, M., Gorgievski, M. J., Qi, J., & Paas, F. (2022). Increasing teaching effectiveness in entrepreneurship education: Course characteristics and student needs differences.

Learning and Individual Differences, *96*, 102147. https://doi.org/10.1016/j.lindif.2022.102147

Lorentzen, A.-C. R. (2022). Digital transformation as distributed leadership: Firing the change agent. *Procedia Computer Science*, *196*, 245–254. https://doi.org/10.1016/j.procs.2021.12.011

Lukita, C., Christina, S., Pranata, S., & Supriyadi, A. (2022). Peningkatan kapasitas mahasiswa dalam menghadapi peluang dan tantangan di era transformasi digital society 5.0. *Jurnal Abdi Insani*, *9*(3), Article 3. https://doi.org/10.29303/abdiinsani.v9i3.685

Mutohhari, F., Nur, H. R., Nurtanto, M., Nurhaji, S., & Fawaid, M. (2022). Analisis kebutuhan diklat teknologi digital guru SMK otomotif menggunakan linear reggresion. *Vocational Education National Seminar (VENS)*, *1*(1).

Niţă, V., & Guţu, I, (2023). The Role of Leadership and Digital Transformation in Higher Education Students' Work Engagement. *International Journal of Environmental Research and …*, *Query date: 2023-04-30 06:13:04*. https://www.mdpi.com/1660-4601/20/6/5124

Nurabadi, A., Suhariadi, F., Mardiyanta, A., Triwiyanto, T., & Adha, M. A. (2022). Digital principal instructional leadership in new normal era. *International Journal of Evaluation and Research in Education (IJERE)*, *11*(3), Article 3. https://doi.org/10.11591/ijere.v11i3.22483

Olanipekun, A. O., & Sutrisna, M. (2021). Facilitating Digital Transformation in Construction—A Systematic Review of the Current State of the Art. *Frontiers in Built Environment*, *7*, 660758. https://doi.org/10.3389/fbuil.2021.660758

Oliveri, L. M., Chiacchio, F., D'Urso, D., Munnia, A., & Russo, F. (2023). Successful digital transformations enabled by technologies or by open mind? Italian case studies. *Procedia Computer Science*, *217*, 1066–1075. https://doi.org/10.1016/j.procs.2022.12.305

Philip, J., & Aguilar, M. G. (2022). Student perceptions of leadership skills necessary for digital transformation. *Journal of Education for Business*, *Query date: 2023-04-29 19:49:49*. https://doi.org/10.1080/08832323.2021.1890540

Raza, K., & Palle, S. M. (2023). *Digital Leadership Capabilities for successful Digital Transformation- Cultural perspective: How do digital leaders' experiences and perspectives on the capabilities needed for successful digital transformation in tech firms differ across different cultural contexts?* https://urn.kb.se/resolve?urn=urn:nbn:se:hj:diva-61752

Reuter, A., Scharf, T., & Smeddinck, J. (2021). Content Creation in Later Life: Reconsidering Older Adults' Digital Participation and Inclusion. *Proceedings of the ACM on Human-Computer Interaction*, *4*(CSCW3), 257:1-257:23. https://doi.org/10.1145/3434166

Ridwan & Sunarto. (2009). *Pengantar Statistika Pendidikan, Sosial, Ekonomi, Komunikasi dan Bisnis* (2009th ed.). ALFABETA.

Salim, E., Zefriyenni, Z., & Wahana, S. (2020). Pengaruh promosi, komunikasi dan kepercayaan terhadap pengambilan keputusan dalam menjalankan e-commerce networking bussiness di kota padang (study kasus mahasiswa fakultas ekonomi

dan bisnis jurusan manajemen universitas putra indonesia yptk padang. *Jurnal Ekobistek*, *9*(1).

Saputra, N., & Nugroho, R. (2021). Pengaruh Digital Leadership dan Digital Collaboration terhadap Digital Skill Semasa COVID-19. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, *7*(3), 977. https://doi.org/10.37905/aksara.7.3.977-986.2021

Schaft, A. H. T. V. D., Lub, X. D., Heijden, B. V. D., & Solinger, O. N. (2022). How Employees Experience Digital Transformation: A Dynamic And Multi-Layered Sensemaking Perspective. *Journal of Hospitality & Tourism Research*, 109634802211230. https://doi.org/10.1177/10963480221123098

Sheninger, E., *Digital leadership: Changing paradigms for changing times*, Second edition. California: Corwin Press, 2019. Accessed: Oct. 17, 2023

Sreenivasan, A., & Suresh, M. (2023). Digital transformation in start-ups: A bibliometric analysis. *Digital Transformation and Society*, *2*(3), 276–292. https://doi.org/10.1108/DTS-12-2022-0072

Sugiono. (2013). *Metode Penelitian Pendidikan Pendekatan Kuantitatiff, Kualitatif dan R & D* (2012th ed., Vol. 2012, pp. 117–259). ALFABETA.

Sujarweni, (2015). *SPSS untuk Penelitian* (2015th ed.). Pusaka Baru Press.

Sulaiman, J., & Ismail, S. N. (2020). Teacher competence and 21st century skills in transformation schools 2025 (TS25). *Universal Journal of Educational Research*, *8*(8), 3536–3544.

Susilawati, S., & Windijanto. (2021). Transforming the digital leadership to improve public service performance in the COVID-19 outbreak. *Economic Annals-XXI*. http://ea21journal.world/index.php/ea-v188-04/

Syam, R., Ras, A., & Habibie, A. Y. (2023). Kesiapan dan kendala transformasi birokrasi digital di pedesaan: Readiness and obstacles of digital bureaucracy transformation in rural areas. *Jurnal Sosiologi Nusantara*, *9*(1), Article 1. https://doi.org/10.33369/jsn.9.1.1-18

Tang, G., Chen, Y., Knippenberg, D. van, & ... (2020). Antecedents and consequences of empowering leadership: Leader power distance, leader perception of team capability, and team innovation. *Journal of …*, *Query date: 2023-01-14 19:50:06*. https://doi.org/10.1002/job.2449

Taufikurrahman, T. (2021). Kepemimpinan kepala sekolah di era digital. *Proceeding: Islamic University of Kalimantan*, *0*, Article 0. https://doi.org/10.31602/.v0i0.4713

Thi, H. P., Tran, Q. N., La, L. G., Doan, H. M., & Vu, T. D. (2022). Factors motivating students' intention to accept online learning in emerging countries: The case study of Vietnam. Journal of Applied Research in Higher Education, 15(2), 324–341. https://doi.org/10.1108/JARHE-05-2021-0191.

Tican, C., & Deniz, S, (2019). Pre-service teachers' opinions about the use of 21st century learner and 21st century teacher skills. *European Journal of Educational Research*, *8*(1), 181–197.

Tulungen, E. E. W., Saerang, D. P. E., & Maramis, J. B. (2022). Transformasi digital: Peran kepemimpinan digital. *Jurnal EMBA : Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, *10*(2). https://doi.org/10.35794/emba.v10i2.41399.

Wahana, K. (2009). *Panduan Praktis SPSS 2017 untuk Pengolahan Data Statistik* (2009th ed.). Andi Offset.

Wahyuni, I. (2022). Transformasi Digital Melalui Teknologi Informasi: Adaptasi Peran Guru Perempuan Sekolah Dasar Pada Masa Pandemi. *SITTAH: Journal of Primary Education*, *3*(2), 133–144. https://jurnalfaktarbiyah.iainkediri.ac.id/index.php/sittah/article/view/566

Weber, E., Krehl, E.-H., & Büttgen, M. (2022). The Digital Transformation Leadership Framework: Conceptual and Empirical Insights into Leadership Roles in Technology-Driven Business Environments. *Journal of Leadership Studies*, *16*(1), 6–22. https://doi.org/10.1002/jls.21810

Wu, W.-C. V., Manabe, K., Marek, M. W., & Shu, Y. (2023). Enhancing 21st-century competencies via virtual reality digital content creation. *Journal of Research on Technology in Education*, *55*(3), 388–410. https://doi.org/10.1080/15391523.2021.1962455

Wujarso, R., Pitoyo, B. S., & Prakoso, R. (2023). Peran Kepemimpinan Digital Dalam Era Digital. *JISAMAR (Journal of Information System, Applied, Management, Accounting and Research)*, *7*(1), Article 1. https://doi.org/10.52362/jisamar.v7i1.720

Yao, Q., Tang, H., Liu, Y., & Boadu, F. (2023). The penetration effect of digital leadership on digital transformation: The role of digital strategy consensus and diversity types. *Journal of Enterprise Information Management*. https://doi.org/10.1108/JEIM-09-2022-0350

Yilmaz, R., Yilmaz, F. K., & Keser, H. (2020). Vertical versus shared e-leadership approach in online project-based learning: A comparison of self-regulated learning skills, motivation and group collaboration …. *Journal of Computing in Higher …*, *Query date: 2023-04-29 19:49:49*. https://doi.org/10.1007/s12528-020-09250-2

Yuting, Z., Adams, D., & Lee, K. C. S. (2022). A systematic review of E-leadership and its effects on student learning in higher education. *Management in Education*, 08920206221111668.

Zamroni, Z., Baharun, H., Wahid, A. H., Muali, C., & Fitriyah Sumarhum, S. M. (2023). The Effect of Total Quality Service with E-Bekal on Customer Satisfaction. *TEM Journal*, 351–356. https://doi.org/10.18421/TEM121-44

Zhang, C., Chen, P., & Hao, Y. (2022). The impact of digital transformation on corporate sustainability- new evidence from Chinese listed companies. *Frontiers in Environmental Science*, *10*, 1047418. https://doi.org/10.3389/fenvs.2022.1047418

Zhu, J., Zhang, B., Xie, M., & Cao, Q. (2022). Digital Leadership and Employee Creativity: The Role of Employee Job Crafting and Person-Organization Fit. *Frontiers in Psychology*, *13*, 827057. https://doi.org/10.3389/fpsyg.2022.827057

Zulu, S. L., Saad, A., Ajayi, S., & Unuigbe, M. (2023). Determinants of an effective digital transformation in construction organisations: A qualitative investigation. *Built Environment Project and Asset Management*, *13*(6), 896–912. https://doi.org/10.1108/BEPAM-02-2023-0045.