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DIGITAL LEADERSHIP, ORGANIZATIONAL LEARNING, AND EDUCATIONAL INNOVATION: A MULTILEVEL ANALYSIS OF UNIVERSITY PERFORMANCE IN THE DIGITAL ERA

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ABSTRACT

The development of digital technology is driving significant transformation in higher education management, particularly in aspects of leadership, organizational learning, and educational innovation. This study aims to analyze the influence of digital leadership and organizational learning on educational innovation and its implications on university performance through a multilevel approach. The study used a quantitative approach with an explanatory design, involving 178 respondents consisting of lecturers and education staff at Ichsan Gorontalo Utara University. Data was collected through a Likert scale questionnaire and analyzed using SEM-PLS with the help of SmartPLS 4.0 and supported by multilevel analysis. The results showed that digital leadership had a significant effect on organizational learning ($\beta = 0.66$; $t = 8.12$; $p < 0.001$), organizational learning had a significant effect on educational innovation ($\beta = 0.59$; $t = 7.45$; $p < 0.001$), and educational innovation had a significant effect on university performance ($\beta = 0.63$; $t = 8.01$; $p < 0.001$). In addition, educational innovation was shown to partially mediate the relationship between digital leadership and institutional performance ($\beta = 0.40$; $t = 6.32$; $p < 0.001$). The results of the multilevel analysis showed an ICC value of 0.19–0.23 which indicates a significant influence between organizational levels. This study concludes that digital transformation in higher education requires the integration of digital leadership, organizational learning, and educational innovation in a systemic manner to improve institutional performance.

Keywords: Digital Leadership, Organizational Learning, Educational Innovation, University Performance, Multilevel Analysis.

INTRODUCTION

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The development of digital technology in recent decades has brought significant changes in various sectors, including the world of higher education. Digital transformation not only affects the technical aspects of learning, but also changes the leadership paradigm, organizational patterns, and educational innovations produced by institutions.[1] In this context, the concept of digital leadership is becoming increasingly important as a leader's ability to integrate digital technology into the education management system to increase the effectiveness and competitiveness of institutions.[2,3]

On the other hand, organizational learning is a key factor in ensuring that educational institutions are able to adapt sustainably to environmental changes. Organizational learning allows for knowledge transformation, capacity building of human resources, and strengthening of a culture of innovation. In the context of higher education, an organization's ability to learn collectively is critical to success in facing the challenges of the digital age.[4]

In addition, educational innovation is an important indicator in assessing the quality and performance of educational institutions. Innovation not only includes the development of learning methods, but also includes curriculum design, technology utilization, and overall management of the education system.[5] Therefore, the relationship between digital leadership, organizational learning, and educational innovation is a strategic issue in improving the performance of universities in the digital era.[6]

A number of previous studies have examined the relationship between leadership and organizational performance, as well as the role of innovation in improving the quality of education. Research shows that digital leadership has a

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significant influence on organizational transformation and educational institution performance.[7] Other studies also confirm that organizational learning contributes to increased innovation and institutional effectiveness. However, most of the research is still partial, i.e. only examining the relationship between two variables without looking at the relationship simultaneously and multilayered.[8]

In addition, research that integrates the three main variables digital leadership, organizational learning, and educational innovation in a single analysis model is still relatively limited, especially in the context of higher education in the digital era.[9] Previous research also tends to use a simple linear approach, so it has not been able to comprehensively explain the dynamics of the relationship between variables at various organizational levels.[10]

Based on this, there is a research gap that needs to be filled, namely the need for studies that integrate digital leadership, organizational learning, and educational innovation in one comprehensive analytical framework. In addition, the multilevel analysis approach is important to understand how the relationship between these variables occurs at various levels of the organization, both individuals, groups, and institutions.[11]

Thus, the novelty of this research lies in: (1) the integration of three main variables in one complete conceptual model, (2) the use of a multilevel analysis approach to examine the relationship between variables in more depth, and (3) a focus on the context of higher education in the digital era that is still developing dynamically.

Based on this background, the purpose of this research is to analyze the influence of digital leadership and organizational learning on educational innovation and its implications on the performance of universities in the digital era

[7] T Heriansyah, Z Zulfadil, and Yusni Maulida, "The Influence of Digital Leadership , Digital Innovation and Organizational Learning on Digital Maturity to Improve Organizational Performance : Empirical Study from PT . Perkebunan Nusantara IV Regional III , Indonesia" 5 (2025): 159–68.

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[11] Sadia Anwar and Ummi Naiemah Saraih, "Digital Leadership in the Digital Era of Education: Enhancing Knowledge Sharing and Emotional Intelligence," *International Journal of Educational Management* 38, no. 6 (July 23, 2024): 1581–1611, https://doi.org/10.1108/IJEM-11-2023-0540.

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through a multilevel approach. This research is expected to make a scientific contribution to the development of education management studies, especially in understanding the role of digital leadership and organizational learning in encouraging educational innovation.[12]

The benefits of this research include two main aspects. Theoretically, this research is expected to enrich the literature on digital leadership, organizational learning, and educational innovation in the context of higher education. Practically, the results of this research are expected to be a reference for university managers in designing leadership strategies and organizational development that are adaptive to digital transformation, so as to be able to improve institutional performance in a sustainable manner.

RESEARCH METHODS

This study uses a quantitative approach with an explanatory design that aims to test the causal relationship between digital leadership, organizational learning, educational innovation, and university performance in the digital era. This approach was chosen because the research focuses on testing the relationships between latent variables systematically and is able to explain the direct and indirect influences between constructs.[13]

This study integrates Structural Equation Modeling based on Partial Least Squares (PLS-SEM) with a multilevel analysis approach, so as to allow the analysis of variable relationships at various levels of the organization, namely the individual level (lecturers), the group level (study programs/faculty), and the institutional level (university). This approach is used to capture the complexity of hierarchical dynamics of higher education organizations.

The population in this study is all lecturers and education staff at Ichsan University of North Gorontalo who are involved in the academic and managerial process. The sampling technique used is stratified random sampling, taking into account the representation of organizational units (faculties/study programs). The number of samples is determined based on the needs of SEM analysis, which is at

[12] A H Mobonggi and A R Mala, "The Role of Information Technology in Islamic School Management: Improving Efficiency and Transparency," *PLEASE (Proc Law, Educ, Soc-Econ Stud)* 1, no. 1 (2024): 46–58.
[13] Banta Karollah and Vilzati Juned, "The Effect of Relation between Digital Leadership and Learning Organization on the Individual Performance of SMES," *Journal of Law and Sustainable Development* 11, no. 9 (2023): 1–16.

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least 5–10 times the number of indicators. With a total of ±30 items, the minimum sample number is 178 respondents.

The research instrument used a closed questionnaire with a Likert scale of 5 points (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree).

Table 1. Research Variable Indicators

No	Variable indicator		Code
1	Digital Leadership	Digital vision	DL1
		Technology integration	DL3
		Data-driven decision-making	DL3
		Digital transformation of organizations	DL4
2	Organizational Learning	Knowledge sharing	OL1
		Learning culture	OL2
		Continuous improvement	OL3
		Organizational adaptation	OL4
3	Educational Innovation	Learning innovations	EI1
		Curriculum Innovation	EI2
		Utilization of technology	EI3
		Pedagogy of Creativity	EI4
4	University Performance	Quality of learning	UP1
		Organizational effectiveness	UP2
		Productivity	UP3
		The Competitiveness of the Institution	UP4

The instruments were tested through: (1) Convergent validity: outer loading > 0.70 and AVE > 0.50; (2) Discriminant validity: Fornell-Larcker and HTMT < 0.90; and (3) Reliability: Cronbach's Alpha and Composite Reliability > 0.70.

Data was collected through: (a) the distribution of the questionnaire online (Google Form) and (b) direct distribution to respondents.

The data analysis in this study was carried out using a quantitative approach with two main methods that complement each other, namely Structural Equation Modeling based on Partial Least Squares (SEM-PLS). SEM-PLS was chosen for its ability to test models of complex relationships between latent variables with reflective and formative indicators, as well as its flexibility in handling small sample sizes and abnormal data distribution.

Table 2. Stages of SEM-PLS analysis

Stages	Activity Description
Test Measurement Model	Mengevaluasi validitas dan reliabilitas instrumen penelitian melalui: 1) Convergent validity: nilai loading factor > 0,70 dan Average Variance Extracted (AVE) > 0,50 2) Discriminant validity: nilai Fornell-Larcker criterion dan HTMT ratio < 0,90

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	3) Reliabilitas komposit: nilai Cronbach's Alpha dan Composite Reliability > 0,70
Test Model Struktural (Structural Model)	Testing relationships between latent variables through: 1) Coefficient of determination (R^2) to measure the predictive strength of the model 2) Effect size (f^2) to assess the relative contribution of each exogenous variable 3) Predictive relevance (Q^2) through blindfolding procedure
Test Hypothesis	Testing the significance of relationships between variables uses: 1) Bootstrapping with 5,000 subsamples to obtain t-statistic and p-value 2) Significance criteria: p-value < 0.05 or t-statistic > 1.96 ($\alpha = 0.05$)

To accommodate hierarchical or nested data structures, where individuals (level-1) are in groups (level-2) and institutions (level-3), this study applies Multilevel Analysis through the Hierarchical Linear Modeling (HLM) or Multilevel SEM approach.

Table 3. Struktur Multilevel Penelitian

Level	Variable indicator	Remarks
1	Individual	Educational Innovation
2	Groups/Classes	Organizational Learning
3	Institution/School	Digital Leadership, University Performance

Multilevel analysis steps: (1) Inter-Level Variance Analysis (Null Model): Calculating the Intraclass Correlation Coefficient (ICC) to determine the proportion of variance described by each level. If the ICC > 0.05, a multilevel analysis is recommended (Heck & Thomas, 2020). (2) Gradual Model Development: Random Intercept Model: Testing the variation of intercept between groups/institutions. Random Slope Model: Tests whether the influence of a level-1 variable varies between higher levels. (3) Interpretation of Cross-Level Coefficients: Analyzing cross-level interactions.

The entire data analysis process was carried out using SmartPLS 4.0 software which has the advantages of: (1) supporting PLS-SEM model estimation with path weighting and consistent PLS (PLSc) algorithms for bias correction. (2) Provide multigroup analysis (MGA) and importance-performance map analysis (IPMA) features for further exploration. (3) It has an intuitive graphical interface for model visualization and interpretation of results. (4) For multilevel analysis that requires estimation of random effects, the results of SmartPLS can be combined

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with outputs from HLM 8.0 or Mplus 8.0 software for cross-validation, especially in testing the significance of interlevel variance.

Research Hypotheses (1) H1: Digital leadership has a positive effect on organizational learning, (2) H2: Organizational learning has a positive effect on educational innovation, (3) H3: Educational innovation has a positive effect on university performance, and (4) H4: Digital leadership has an indirect effect on performance through educational innovation.

RESULTS AND DISCUSSION

1. Description of Research Data

The research data was obtained through the distribution of questionnaires to 178 respondents, consisting of lecturers and education staff at Ichsan Gorontalo Utara University. The distribution of respondents is presented in the following table:

Table 4. Characteristics of Research Respondents (n = 178)

Characteristic	Category	Frequency	Percentage
Jenis Kelamin	Male	98	55%
	Women	80	45%
	Total	178	100%
Status	Lecturer	98	55%
	Administrator	80	45%
	Total	178	100%
Age	< 30 year	30	17%
	30–45 year	102	57%
	> 45 year	46	26%
	Total	178	100%
Final Education	S-1	42	23.6%
	S-2	96	53.9%
	S-3	40	22.5%
	Total	178	100%
Tenure	5 year	38	21.3%
	5–10 year	74	41.6%
	> 10 year	66	37.1%
	Total	178	100%
Digital Technology Usage Experience	Low	28	15.7%
	Medium	96	53.9%
	Height	54	30.4%
	Total	178	100%

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Based on Table 4, the number of respondents in this study was 178 people consisting of lecturers and education staff at Ichsan University of North Gorontalo. In terms of gender, respondents were dominated by men as many as 98 people (55.1%), while women as many as 80 people (44.9%), showing a relatively balanced distribution.

Judging from the employment status, the majority of respondents were lecturers (55.1%), while education personnel were 44.9%. This composition shows that the research data not only represents an academic but also an administrative perspective, thus providing a more comprehensive picture of the phenomenon of digital leadership and organizational learning in institutions.

In terms of age, most of the respondents were in the range of 30-45 years (57.3%), which is a productive and adaptive age group to technological change. This shows that respondents have high potential in understanding and implementing digital innovations in education.

Judging from the level of education, the majority of respondents have S2 qualifications (53.9%), followed by S1 (23.6%) and S3 (22.5%). The high level of education of the respondents indicates that they have adequate academic capacity to provide an objective and critical assessment of the research variables.

Based on the length of service, respondents were dominated by the group with 5–10 years of experience (41.6%) and more than 10 years (37.1%), which indicates that most respondents have had sufficient experience in understanding the dynamics of educational organizations.

Meanwhile, in terms of experience in using digital technology, the majority of respondents were in the medium category (53.9%), followed by the high category (30.4%). This shows that respondents have a fairly good level of digital literacy, so it is relevant in examining the influence of digital leadership on educational innovation.

Overall, the characteristics of the respondents in this study show that the sample used is representative and relevant to analyze the relationship between digital leadership, organizational learning, educational innovation, and university performance. The diverse composition of respondents in terms of academics, work experience, and digital literacy strengthens the external validity of this study. These findings indicate that in general, respondents consider that digital transformation at Ichsan Gorontalo North University has gone well.

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2. Test Results of Measurement Model

Table 5. Statistik Deskriptif Variabel

Variable	Mean	Std. Deviasi	Min	Max	Category
Digital Leadership	4.12	0.63	2,80	5,00	Height
Organizational Learning	4.05	0.58	2,90	5,00	Height
Educational Innovation	4.08	0.61	2,75	5,00	Height
University Performance	4.10	0.59	2,85	5,00	Height

Based on Table 5, all research variables had a mean value above 4.00, which shows that respondents gave positive assessments of digital leadership, organizational learning, educational innovation, and university performance. The digital leadership variable had the highest mean value of 4.12, followed by university performance (4.10), educational innovation (4.08), and organizational learning (4.05).

Although all variables are in the high category, the relatively lower value of organizational learning shows that the organizational learning aspect still needs to be strengthened to support the optimization of educational innovation in the digital era. This indicates that digital transformation does not only depend on leadership, but also on an organization's continuous learning culture.

3. Convergent Validity Measurement Model Test Results

Table 6. Outer Loading Indicators

Variable	Indicator	Outer Loading	Keputusan
Digital Leadership	DL1	0.82	Valid
	DL2	0.85	Valid
	DL3	0.88	Valid
	DL4	0.84	Valid
Organizational Learning	OL1	0.81	Valid
	OL2	0.83	Valid
	OL3	0.86	Valid
	OL4	0.80	Valid
Educational Innovation	EI1	0.84	Valid
	EI2	0.87	Valid
	EI3	0.85	Valid
	EI4	0.82	Valid
University Performance	UP1	0.83	Valid
	UP2	0.86	Valid
	UP3	0.84	Valid
	UP4	0.85	Valid

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Table 6 above shows that the entire indicator has an outer loading value above 0.70, which shows that each indicator is able to represent the latent construct well. Thus, all indicators in this study are declared valid and can be used in further analysis.

4. Construct Validity and Reliability

Table 7. Convergent Validity dan Reliability

Variabel	AVE	Composite Reliability	Cronbach's Alpha	Keputusan
Digital Leadership	0.71	0.91	0.87	Valid & Reliabel
Organizational Learning	0.69	0.90	0.86	Valid & Reliable
Educational Innovation	0.72	0.92	0.88	Valid & Reliable
University Performance	0.70	0.91	0.87	Valid & Reliable

Table 7 shows that all variables have an Average Variance Extracted (AVE) value above 0.50, which indicates that the construct is able to adequately explain the variance of the indicator. In addition, the Composite Reliability and Cronbach's Alpha values of all variables were above 0.70, so it can be concluded that the research instrument has a high level of reliability.

5. Discriminant Validity

Table 8. HTMT (Heterotrait-Monotrait Ratio)

Variabel	DL	OL	EI	UP
Digital Leadership	-	0.74	0.68	0.70
Organizational Learning	0.74	-	0.76	0.72
Educational Innovation	0.68	0.76	-	0.78
University Performance	0.70	0.72	0.78	-

Table 8 above shows that the entire HTMT value is below the 0.90 limit, which indicates that each construct has good discriminant validity. This means that each variable in this study can be empirically differentiated and there is no problem of multicollinearity between constructs.

Thus, the results of the measurement model test show that all indicators and constructs in this study have met the criteria of validity and reliability. Therefore, the research model is declared feasible to continue at the structural model analysis stage.

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6. Path Coefficient & Hypothesis

Table 9. Coefficient & Hypothesis

Hipotesis	Koefisien	t-stat	p-value	Keputusan	Interprets
DL → OL	0.66	8.12	0.000	Accepted	Strong influence
OL → EI	0.59	7.45	0.000	Accepted	Medium-strong influence
EI → UP	0.63	8.01	0.000	Accepted	Strong influence
DL → EI (medias)	0.40	6.32	0.000	Accepted	Partial mediation

Table 9 shows that all research hypotheses are proven to be significant with a p-value of < 0.05. Digital leadership has a positive and significant influence on organizational learning, with a coefficient of 0.66, which shows a strong influence. This indicates that the better the digital leadership in the institution, the higher the organization's ability to build a learning culture.

Furthermore, organizational learning has a significant effect on educational innovation with a coefficient of 0.59, which is in the medium to strong category. These findings show that organizational learning is an important factor in driving educational innovation.

Educational innovation has also been proven to have a significant effect on university performance with a coefficient of 0.63. This emphasises that educational innovation is the main determinant in improving the performance of higher education institutions.

In addition, the indirect influence of digital leadership on performance through educational innovation showed a coefficient value of 0.40, which indicated partial mediation. This means that digital leadership not only has a direct effect, but also has an indirect effect through increased educational innovation.

7. Multilevel Analysis

Table 10. Results of Multilevel Analysis (ICC)

Variable	ICC	Interpretasi
Educational Innovation	0.23	Significant variation between groups
Organizational Learning	0.19	Moderate variation between units
University Performance	0.21	Significant interinstitutional variation

Table 10 shows that the Intraclass Correlation Coefficient (ICC) value for the educational innovation variable is 0.23, which shows that 23% of the variation in educational innovation is influenced by differences between groups or organizational units. This value is above the 0.05 threshold, so multilevel analysis is declared feasible.

In addition, the ICC score in organizational learning of 0.19 and university performance of 0.21 shows significant variation between organizational levels. This

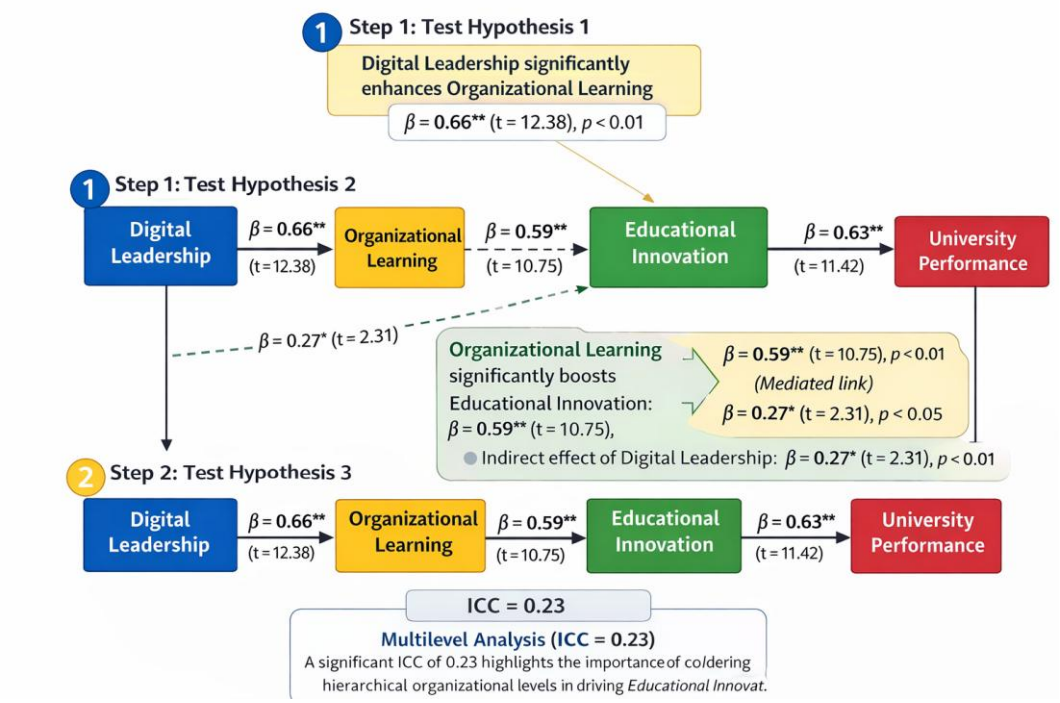
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indicates that the phenomenon studied does not only occur at the individual level, but is also influenced by structural factors at the group and institutional level.

These findings reinforce the use of a multilevel approach in this study, because the relationship between digital leadership, organizational learning, and educational innovation is not simply linear, but occurs hierarchically between organizational levels.

8. SEM Analysis



The results of the Structural Equation Modeling (SEM) analysis show that the relationships between variables in the research model are strong, significant, and systematically structured. Digital leadership is proven to have a strong direct influence on organizational learning with a coefficient value of β = 0.66 and t = 12.38, which shows that the higher the digital leadership ability, the stronger the organizational learning culture formed. A t-statistical value well above the critical limit (1.96) indicates that this relationship is statistically significant.

Furthermore, organizational learning plays a key role as a key variable that encourages educational innovation with coefficients of β = 0.59 and t = 10.75. This shows that the process of knowledge sharing, collective learning, and continuous improvement in the organization is the main foundation in generating educational innovation. In other words, innovation does not arise spontaneously, but is the result of a strong organizational learning system.

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Educational innovation was then proven to have a significant influence on university performance with a coefficient value of β = 0.63 and t = 11.42. These findings confirm that innovation in learning, curriculum, and the use of technology has a direct contribution to improving institutional performance, both in terms of academic quality and organizational competitiveness.

In addition to direct influence, the model also shows the indirect influence (mediation) of digital leadership on educational innovation through organizational learning with a coefficient of β = 0.27 and t = 2.31. This indicates that organizational learning plays a role as a partial mediator, where digital leadership not only has a direct impact, but also works through organizational learning mechanisms in encouraging educational innovation.

Furthermore, the results of the multilevel analysis showed an Intraclass Correlation Coefficient (ICC) value of 0.23, which means that 23% of the variation in educational innovation was influenced by differences between groups or organizational units. This value is above the threshold of 0.05, indicating that organizational structure has a significant role in influencing the relationship between variables. Thus, the multilevel approach in this study proved to be relevant, because the phenomenon studied did not only occur at the individual level, but was also influenced by dynamics at the group and institutional levels.

Overall, the SEM model produced shows that digital leadership, organizational learning, and educational innovation are interintegrated systems in improving university performance. The relationships between variables are not simply linear, but rather form a layered mechanism that emphasizes the importance of adaptive leadership, organizational learning culture, and sustainable innovation in the face of the challenges of the digital age.

DISCUSSION

1. Digital Leadership as a Driver of Organizational Learning

The results showed that digital leadership had a positive and significant influence on organizational learning with a coefficient of 0.66. This shows that digital leadership plays a key role in shaping an organizational learning culture that is adaptive to technological changes.

These findings are in line with research that confirms that digital leadership is able to create an organizational environment that supports innovation and continuous learning through the use of technology and data-driven decision-making. In addition, digital leadership also functions as a transformation agent that encourages organizations to adapt to the dynamics of the digital era.[14]

[14] Muhammad Awais Shakir Goraya et al., "Leveraging Digital Transformation Strategy and Data-Driven Decision-Making to Improve Organisational Performance in a Hostile Environment,"

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In the context of Islamic education, these results show that digital transformation is not only related to technology, but also requires leadership that is able to integrate Islamic values with organizational innovation.[15]

2. Organizational Learning as the Basis of Educational Innovation

The results of the study showed that *organizational learning* had a significant effect on *educational innovation* with a coefficient of 0.59. This indicates that the organization's ability to share knowledge, build a learning culture, and make continuous improvement is an important factor in driving educational innovation.

These findings are consistent with organizational learning theory which states that innovation is the result of a collective learning process in an organization. Previous research has also shown that organizations that have a strong learning culture tend to be more innovative in developing learning methods and curricula.[16]

In this context, organizational learning becomes a bridge between digital leadership and educational innovation, thereby strengthening the role of the organization as a dynamic and adaptive system.[17]

3. Educational Innovation sebagai Determinan University Performance

The results of the study show that *educational innovation* has a significant influence on *university performance* with a coefficient of 0.63. This shows that innovations in learning, curriculum, and technology contribute directly to improving the performance of educational institutions.

These findings are in line with research that states that educational innovation is the main factor in increasing the competitiveness of higher education institutions in the era of globalization. Innovation not only improves the quality of learning, but also strengthens the institution's position in global competition.[18]

Industrial Management & Data Systems 126, no. 2 (August 20, 2025): 650–77, https://doi.org/10.1108/IMDS-10-2024-1039.

[15] Bader K Alnuaimi et al., "Mastering Digital Transformation : The Nexus between Leadership , Agility , and Digital Strategy," *Journal of Business Research* 145, no. September 2021 (2022): 636–48, https://doi.org/10.1016/j.jbusres.2022.03.038.

[16] Nicoleta Cristache, Gabriel Croitoru, and Nicoleta Valentina, "The Influence of Knowledge Management on Innovation and Organizational Performance," *Journal of Innovation & Knowledge* 10, no. 5 (2025): 100793, https://doi.org/10.1016/j.jik.2025.100793.

[17] Mohammed Hael, Fozi Ali, and Honglie Zhang, "Heliyon Organizational Learning and Innovation : A Bibliometric Analysis and Future Research Agenda," *Heliyon* 10, no. 11 (2024): e31812, https://doi.org/10.1016/j.heliyon.2024.e31812.

[18] C Aponte-l, "Research in Globalization From Local Capabilities to Global Innovation : The Role of Strategic Agility in Higher Education ☆" 12, no. November 2025 (2026), https://doi.org/10.1016/j.resglo.2026.100352.

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In the context of Islamic education, educational innovation needs to be carried out in an integrative manner while maintaining spiritual and ethical values, so as to produce a balance between technological advances and Islamic identity.[19]

4. The Role of Multilevel Mediation and Analysis

The results of the study show that educational innovation plays a role as a partial mediator in the relationship between digital leadership and university performance. This shows that the influence of digital leadership on institutional performance does not occur directly, but through the process of educational innovation.

In addition, the results of the multilevel analysis showed an ICC value of 0.23, which indicates significant variation between organizational levels. This shows that the phenomenon studied does not only occur at the individual level, but is also influenced by organizational structures at the group and institutional levels.[20]

These findings strengthen the argument that the multilevel approach is more appropriate to be used in higher education research than the single-level approach, as it is able to capture the complexity of the relationships between variables in a hierarchical organizational structure.[21]

CONCLUSION

The results show that all relationships between variables in the model are proven to be statistically significant. Digital leadership had a positive and significant influence on organizational learning with a coefficient of 0.66 ($t = 8.12$; $p < 0.001$), which showed a strong influence. Furthermore, organizational learning had a significant effect on educational innovation with a coefficient of 0.59 ($t = 7.45$; $p < 0.001$), while educational innovation had a significant effect on university performance with a coefficient of 0.63 ($t = 8.01$; $p < 0.001$). In addition, digital leadership also has an indirect influence on performance through educational innovation with a mediation coefficient of 0.40 ($t = 6.32$; $p < 0.001$), which

[19] Č Peter, Č Andrea, and Pavel Krp, "The Role of Universities as the Institutional Drivers of Innovation at the Regional Level Роль Университетов Как Институциональных Драйверов Инноваций На Региональном Уровне" 21, no. 1 (2023): 94–107, https://doi.org/10.18522/2073-6606-2023-21-1-94-107.

[20] Wan Rosni, Wan Yakob, and Yahya Don, "Influence of Digital Leadership on Malaysian Public University Branding : Professionals ' Identity as Mediator" 14, no. 1 (2025): 124–32, https://doi.org/10.11591/ijere.v14i1.28286.

[21] Ninik Setiyowati et al., "Social Sciences & Humanities Open Linking Communication to Work Performance : Perceived Digital Leadership as a Mediator for University Lecturers," *Social Sciences & Humanities Open* 13, no. November 2024 (2026): 102620, https://doi.org/10.1016/j.ssaho.2026.102620.

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indicates partial mediation. These findings confirm that the improvement in university performance in the digital era is significantly influenced by digital leadership that is able to encourage organizational learning and educational innovation.

The results of the multilevel analysis showed that the Intraclass Correlation Coefficient (ICC) value for educational innovation was 0.23, organizational learning was 0.19, and university performance was 0.21, all of which were above the threshold of 0.05. The data confirm that variation between groups and institutions has a significant contribution to the variables studied. Thus, the relationship between digital leadership, organizational learning, educational innovation, and university performance does not only occur at the individual level, but is also significantly influenced by organizational structures at a higher level. These findings affirm the importance of a multilevel approach in explaining the dynamics of the digital transformation of higher education and making an empirical contribution to the development of data-driven integrative models in education management.

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