

RESEARCH ARTICLE

Javanese work culture enhances teachers' pedagogical competence through the mediation of digital agency in primary schools

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ABSTRACT

Background: Digital transformation has intensified demands on teachers' pedagogical competence. Although schoolwork culture, teacher agency, and pedagogical competence have been widely discussed, these constructs have largely been examined separately. Moreover, local cultural values are often treated as contextual backgrounds rather than empirically tested resources that may shape teachers' adaptive professional capacity. Consequently, limited evidence explains how organisational work culture and local collaborative values jointly relate to pedagogical competence through teachers' Digital-Adaptive Pedagogical Agency.

Purpose: This study aims to analyse the influence of work culture and Javanese collaborative values on pedagogical competence through Digital-Adaptive Pedagogical Agency among elementary school teachers.

Method: The study employed a quantitative approach using Structural Equation Modelling–Partial Least Squares, involving 160 teachers from 15 elementary schools in Jepara Regency, Indonesia.

Findings: Work Culture showed the strongest positive relationship with Digital-Adaptive Pedagogical Agency ($\beta = 0.481$), followed by Javanese Collaborative Values ($\beta = 0.249$). Digital-Adaptive Pedagogical Agency was the strongest direct predictor of Pedagogical Competence ($\beta = 0.425$), while the model explained 57.5% of the variance in Pedagogical Competence. Mediation analysis further showed that Digital-Adaptive Pedagogical Agency significantly mediated the relationships between Work Culture and Pedagogical Competence ($\beta = 0.204$) and between Javanese Collaborative Values and Pedagogical Competence ($\beta = 0.106$). These findings indicate that organisational conditions have a stronger practical association with teachers' adaptive pedagogical capacity than local collaborative values, although both represent relevant contextual resources.

Implication: The findings suggest that efforts to strengthen pedagogical competence should extend beyond technology training by developing collaborative work cultures, reflective professional learning, and culturally responsive forms of teacher collaboration. The study contributes an integrated empirical model that positions Digital-Adaptive Pedagogical Agency as a key mechanism linking organisational and local cultural resources with teachers' pedagogical competence in the context of digital education.

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INTRODUCTION

The digital transformation that has unfolded over the past two decades has fundamentally altered the educational landscape (Timotheou et al., 2023; Tri & Hoang, 2023). Schools are no longer viewed merely as spaces for knowledge transfer but also as spaces for adapting to dynamic technological, social, and cultural changes (Taufikin et al., 2026; Taufikin, Supa'at, Azifah, et al., 2024; Veluri et al., 2025). The emergence of artificial intelligence, digital learning platforms, educational analytics, and the increasing number of students who have grown up as digital natives presents new demands on the teaching profession (Fathima et al., 2026; Kuka et al., 2022). In this context, pedagogical competence is no longer sufficient to be understood merely as the ability to manage learning procedurally; rather, it is increasingly linked to the ability to make pedagogical decisions that are reflective, adaptive, and responsive to changes in the learning environment (Guillén-Gámez et al., 2026; Hektoen, 2025). Various international reports indicate that the quality of 21st-century education is increasingly determined by teachers' capacity to simultaneously integrate technology, pedagogy, and students' learning needs (OECD, 2023; Taufikin, Supa'at, Sharma, et al., 2024; Tondeur et al., 2020). At the same time, many countries still face challenges in ensuring that digital transformation is truly accompanied by improved learning quality at the classroom level. This situation highlights that strengthening teachers' pedagogical competence has become a strategic issue inseparable from the global education transformation agenda.

Attention to pedagogical competence in the digital age has given rise to various theoretical perspectives that seek to explain the factors influencing teachers' professional quality. Social Cognitive Theory, developed by Bandura (1977), explains that professional behaviour is shaped through reciprocal interactions between the individual, the social environment, and learning experiences (Rumjaun & Narod, 2025). This perspective indicates that teachers' professional capacity does not operate in isolation but is influenced by the organisational and social contexts in which they work. This view aligns with Organizational Culture Theory proposed by Schein (Schein, 2016), which positions organisational culture as a system of shared values, norms, and assumptions that influence the behaviour of organisational members. In contemporary educational literature, attention has also increasingly turned to teacher agency, understood as an individual's capacity to make conscious professional decisions in response to changes in the educational environment (Biesta, 2020; Priestley et al., 2015). Together, these perspectives provide a conceptual

foundation for understanding pedagogical competence as associated not only with teachers' individual abilities but also with the interaction between organisational culture, the social environment, and teachers' adaptive capacity in responding to educational change.

Recent studies indicate that schoolwork culture is closely linked to the quality of learning and teacher professionalism. School environments characterised by professional collaboration, open communication, innovation, and continuous learning tend to support more effective pedagogical practices (Nguyen & Ng, 2020; Skaalvik & Skaalvik, 2017; Zhu & Zhai, 2025). At the same time, the rise of digital education has increased attention to teachers' adaptive capacity in managing change. Research by Tondeur et al. (2020) highlights the importance of teachers' ability to integrate technology meaningfully into teaching practices. Meanwhile, Trust et al. (2016) demonstrate that the effectiveness of educational technology use is determined not only by the availability of digital devices but also by teachers' ability to adapt instructional strategies to students' evolving needs. These findings indicate that organisational culture and teachers' adaptive capacity are two critical elements for understanding the quality of learning in the digital age.

On the other hand, research on teacher agency has grown significantly in the international literature. Various studies indicate that agency enables teachers to engage in professional reflection, develop learning innovations, and adapt instructional practices to students' contextual needs (Kayi-Aydar, 2015; Priestley et al., 2015, 2015). However, most of these studies focus on Western contexts and primarily examine the influence of educational policies, school leadership, or individual professional factors. At the same time, research on the contribution of local culture to teachers' pedagogical capacity remains relatively limited. In the Indonesian context, several studies have highlighted the importance of local cultural values in strengthening social relationships and educational character (Ariani et al., 2022; Ramadhana et al., 2023). However, local culture should not be understood solely as a positive professional resource. Collaborative values may strengthen trust, reciprocity, and mutual support, yet cultural norms can also shape professional relationships in ways that constrain individual initiative. In particular, *sungkan* and *ewuh pekewuh* may make younger teachers reluctant to challenge senior colleagues, express different professional views, or introduce unfamiliar digital practices. In school settings undergoing digital transformation, such relational norms may create tension between maintaining social harmony and exercising the initiative required for adaptive professional action. Consequently, local culture may function simultaneously as a resource that enables collaboration and as a contextual condition that can limit the exercise of teacher agency.

This tension is particularly relevant to understanding Digital-Adaptive Pedagogical Agency. Digital transformation requires teachers not only to adopt technologies but also to question established routines, experiment with unfamiliar practices, and make professional

decisions under changing conditions (Alesanco & Cuartas, 2026). However, the capacity to exercise such agency may depend on whether organisational and cultural environments provide sufficient space for professional experimentation. In culturally hierarchical relationships, younger teachers who possess stronger familiarity with digital technologies may still hesitate to initiate change when doing so risks disrupting established seniority norms or interpersonal harmony (Frankel et al., 2024; Meyers & Uzzell, 2026). Conversely, collaborative cultural relationships may provide a basis for collective learning and reciprocal support. Understanding these contrasting possibilities is therefore essential for explaining how local cultural values relate to teachers' adaptive capacity rather than assuming that all collaborative values produce uniformly positive professional outcomes.

Although various studies have discussed school organisational culture, teacher agency, and pedagogical competence separately, several academic gaps remain evident. First, empirical studies linking schoolwork culture to Digital-Adaptive Pedagogical Agency at the elementary school level remain relatively limited. Second, previous research has largely treated local culture as a contextual variable. In contrast, empirical testing of local cultural values as social resources associated with pedagogical competence remains limited. Third, few studies simultaneously integrate organisational work culture and local collaborative values into a single structural model to explain teachers' pedagogical competence. Fourth, most studies on teacher agency remain dominated by individual and institutional perspectives and have not adequately considered how cultural social capital, including its enabling and constraining dimensions, relates to teachers' adaptive capacity. Thus, little is known about how organisational culture and local collaborative values interact through Digital-Adaptive Pedagogical Agency in relation to pedagogical competence in primary school settings. These limitations highlight the importance of research that not only examines relationships between variables empirically but also considers the potentially contrasting role of local culture in teachers' professional responses to digital transformation.

Based on this background, this study aims to examine the relationships of Work Culture and Javanese Collaborative Values with Pedagogical Competence through Digital-Adaptive Pedagogical Agency among primary school teachers in Jepara Regency, Indonesia. Javanese collaborative values in this study include social practices such as *guyub*, *gotong royong*, *tepa selira*, and *unggah-ungguh*, which remain embedded in the social interactions of Javanese society. These values may provide social resources for collaboration and mutual learning, while the broader relational context in which they operate may also require careful attention to norms such as *sungkan* and *ewuh pekewuh* in understanding teachers' agency during digital transformation. Specifically, this study seeks to answer three main questions: to what extent does Work Culture influence Digital-Adaptive Pedagogical Agency; to what extent do Javanese Collaborative Values contribute to Digital-Adaptive Pedagogical Agency;

and how does Digital-Adaptive Pedagogical Agency mediate the relationships between Work Culture, Javanese Collaborative Values, and Pedagogical Competence. Theoretically, this study extends the literature on teacher agency by highlighting the interaction between organisational culture and local cultural values in explaining teachers' pedagogical competence. Practically, the findings are expected to provide insights for schools and policymakers in developing more contextual strategies for improving teacher quality while recognising both the collaborative potential and possible relational constraints of local culture during digital transformation.

Based on the theoretical framework and the proposed conceptual model, this study formulates the following hypotheses; (H1): Work Culture has a positive effect on Digital-Adaptive Pedagogical Agency. (H2): Javanese Collaborative Values have a positive effect on Digital-Adaptive Pedagogical Agency. (H3): Digital-Adaptive Pedagogical Agency has a positive effect on Pedagogical Competence. (H4): Work Culture has a positive effect on Pedagogical Competence. (H5): Javanese Collaborative Values have a positive effect on Pedagogical Competence. (H6): Digital-Adaptive Pedagogical Agency mediates the relationship between Work Culture and Pedagogical Competence. (H7): Digital-Adaptive Pedagogical Agency mediates the relationship between Javanese Collaborative Values and Pedagogical Competence.

METHODS

This study employs a quantitative approach using an explanatory survey design (Creswell & Creswell, 2022). This design was chosen because the primary objective of the research is not merely to describe the phenomena occurring but to test the structural relationships among Work al Culture, Javanese Collaborative Values, Digital-Adaptive Pedagogical Agency, and the pedagogical competencies of elementary school teachers. In the context of the increasingly complex digital education transformation, a quantitative approach allows for the objective testing of relationships between constructs based on empirical data obtained from a relatively large number of respondents.

An explanatory survey approach is considered relevant because this study aims to explain how organisational and socio-cultural factors interact through teachers' adaptive capacity in shaping pedagogical competence. Thus, this research design aligns with the research questions focused on testing both direct and indirect influences among variables. The analysis of these relationships was conducted using Structural Equation Modelling–Partial Least Squares (SEM-PLS), which allows for the simultaneous evaluation of measurement models and structural models (Hair & Alamer, 2022).

The study was conducted in Jepara Regency, Central Java Province, Indonesia. This region was selected because it retains strong socio-cultural characteristics that uphold

Javanese collaborative values, such as *guyub*, *gotong royong*, *tepa selira*, and *unggah-ungguh*. These values are not only present in the social life of the community but are also reflected in professional interactions within the school environment.

The selection of Jepara was also based on the coexistence of two realities. On one hand, elementary schools face increasingly intense demands for digital transformation through the use of learning technologies, digital platforms, and various forms of educational innovation. On the other hand, the school community still operates within a relatively strong local cultural environment. This situation provides a relevant empirical context for understanding how modern organisational culture and local cultural values interact in shaping teachers' professional capacity.

The study involved 15 public elementary schools spread across several subdistricts in Jepara Regency. All schools share relatively uniform institutional characteristics as public schools, allowing for a more focused examination of relationships between variables without being overly influenced by significant institutional variations. The primary data source for the study came from elementary school teachers assigned to the 15 schools serving as research sites. A total of 160 teachers participated as research respondents. They consisted of homeroom teachers and subject teachers who were directly involved in the learning process and had experience using various forms of educational technology in their daily teaching activities.

The study employed purposive-proportional sampling (Etikan & Bala, 2017; Islam, 2026). Teachers were first selected purposively based on the established inclusion criteria. The number of eligible participants recruited from each school was then determined proportionally according to the distribution of teachers across the participating schools. This approach ensured that respondents met the study requirements while maintaining proportional representation across research sites.

The adequacy of the sample size was assessed through statistical power analysis before structural model testing. The analysis considered the maximum number of predictors directed at an endogenous construct, a significance level of 0.05, and the recommended statistical power threshold of 0.80. The final sample of 160 teachers exceeded the minimum requirement for detecting meaningful relationships within the proposed structural model, supporting the adequacy of the sample for SEM-PLS analysis. Inclusion criteria included teachers who had been actively teaching for at least two years, were directly involved in the learning process, and were willing to participate voluntarily. Meanwhile, teachers who were on extended leave or not actively teaching during the study period were excluded from the research sample.

Table 1.*Demographic Characteristics of Participants*

Characteristics	Category	Frequency
Gender	Male	56
	Female	104
Age	≤30 Years	20
	31–40 years	45
	41–50 Years	60
	Over 50 Years	35
Teaching Experience	2–10 Years	50
	11–20 Years	75
	>20 Years	35
Education	Bachelor's Degree	134
	Master's Degree	26
Total Participants		160

Data collection was conducted over four months, from January to April 2026. Data were obtained through the distribution of structured questionnaires designed based on the theoretical indicators of each research construct.

The research instrument used a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) (Anjaria, 2022; Koo & Yang, 2025). The Work Culture variable was measured using indicators of professional discipline, workplace collaboration, innovation, organisational commitment, and continuous learning. Javanese Collaborative Values were measured using indicators of guyub, gotong royong, tepa selira, and unggah-ungguh. The Digital-Adaptive Pedagogical Agency variable encompasses pedagogical reflection, technology adaptation, learning decision-making, and instructional flexibility. Pedagogical competence is measured based on the ability to understand learners, design instruction, implement instruction, conduct evaluation, and develop learners' potential.

Table 2.*Research Variables and Measurement Indicators*

Variable	Main Indicators	Data Source
Work Culture	Collaboration, innovation, professionalism, and organizational commitment	Survey
Javanese Collaborative Values	Solidarity, mutual assistance, harmony, respect	Survey
Digital-Adaptive Pedagogical Agency	Reflection, adaptation, pedagogical decision-making, and instructional flexibility	Survey
Pedagogical Competence	Planning, implementation, evaluation, and learner development	Survey

Prior to full-scale distribution, the instrument was tested through pilot testing to ensure clarity of language, consistency of indicators, and suitability for the respondents'

context (see table 2). All questionnaires were distributed both in person and online to increase the response rate.

Data analysis was conducted using SmartPLS software. The choice of SEM-PLS was based on its ability to simultaneously test structural relationships among latent constructs and evaluate mediating effects within a single integrated model (Hair & Alamer, 2022; Kock & Hadaya, 2018).

Before evaluating the measurement and structural models, Harman's single-factor test was conducted to assess potential common method bias. All measurement items were entered into an exploratory factor analysis without rotation. Common method bias was considered unlikely when a single factor did not account for the majority of the total variance.

The analysis procedure was conducted in two main stages. The first stage was measurement model evaluation. In this stage, convergent validity was tested using outer loading values (> 0.70) and Average Variance Extracted ($AVE > 0.50$). Construct reliability was evaluated using Cronbach's Alpha, Composite Reliability, and ρ_A , with a recommended minimum value of 0.70. Discriminant validity was assessed using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT).

The second stage was structural model evaluation. This analysis included testing path coefficients, the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and hypothesis testing through the bootstrapping procedure with 5,000 subsamples. Relationships between variables were considered statistically significant when the p-value was below 0.05.

RESULT AND DISCUSSION

Results

The SEM-PLS analysis was conducted using SmartPLS to evaluate the measurement model, structural model, predictive relevance, and hypothesis testing. The proposed model examined the relationships among Work Culture (WC), Javanese Collaborative Values (JCV), Digital-Adaptive Pedagogical Agency (DAPA), and Pedagogical Competence (PC). The full context of the article is available in the uploaded manuscript.

Measurement Model Evaluation

Convergent validity was assessed by examining the standardized outer loadings of each indicator and the Average Variance Extracted (AVE). Following the recommendations of Hair et al., indicator loadings greater than 0.70 and AVE values exceeding 0.50 indicate that the observed indicators adequately represent their corresponding latent constructs.

Table 3.*Indicator Loadings*

Construct	Indicator	Loading
DAPA	DAPA1	0.871
	DAPA2	0.860
	DAPA3	0.876
	DAPA4	0.880
	DAPA5	0.874
	DAPA6	0.880
	DAPA7	0.874
	DAPA8	0.880
JCV	JCV1	0.854
	JCV2	0.879
	JCV3	0.862
	JCV4	0.865
	JCV5	0.871
	JCV6	0.867
	JCV7	0.855
	JCV8	0.823
PC	PC1	0.915
	PC2	0.903
	PC3	0.903
	PC4	0.892
	PC5	0.893
	PC6	0.905
	PC7	0.891
	PC8	0.862
WC	WC1	0.839
	WC2	0.874
	WC3	0.859
	WC4	0.837
	WC5	0.855
	WC6	0.820
	WC7	0.838
	WC8	0.879

Table 3 shows that all measurement indicators exhibited standardized loadings above the recommended threshold of 0.70, ranging from 0.820 to 0.915. The highest loading was observed for PC1, indicating that this indicator most strongly represents the Pedagogical Competence construct, whereas WC6 recorded the lowest loading while remaining well above the acceptable criterion. Overall, the consistently high loading values indicate that each indicator contributes substantially to explaining its respective latent construct, with no

evidence of weak or problematic indicators requiring elimination. Consequently, all measurement items were retained for subsequent analyses, supporting the adequacy of the measurement model in representing Work Culture, Javanese Collaborative Values, Digital-Adaptive Pedagogical Agency, and Pedagogical Competence.

Table 4.

Reliability and Convergent Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
DAPA	0.956	0.957	0.963	0.765
JCV	0.950	0.952	0.958	0.739
PC	0.965	0.966	0.970	0.802
WC	0.945	0.946	0.954	0.723

The reliability assessment demonstrates a high degree of internal consistency across all latent constructs (Table 4). Cronbach's Alpha values ranged from 0.945 to 0.965, while Composite Reliability values ranged from 0.954 to 0.970, substantially exceeding the recommended threshold of 0.70. Likewise, rho_A values consistently remained above 0.90, further confirming the robustness of construct reliability.

The convergent validity assessment produced AVE values ranging from 0.723 to 0.802, indicating that each construct explained more than 72% of the variance in its observed indicators. Among the four constructs, Pedagogical Competence achieved the highest AVE, suggesting the strongest convergence between its indicators and the underlying construct. Collectively, these findings provide strong empirical evidence that the measurement model possesses satisfactory reliability and convergent validity, thereby supporting the appropriateness of proceeding to the evaluation of discriminant validity and structural relationships.

Table 5.

Fornell–Larcker Criterion

Construct	DAPA	JCV	PC	WC
DAPA	0.874			
JCV	0.427	0.860		
PC	0.683	0.493	0.896	
WC	0.573	0.370	0.619	0.850

As presented in Table 5, the square root of the AVE for each construct exceeded its corresponding inter-construct correlations. Specifically, the diagonal values ranged from 0.850 to 0.896, whereas the highest correlation between constructs was 0.683 (between Digital-Adaptive Pedagogical Agency and Pedagogical Competence). These results indicate that each latent construct shares greater variance with its own indicators than with other constructs included in the model. Accordingly, the Fornell–Larcker criterion confirms that

Work Culture, Javanese Collaborative Values, Digital-Adaptive Pedagogical Agency, and Pedagogical Competence represent empirically distinct constructs, supporting satisfactory discriminant validity.

Table 6.

HTMT Ratio

Construct	DAPA	JCV	PC	WC
DAPA	-			
JCV	0.444	-		
PC	0.708	0.509	-	
WC	0.600	0.386	0.645	-

The HTMT analysis further substantiates the discriminant validity of the measurement model. As shown in Table 6, all HTMT values ranged from 0.386 to 0.708, remaining well below the conservative threshold of 0.85. The highest HTMT value (0.708) was observed between Digital-Adaptive Pedagogical Agency and Pedagogical Competence, indicating a meaningful conceptual association while remaining sufficiently distinct to avoid discriminant validity concerns. The consistently low HTMT ratios across all construct pairs provide additional evidence that the latent variables measure different theoretical concepts and that multicollinearity among constructs is unlikely to compromise the structural model estimation.

Structural Model Evaluation

Table 7.

R-Square Values

Endogenous Variable	R ²	Adjusted R ²
DAPA	0.382	0.374
PC	0.575	0.567

The explanatory power of the structural model was evaluated using the coefficient of determination (R^2). As presented in Table 7, the model accounted for 38.2% of the variance in Digital-Adaptive Pedagogical Agency and 57.5% of the variance in Pedagogical Competence. These findings indicate that Work Culture and Javanese Collaborative Values jointly explain a substantial proportion of teachers' adaptive pedagogical capacity, while the combined effects of Work Culture, Javanese Collaborative Values, and Digital-Adaptive Pedagogical Agency provide even greater explanatory power for Pedagogical Competence.

The relatively small differences between the R^2 and adjusted R^2 values for both endogenous constructs further indicate that the structural model is stable and not materially affected by model complexity. Overall, the findings suggest that the proposed model possesses moderate explanatory capability for Digital-Adaptive Pedagogical Agency and

moderately strong explanatory capability for Pedagogical Competence, supporting the adequacy of the proposed structural relationships for subsequent hypothesis testing

Table 8.

Effect Size Assessment

Relationship	f²	Interpretation
WC → DAPA	0.323	Large
JCV → DAPA	0.087	Small
WC → PC	0.139	Small to Medium
JCV → PC	0.075	Small
DAPA → PC	0.263	Medium

The effect size analysis was conducted to determine the relative contribution of each exogenous construct to the explained variance of the endogenous variables. As shown in Table 8, Work Culture exerted the largest effect on Digital-Adaptive Pedagogical Agency, indicating that improvements in organizational work culture substantially increase teachers' adaptive pedagogical capacity. This value approaches the threshold for a large effect, suggesting that Work Culture constitutes the principal antecedent of Digital-Adaptive Pedagogical Agency within the proposed model.

In contrast, Javanese Collaborative Values demonstrated a smaller contribution to Digital-Adaptive Pedagogical Agency, indicating that although local collaborative values significantly contribute to teachers' adaptive capacity, their practical influence is less pronounced than that of organizational work culture.

Regarding Pedagogical Competence, Digital-Adaptive Pedagogical Agency produced the strongest direct contribution, representing a medium effect size and indicating that adaptive pedagogical capability is the most influential predictor of teachers' pedagogical competence. Meanwhile, Work Culture showed a small-to-moderate contribution, whereas Javanese Collaborative Values exhibited the smallest effect among the direct predictors. These findings suggest that organizational and cultural factors contribute to pedagogical competence with different levels of practical importance, with adaptive pedagogical agency emerging as the primary mechanism through which these influences are translated into professional competence.

Predictive Assessment

Predictive relevance was evaluated using the blindfolding procedure.

Table 9.

Predictive Relevance (Q²)

Construct	SSO	SSE	Q²
DAPA	1,280,000	912,326	0.287

PC	1,280,000	698,378	0.454
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The blindfolding results presented in Table 9 indicate that both endogenous constructs achieved positive predictive relevance. Digital-Adaptive Pedagogical Agency recorded a Q^2 value of 0.287, while Pedagogical Competence obtained a substantially higher Q^2 value of 0.454. Since both values exceed zero, the model demonstrates satisfactory predictive capability for explaining future observations of the endogenous constructs.

The comparatively higher Q^2 value for Pedagogical Competence indicates that the integrated effects of Work Culture, Javanese Collaborative Values, and Digital-Adaptive Pedagogical Agency provide stronger predictive accuracy for teachers' pedagogical competence than the prediction of Digital-Adaptive Pedagogical Agency itself. These findings complement the coefficient of determination results, indicating that the proposed structural model not only explains a considerable proportion of variance but also possesses meaningful predictive relevance for the investigated educational constructs.

Hypothesis Testing

Bootstrapping with 5,000 resamples was performed to examine the significance and direction of the hypothesized relationships among the latent constructs. The analysis evaluated both the magnitude and direction of the standardized path coefficients to determine the extent to which the proposed hypotheses were empirically supported.

Table 10.

Direct Effects and Hypothesis Testing

Hypothesis	Path	β	Decision
H1	WC → DAPA	0.481	Supported
H2	JCV → DAPA	0.249	Supported
H3	DAPA → PC	0.425	Supported
H4	WC → PC	0.301	Supported
H5	JCV → PC	0.200	Supported

The bootstrapping results indicate that all proposed direct relationships were empirically supported. As presented in Table 10, Work Culture exerted the strongest direct influence on Digital-Adaptive Pedagogical Agency, suggesting that improvements in organizational work practices are associated with substantial increases in teachers' adaptive pedagogical capacity. In comparison, Javanese Collaborative Values also demonstrated a positive effect on Digital-Adaptive Pedagogical Agency, although the magnitude of this relationship was considerably smaller.

Regarding Pedagogical Competence, Digital-Adaptive Pedagogical Agency emerged as the strongest direct predictor, exceeding the direct effects of both Work Culture and Javanese Collaborative Values. These findings indicate that teachers' capability to make

adaptive pedagogical decisions contributes more strongly to pedagogical competence than organizational or cultural factors operating independently.

Among the two exogenous constructs, Work Culture demonstrated a greater direct contribution to Pedagogical Competence than Javanese Collaborative Values, suggesting that organizational conditions provide relatively stronger support for the development of teachers' professional competence. Nevertheless, the positive coefficients obtained for all structural paths indicate that improvements in organizational culture, local collaborative values, and adaptive pedagogical agency consistently contribute to higher levels of pedagogical competence within the proposed structural model.

Overall, the acceptance of all five direct hypotheses provides empirical support for the structural relationships specified in the conceptual framework. The pattern of standardized coefficients further indicates that the model is primarily driven by organizational conditions that strengthen teachers' adaptive pedagogical capacity, which subsequently contributes to improved pedagogical competence.

Mediation Analysis

The mediating role of Digital-Adaptive Pedagogical Agency was evaluated by examining the significance of the specific indirect effects generated through the bootstrapping procedure. Mediation was considered statistically supported when the indirect effect was significant at the 5% significance level.

Table 11.

Specific Indirect Effects

Hypothesis	Indirect Path	β	t-value	p-value	Decision
H6	JCV $\rightarrow$ DAPA $\rightarrow$ PC	0.106	2.875	0.004	Supported
H7	WC $\rightarrow$ DAPA $\rightarrow$ PC	0.204	4.551	0.000	Supported

The mediation analysis confirms that Digital-Adaptive Pedagogical Agency significantly mediates the relationships between both exogenous constructs and Pedagogical Competence. As shown in Table 11, the indirect effect of Javanese Collaborative Values on Pedagogical Competence through Digital-Adaptive Pedagogical Agency was positive and statistically significant, providing empirical support for H6.

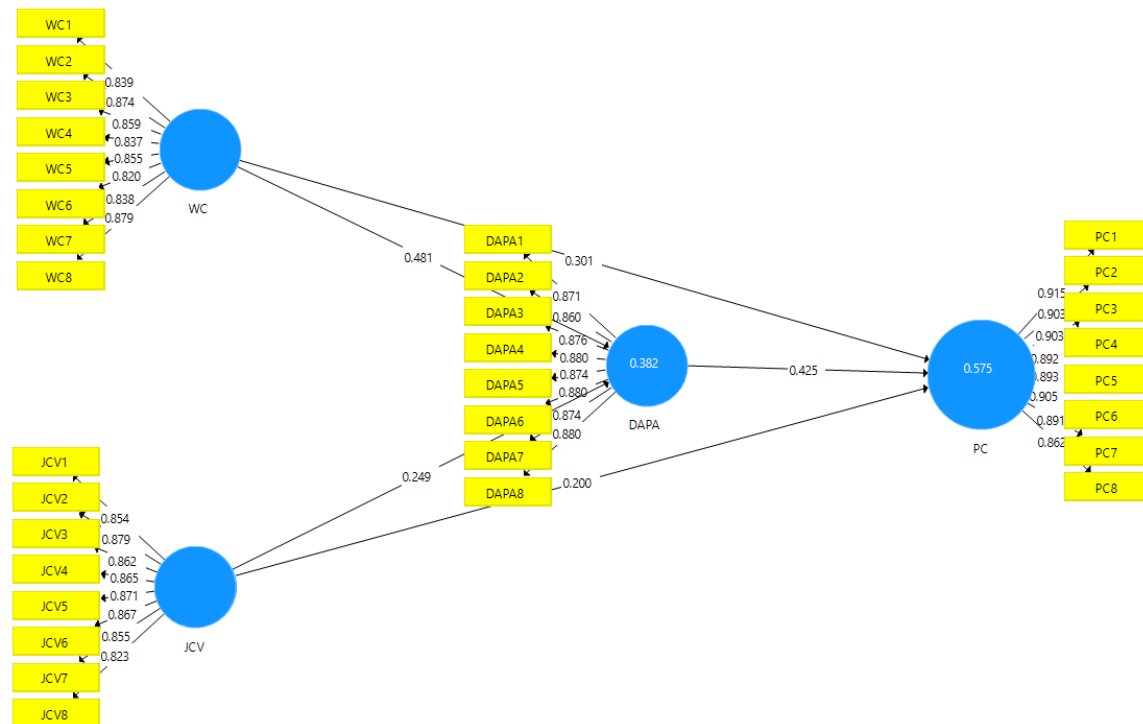
A stronger mediating effect was observed for the relationship between Work Culture and Pedagogical Competence, where the indirect effect reached. The larger standardized coefficient and higher t-value indicate that the mediating mechanism associated with organizational work culture is more pronounced than that associated with local collaborative values.

Comparing the two indirect effects demonstrates that the influence of Work Culture on Pedagogical Competence is transmitted through Digital-Adaptive Pedagogical Agency

almost twice as strongly as the corresponding indirect influence of Javanese Collaborative Values. This pattern suggests that adaptive pedagogical capacity serves as a more effective transmission mechanism for organizational influences than for cultural influences within the proposed model.

Figure 1.

Structural Model



Taken together, the mediation results indicate that Digital-Adaptive Pedagogical Agency functions as a statistically significant intermediary linking both organizational and cultural antecedents with teachers' pedagogical competence. The significance of both indirect paths further strengthens the overall explanatory structure of the model by demonstrating that improvements in pedagogical competence occur not only through direct organizational and cultural influences but also through teachers' adaptive pedagogical capacity.

Discussion

The findings indicate that teachers' pedagogical competence in the digital era develops through the interaction of organizational conditions, local cultural resources, and teachers' adaptive professional capacity. Rather than operating independently, these factors form an interconnected process in which organizational and cultural environments create conditions that enable teachers to make adaptive pedagogical decisions. This pattern suggests that contextual resources do not automatically translate into competence; their contribution depends on teachers' capacity to interpret and mobilize them through adaptive action. This finding suggests that improving pedagogical competence requires not only

technological proficiency but also supportive professional environments that encourage collaboration, reflection, and continuous learning (Bandura, 1977; Fullan, 2016; Priestley et al., 2015; Rumjaun & Narod, 2025).

The first major finding demonstrates that Work Culture is the strongest predictor of Digital-Adaptive Pedagogical Agency. This relationship suggests that adaptive pedagogical capacity is primarily cultivated within schools characterized by collaboration, professional trust, shared responsibility, and openness to innovation. Such organizational conditions encourage teachers to exchange instructional experiences, reflect collectively on classroom challenges, and experiment with new teaching strategies. Consequently, work culture functions not merely as an administrative setting but as a professional learning environment that continuously shapes teachers' adaptive decision-making.

This finding is consistent with Organizational Culture Theory, which explains that shared organizational values and norms influence members' professional behavior (Schein, 2016). More specifically, the stronger effect of Work Culture indicates that when collaboration and innovation become shared professional norms, teachers have greater space to exercise adaptive action. This interpretation also reflects Social Cognitive Theory, in which teachers' professional behaviour develops through reciprocal interaction with their environment (Bandura, 1977; Rumjaun & Narod, 2025). Organizational culture therefore does not merely surround teachers but shapes the conditions within which confidence, reflection, and experimentation are exercised. Similar findings have been reported by Zhu and Zhai (2025), Nguyen et al. (2020), and Fullan (2016), who emphasize that collaborative school cultures enhance teacher learning and instructional innovation. The present study extends these findings by demonstrating that organizational culture strengthens teachers' adaptive pedagogical agency, which subsequently supports professional competence, rather than influencing competence directly alone.

The second finding shows that Javanese Collaborative Values positively influence Digital-Adaptive Pedagogical Agency, although their contribution is smaller than that of Work Culture. Values such as *guyub*, *gotong royong*, *tepa selira*, and *unggah-ungguh* create professional relationships characterized by trust, reciprocity, and mutual support, enabling teachers to solve instructional problems collaboratively. From the perspective of Social Capital Theory, these shared norms facilitate collective learning by strengthening cooperation and professional interaction (Bourdieu, 1986; Eloire, 2018). This finding supports Hargreaves and O'Connor's (2018) concept of collaborative professionalism while complementing evidence that collegial interaction enhances instructional innovation (Darling-Hammond, 2017; Leithwood et al., 2020; Sun et al., 2024).

However, the smaller contribution of Javanese Collaborative Values also reveals an important contrast. Collaborative values may strengthen trust and mutual support, yet

norms associated with *sungkan* and *ewuh pekewuh* may sometimes make younger teachers hesitant to question senior colleagues, express different professional views, or initiate unfamiliar digital practices. In digital transformation, the desire to preserve interpersonal harmony may occasionally constrain the experimentation and professional voice required for adaptive agency.

This contrast helps explain the result theoretically. Social Cognitive Theory suggests that social environments can provide both enabling and constraining conditions for professional action. Similarly, the ecological perspective of Teacher Agency emphasises that agency is achieved within particular cultural and institutional conditions rather than exercised independently of them (Biesta, 2020; Priestley et al., 2015). Thus, a younger teacher may possess strong digital knowledge, but exercise limited agency when seniority norms discourage initiative. Conversely, the same collaborative relationships may become a resource when senior and younger teachers engage in reciprocal learning. Unlike previous studies that largely position local culture as contextual background, this study demonstrates that collaborative cultural values function as measurable social capital that contributes to teachers' adaptive professional behavior.

The third finding identifies Digital-Adaptive Pedagogical Agency as the strongest determinant of Pedagogical Competence, indicating that competence increasingly depends on teachers' capacity to interpret educational change, integrate digital technologies meaningfully, and adjust instructional strategies to students' needs. This finding supports the ecological perspective of Teacher Agency, which views teachers as active professionals who continuously negotiate institutional demands through reflective action (Biesta, 2020; Priestley et al., 2015). The result strengthens this perspective by showing that organizational and cultural resources become pedagogically meaningful when teachers actively translate them into instructional decisions. It also corroborates Tondeur et al. (2020) and Trust et al. (2016), who argue that effective digital education depends more on adaptive pedagogical decision-making than on technological mastery alone. Collectively, these findings reinforce the view that adaptive pedagogical agency constitutes the critical professional capability connecting organizational support with high-quality pedagogical practice.

The results further demonstrate that Work Culture and Javanese Collaborative Values directly enhance Pedagogical Competence, although their effects are weaker than those transmitted through Digital-Adaptive Pedagogical Agency. This pattern indicates that organizational and cultural environments provide essential conditions for teachers' professional development, yet these contextual resources become fully effective only when teachers actively translate them into adaptive pedagogical practices. Thus, pedagogical competence is not a direct outcome of favourable organizational conditions but is shaped by teachers' capacity to interpret and apply those conditions in classroom practice. This

pattern connects Schein's emphasis on organizational norms with the ecological view of agency: supportive conditions provide opportunities, but teachers remain the actors who mobilize those opportunities into practice. This finding supports the view that teachers are active agents who construct professional competence through reciprocal interactions with their institutional environment rather than merely responding to external organizational influences (Bandura, 1977; Biesta, 2020; Rumjaun & Narod, 2025).

The mediation analysis provides the study's central empirical contribution. The findings indicate that Digital-Adaptive Pedagogical Agency significantly mediates the relationships between Work Culture, Javanese Collaborative Values, and Pedagogical Competence, with the mediating effect of Work Culture being considerably stronger. This finding suggests that organizational culture and local cultural values do not automatically improve teachers' competence. Instead, these resources must first be transformed into adaptive professional action through teachers' capacity to reflect, innovate, and respond to changing instructional contexts. Consequently, Digital-Adaptive Pedagogical Agency functions not merely as a statistical mediator but as the professional mechanism connecting institutional resources with effective pedagogical practice.

The mediation result integrates the theoretical framework more directly. Organizational Culture Theory explains how shared norms create conditions for professional action, Social Cognitive Theory explains how teachers develop through reciprocal interaction with those conditions, and the ecological perspective of Teacher Agency explains how teachers actively achieve agency within them. The findings therefore suggest that adaptive agency is neither solely an individual attribute nor simply a product of organizational culture, but an outcome of interaction between teachers and their organizational and cultural environments.

The cultural contrast further qualifies this mediation. Javanese collaborative values may support agency through trust and mutual learning, whereas *sungkan* and *ewuh pekewuh* may limit professional initiative when respect for seniority discourages younger teachers from proposing digital change. The mediating role of agency is therefore particularly important because it captures how teachers negotiate supportive and potentially constraining cultural conditions before translating them into pedagogical practice.

Compared with previous studies, this research offers a more integrated explanation of teachers' professional competence. Earlier studies primarily examined organizational culture, teacher agency, or technology integration separately (Nguyen & Ng, 2020; Tondeur et al., 2020; Trust et al., 2016; Zhu & Zhai, 2025), while local cultural values were generally treated as contextual background. The present findings show that Javanese Collaborative Values operate as measurable social capital whose educational contribution becomes meaningful through adaptive pedagogical agency. At the same time, the findings suggest

that local culture should not be understood as uniformly enabling. Its collaborative strengths may coexist with relational norms that can constrain professional voice and innovation.

The principal contribution of this study therefore lies not in proposing a new theory but in extending the explanatory framework of teacher competence. The findings demonstrate that pedagogical competence develops through a sequential process in which organizational culture and local collaborative values strengthen adaptive pedagogical agency, which subsequently translates these contextual resources into effective instructional practice. This process is best understood as relational rather than automatic: cultural and organizational resources create possibilities for action, while teachers' agency determines how those possibilities are translated into practice. This perspective broadens existing understandings of teacher competence by positioning adaptive agency as the pivotal mechanism linking organizational context with professional performance.

Practically, the findings imply that teacher development initiatives should integrate collaborative school culture, local cultural capital, and reflective professional learning alongside digital skills training to achieve sustainable improvements in pedagogical competence. Schools should also encourage reciprocal learning between younger and senior teachers so that respect and harmony do not unintentionally limit digital initiative but instead support cross-generational collaboration and innovation. Future research may validate this explanatory framework across different cultural settings and educational systems to examine its broader applicability.

CONCLUSIONS

This study demonstrates that the pedagogical competence of elementary school teachers in the digital era is associated with relationships that extend beyond mere mastery of technology or technical teaching skills. The findings indicate that Digital-Adaptive Pedagogical Agency plays a central role in explaining how Work Culture and Javanese Collaborative Values relate to teachers' pedagogical competence. A work culture characterised by collaboration, openness, and continuous learning showed the strongest relationship with teachers' adaptive capacity. At the same time, Javanese collaborative values such as *guyub*, *gotong royong*, *tepa selira*, and *unggah-ungguh* also showed a meaningful contribution to teachers' ability to respond to changes in learning reflectively and contextually. These findings broaden the understanding that pedagogical competence is associated not only with professional training or individual capacity but also with organisational and cultural conditions and teachers' ability to translate these resources into adaptive pedagogical decisions. However, local culture should not be viewed as uniformly enabling. While collaborative values may strengthen trust and mutual support, norms associated with *sungkan* and *ewuh pekewuh* may make younger teachers hesitant to

express different views or initiate unfamiliar digital practices in relationships with senior colleagues. Such relational dynamics may constrain Digital-Adaptive Pedagogical Agency when respect and social harmony limit professional initiative. In this context, Digital-Adaptive Pedagogical Agency functions not only as a mediating variable but also as the mechanism through which social and organisational resources are translated into pedagogical practice.

The implications of this study are theoretical, practical, and social. Theoretically, the findings extend the discussion on teacher agency by showing that adaptive professional capacity is associated with organisational culture and local cultural values embedded in educational communities. Practically, strengthening teachers' competence should extend beyond digital literacy or technology training. Schools can establish regular cross-generational peer-learning sessions in which younger and senior teachers exchange digital and pedagogical expertise, create small collaborative teams to experiment with digital instruction, and provide structured opportunities for teachers to present and discuss new practices without disrupting respect for seniority. School leaders should also encourage reciprocal mentoring so that younger teachers can contribute digital expertise while senior teachers contribute pedagogical experience. These practices may preserve the collaborative strengths of local culture while reducing relational barriers that discourage professional voice and digital initiative.

Socially, the findings indicate that local cultural values remain relevant to digital education, but their contribution depends on how they are enacted within professional relationships. This study is limited by its cross-sectional survey design, which captures relationships at a specific point in time and does not establish long-term causal development, and by respondents drawn from a relatively homogeneous cultural region. Future research could therefore use longitudinal or comparative designs across different cultural settings and examine variables such as digital leadership, professional learning communities, artificial intelligence readiness, and digital literacy. Such research could further examine when collaborative cultural values support agency and when relational norms associated with seniority may constrain it. Thus, this study contributes to the educational literature by demonstrating that effective digital education is associated not only with the sophistication of classroom technology but also with organisational culture, local cultural relationships, and teachers' capacity to exercise adaptive pedagogical agency in translating these conditions into practice.

DECLARATIONS

Author Contribution

Fitriyani, N.W., Conceptualization, Investigation, Data Curation, Formal Analysis, Methodology, Visualization, Writing–Original Draft, and Project Administration; **Utaminingsih, S.**, Methodology, Review & Editing, Validation, Supervision, and Resources; **Hariyadi, A.**, Formal Analysis, Methodology, Validation, Writing–Review & Editing, Supervision; **Rahman, H.F.**, Data Curation, Investigation, Visualization, Software, Validation.

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Conflicts of Interest

The authors declare no conflict of interest.

Declaration of AI Use

The authors used DeepL, Grammarly Premium, and ChatGPT solely as language-support tools during the preparation of this manuscript. DeepL was used to assist with English translation, Grammarly Premium was used to improve grammar, spelling, punctuation, and writing clarity, and ChatGPT was used to identify and refine language-related issues, including grammar, sentence structure, and stylistic consistency.

Additional Information

The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request by the Editor or the journal during the peer-review process or after publication, where appropriate.

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