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The Influence of Digital Competency and Teacher Leadership on Innovative Behaviour and Teaching Performance in Jambi Province

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Abstract
This study aims to analyse the influence of digital competency and teacher leadership on innovative behaviour and teaching performance among teachers in Jambi Province, reflecting the growing demands of modern education that require teachers to adapt to technological advancements and demonstrate strong leadership within instructional settings. Using a quantitative approach, data were collected through a validated Likert-scale questionnaire distributed online to 197 teachers selected through quota sampling. The data were analysed using PLS-SEM to examine the strength and significance of the relationships among the variables. The results indicate that both digital competency and teacher leadership have a significant positive effect on innovative behaviour, suggesting that teachers who possess stronger digital skills and leadership abilities are more likely to initiate and adopt innovative practices in the classroom. However, the study also reveals that digital competency and innovative behaviour do not have a direct significant impact on teaching performance, implying that improvements in teaching performance may depend on other factors such as organizational support, school culture, workload, or policy frameworks that were not examined in this research. These findings highlight the importance of adopting a more comprehensive approach when seeking to enhance teaching performance, as digital proficiency and innovation alone may not be sufficient without supportive institutional conditions. The study contributes to the existing literature on digital competence, teacher leadership, and innovation in the Indonesian educational context and provides valuable insights for stakeholders in designing more effective professional development and instructional improvement programs.

Keywords: Digital Competency; Innovative Behaviour; Teacher Leadership; Teaching Performance

INTRODUCTION

In the contemporary educational landscape, the integration of digital competencies and robust teacher leadership has become a defining characteristic of effective schooling systems. The acceleration of technological transformation, coupled with the expansion of collaborative and student-cantered learning paradigms, has reshaped expectations toward teachers' professional roles. Teachers

are no longer positioned merely as transmitters of knowledge but as adaptive instructional leaders who must navigate digital ecosystems, manage technologically enriched classrooms, and cultivate innovation-oriented learning cultures. As highlighted in recent scholarship, digital literacy and leadership capability are fundamental components in meeting the demands of 21st-century educational frameworks (Amzat et al., 2022; Rasdiana et al., 2024). These competencies enable teachers to engage in pedagogical redesign, integrate digital platforms strategically, and align instruction with global educational benchmarks.

Digital competence, in particular, plays a transformative role in enhancing instructional effectiveness and student engagement. The use of multimedia tools, digital collaboration platforms, and technology-based assessment systems has been shown to enrich learning experiences and foster higher-order thinking skills among students (Gyeltshen, 2021). Beyond technical skills, digital competence encompasses critical evaluation of information, digital communication, data security awareness, and reflective use of emerging technologies. When teachers master these dimensions, they are better equipped to design meaningful learning experiences that prepare students for participation in a digitally driven society. Consequently, teachers are expected not only to integrate technology operationally but to exercise leadership in shaping digital learning environments that encourage creativity, collaboration, and continuous improvement.

However, despite the strong global emphasis on digital transformation and leadership in education, practical challenges remain evident in many regional contexts, including Jambi Province in Indonesia. Variations in teachers' digital literacy levels, disparities in technological infrastructure, and limited institutional support systems continue to constrain effective technology integration (Rudhumbu et al., 2021; Hidayat et al., 2024). Schools in geographically diverse areas often experience unequal access to stable internet connectivity, updated devices, and structured professional development programs. Such disparities create uneven readiness among teachers, affecting their ability to operationalize digital competencies consistently across classrooms.

In addition to technological constraints, inconsistencies in teacher leadership further complicate the translation of competence into performance. Leadership practices at the instructional level frequently reflect differences in organizational culture, administrative support, and professional learning opportunities (Daud et al., 2016; Rasdiana et al., 2024). While innovation in teaching is strongly advocated, the gap between theoretical models of digital integration and their practical implementation remains apparent. Teachers may possess digital knowledge or leadership potential, yet struggle to convert these capacities into sustained innovative behaviour that enhances teaching performance. This disconnect underscores the urgency of examining the mechanisms that facilitate or hinder innovative behaviour among teachers. Identifying such factors is essential for understanding how digital competence and leadership capacity can effectively contribute to improved instructional outcomes (Paletta et al., 2021; Zhao et al., 2025).

Contemporary scholarship increasingly underscores digital competency as a foundational element in modern educational practice. Beyond operational familiarity with technological tools, digital competence encompasses teachers' ability to strategically integrate digital resources, redesign instructional strategies, and create interactive learning ecosystems that stimulate student engagement. Empirical findings demonstrate that teachers with strong digital competency exhibit greater confidence and instructional efficacy when employing multimedia platforms, online collaboration tools, and digital assessment systems (Hasanudin, 2025; Sary et al., 2023). This enhanced efficacy not only transforms classroom dynamics but also contributes to improved learning outcomes by fostering active participation, critical thinking, and adaptive problem-solving. In this sense, digital competence operates as both a technical and pedagogical capability that reshapes how learning experiences are constructed and delivered.

Parallel to digital competence, teacher leadership represents a pivotal dimension in cultivating innovation-oriented educational environments. Instructional leadership at the teacher level facilitates collaborative learning cultures, reflective professional dialogue, and shared responsibility for instructional improvement. Studies have demonstrated that leadership behaviours such as guiding

classroom discourse, encouraging peer interaction, and modelling reflective practice play a significant role in nurturing creative problem-solving and pedagogical experimentation (Nawaz et al., 2023). When teachers exercise leadership within their classrooms and professional communities, they create conditions that enable innovation to emerge organically. Thus, the intersection between digital competence and teacher leadership forms a behavioural pathway through which innovative practices are enacted in instructional settings.

Despite the growing recognition of these interrelated constructs, much of the existing research has examined digital competency, teacher leadership, innovative behaviour, and teaching performance in isolation. Studies conducted in diverse national contexts often focus on one or two variables without systematically exploring their interconnected structural relationships (Effiyaldi et al., 2024; Fetty et al., 2022). Such fragmented approaches may obscure the complex mechanisms through which competencies and leadership capacities translate into measurable teaching performance, particularly in regions characterized by technological disparities and uneven pedagogical readiness. In Jambi Province, where variations in digital infrastructure and institutional support remain pronounced (Puspita & Widjaja, 2023), understanding these interconnections becomes even more critical. A localized examination is necessary to capture contextual dynamics that may influence how digital competence and leadership capacity shape innovative behaviour and performance outcomes.

Addressing this gap requires the development of a comprehensive structural framework capable of examining both direct and indirect relationships among the four constructs. Recent methodological advancements advocate the use of structural equation modelling to analyse complex interactions within educational systems (Zhu et al., 2024; Almaududi et al., 2022). Accordingly, the present study integrates digital competency, teacher leadership, innovative behaviour, and teaching performance within a unified model analysed using Partial Least Squares–Structural Equation Modelling (PLS-SEM) (Naibaho et al., 2025; Abdillah et al., 2024). By focusing on teachers across Jambi Province, this research provides contextualized empirical evidence regarding how digital skills and leadership capacity are operationalized into innovation and instructional effectiveness in real-world educational environments. Beyond theoretical contribution, the findings are expected to offer practical insights for policymakers, school leaders, and educators seeking to strengthen innovation and improve teaching performance within technology-integrated schooling systems (Fildansyah & Nailul, 2025; Saputra, 2025).

Building upon the theoretical arguments and empirical gaps identified earlier, this study seeks to systematically examine how digital competency and teacher leadership shape innovative behaviour and teaching performance within the specific context of Jambi Province. Accordingly, the research is guided by three central questions: (1) whether digital competency influences teachers' innovative behaviour and teaching performance; (2) whether teacher leadership affects innovative behaviour and teaching performance; and (3) whether innovative behaviour itself contributes to teaching performance. These questions reflect the assumption that teacher performance in contemporary educational settings is not merely the outcome of isolated competencies, but rather the result of interconnected professional capacities that operate simultaneously within instructional environments.

In line with these research questions, the study aims to analyse the direct effects of digital competency and teacher leadership on innovative behaviour, to examine their direct influence together with innovative behaviour on teaching performance, and to develop a comprehensive structural model explaining how these variables interact in the educational landscape of Jambi Province. By integrating these constructs within a unified analytical framework, the study moves beyond fragmented approaches and seeks to clarify both the magnitude and direction of their relationships. The hypotheses formulated to address these objectives are outlined below and provide the empirical foundation for testing the proposed structural model.

First, with regard to direct relationships, digital competency is hypothesized to exert a positive and significant influence on teaching performance (H1) and on teachers' innovative behaviour (H2). These hypotheses are grounded in the premise that teachers who possess strong digital skills are better equipped to implement technology-enhanced instruction and experiment with novel pedagogical

approaches. Similarly, teacher leadership is proposed to have a positive and significant effect on teaching performance (H3) as well as on innovative behaviour (H4), reflecting the view that leadership behaviours such as fostering collaboration, guiding reflective dialogue, and encouraging instructional improvement create conditions that stimulate both innovation and performance enhancement. In addition, innovative behaviour itself is hypothesized to positively and significantly influence teaching performance (H5), suggesting that teachers who actively generate and implement new ideas are more likely to demonstrate higher instructional effectiveness.

Beyond these direct effects, the study also considers the possibility of indirect pathways. Innovative behaviour is proposed as a mediating mechanism linking digital competency to teaching performance (H6) and linking teacher leadership to teaching performance (H7). This mediating perspective assumes that competencies and leadership capacities may not influence performance automatically; rather, their impact may materialize through teachers' willingness and ability to translate these capacities into concrete innovative actions within classroom practice.

Finally, to acknowledge the broader organizational context in which teachers operate, the model incorporates potential moderating variables. Organizational support is hypothesized to strengthen the relationship between digital competency and teaching performance (H8), such that the effect becomes more pronounced when institutional backing, infrastructure, and professional development opportunities are robust. Likewise, a positive work environment is expected to moderate the relationship between teacher leadership and innovative behaviour (H9), amplifying the influence of leadership when school's foster collaborative, supportive, and innovation-friendly cultures. Together, these hypotheses construct a multi-layered analytical framework that captures direct, indirect, and contextual influences on teaching performance in Jambi Province.

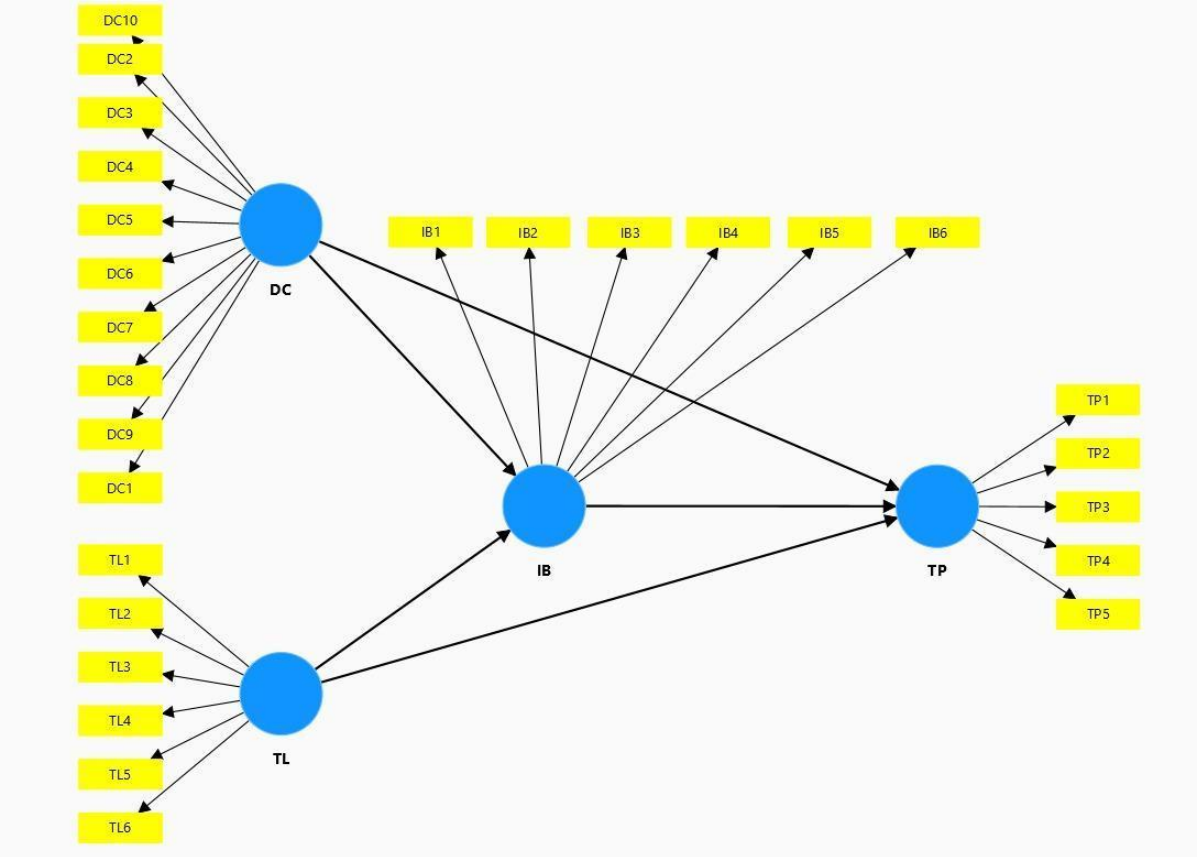


Figure 1. Research Structural Design

Note: DC : Digital Competence
TL : Teacher Leadership
IB : Innovation Behaviour
TP : Teaching Performance

RESEARCH METHODS

Research Design

This study employed a quantitative approach using a cross-sectional survey design to examine the structural relationships among digital competency, teacher leadership, innovative behaviour, and teaching performance. The survey method was selected because it allows the researcher to gather data from a large number of respondents efficiently and is suitable for measuring latent constructs through standardized instruments.

Instrument Development and Adaptation

The primary instrument used in this study was a structured questionnaire specifically adapted for teachers in Jambi Province. The adaptation process was carried out to ensure that the instrument accurately reflected the teaching context, digital environment, and school culture in the region.
The questionnaire consisted of four constructs:

1. Digital Competency (DC) — 10 items
2. Teacher Leadership (TL) — 6 items
3. Innovative Behaviour (IB) — 6 items
4. Teaching Performance **(**TP) — 5 items

Each item used a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). The items were translated, reworded, and contextually adjusted to align with the linguistic and instructional practices commonly found in Jambi schools.

Contextual Adaptation

To ensure regional suitability:

1. Wording was simplified using Bahasa Indonesia used in local schools, avoiding jargon unfamiliar to teachers.
2. Digital Competency items were adjusted to reflect actual digital practices in Jambi classrooms, such as operating multimedia learning resources, managing learning platforms, and ensuring digital safety.
3. Teacher Leadership indicators were aligned with instructional leadership roles typically carried out by teachers, including guiding discussions, supporting collaborative learning, modeling problem-solving, and managing classroom interactions.
4. The adaptation also considered variations in school digital infrastructure, especially between urban and rural districts.

Content Validation

To establish content validity, an expert panel consisting of one school supervisor and two senior teachers reviewed the questionnaire for clarity, relevance, and contextual appropriateness. Their feedback ensured that each item accurately represented teachers' actual responsibilities and experiences in Jambi.

Pilot Testing and Reliability Assessment

A pilot test was conducted with 50 randomly selected teachers to assess the comprehensibility and reliability of the instrument. Minor wording revisions were made to improve item clarity and avoid double-meaning statements. Reliability was evaluated using Cronbach's Alpha, with all constructs achieving values above 0.70, indicating acceptable internal consistency. In the main analysis, additional psychometric evaluations were conducted, including:

1. Indicator reliability (factor loadings)
2. Internal consistency reliability (Cronbach's Alpha and Composite Reliability)
3. Convergent validity (Average Variance Extracted)
4. Discriminant validity (HTMT Ratio)

All constructs met recommended thresholds, confirming that the instrument was statistically reliable and valid for further analysis.

Population and Sampling Technique

The study population comprised all teachers across Jambi Province. Considering the geographic diversity and varying school characteristics, quota sampling was used to ensure proportional representation. A total of 197 teachers participated, representing several districts and different school levels.

This sampling strategy was chosen because it allows researchers to guarantee that specific categories within the population such as district, school level, or teacher status are adequately represented, even when sampling conditions are uneven. This was important due to the differing accessibility and digital readiness across the province.

Data Collection Procedure

The survey was administered electronically using Google Forms. Links were distributed through teacher forums, WhatsApp groups, and district-level communication channels. Participants were informed of the study's purpose and assured that all responses would remain anonymous. Informed consent was obtained digitally before they proceeded with the questionnaire. The data collection period lasted two weeks to accommodate teachers' varying workloads and availability.

Data Analysis Technique

The collected data were analysed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with the SmartPLS 4.2 software. PLS-SEM was selected because it is suitable for exploratory models, handles complex relationships between latent variables, and is effective with medium sample sizes such as in this study. The analysis involved two main stages:

1. Measurement Model Assessment
   - Evaluating indicator reliability
   - Assessing internal consistency (CR, Alpha)
   - Establishing convergent validity (AVE)
   - Testing discriminant validity (HTMT)
2. Structural Model Assessment
   - Examining path coefficients
   - Assessing t-statistics and p-values through bootstrapping with 5,000 subsamples
   - Evaluating effect sizes and model predictive relevance

This approach aligned with the study's aim to identify the direct effects of digital competency and teacher leadership on innovative behaviour and teaching performance, and to assess whether innovative behaviour contributes significantly to teaching performance.

RESULTS AND DISCUSSION

During the pilot testing phase, the researcher evaluated the questionnaire items to ensure clarity, relevance, and measurement accuracy. The instrument consisted of four constructs: Digital Competency (10 items), Teacher Leadership (6 items), Innovative Behaviour (6 items), and Teaching Performance (5 items), totalling 27 items. Based on the pilot results, several items underwent minor wording revisions to improve clarity and contextual suitability, while all items met the required reliability and validity thresholds for inclusion in the main study. Consequently, the final instrument retained all 27 items across the four constructs. The subsequent analysis was conducted using appropriate statistical techniques to test the proposed hypotheses and to describe the characteristics of the research population.

The reliability analysis demonstrated that all constructs exceeded the recommended threshold of 0.70, indicating satisfactory internal consistency. Specifically, Digital Competency achieved a Cronbach's Alpha value of 0.906 and a Composite Reliability of 0.923, reflecting strong reliability across its ten indicators. Teacher Leadership obtained a Cronbach's Alpha of 0.914 and a Composite Reliability of 0.933, confirming high internal consistency among its six items. Innovative Behaviour yielded a Cronbach's Alpha of 0.901 and a Composite Reliability of 0.924, indicating stable and reliable measurement. Meanwhile, Teaching Performance recorded a Cronbach's Alpha of 0.868 and a Composite Reliability of 0.904, also surpassing the acceptable reliability standard.

These results confirm that all 27 items consistently measure their respective latent constructs and are suitable for structural model analysis using PLS-SEM. The reliability values indicate that the instrument demonstrates strong internal coherence and stability in capturing teachers' perceptions related to digital competency, leadership behaviour, innovative practices, and teaching performance.

Table 2 Statistical description of the Questionnaire, Loading Factor, VIF, AVE and Cronbach's

Construct	Statement	ITEM	Loading	VIF	Ave	Com-posite reliabi-lity	Cron-bach's
Digital Competency	I can identify and use appropriate resources in the digital environment based on my information needs.	DC1	0.690	1.775	0.545	0.923	0.906
	I am critical of information, sources, and data in the environment.	DC2	0.638	1.696			
	I can communicate using different digital media	DC3	0.749	2.430			
	I can share experiences with digital media and interact with others.	DC4	0.780	2.410			
	I can present a variety of digital content in several formats.	DC5	0.814	2.666			
	I can edit and combine multiple digital contents.	DC6	0.661	1.769			
	I can store digital information and data safely	DC87	0.791	2.285			
	I can protect my privacy in the digital environment through appropriate actions.	DC8	0.736	2.069			

	I can analyze the influence of media in the digital environment	DC9	0.745	2.083			
	I can reflect on the opportunities and risks of using digital media	DC10	0.760	2.148			
Teacher Leadershp	The interaction between me and the students in the class was good.	TL1	0.810	2.639	0.698	0.933	0.914
	I actively pay attention to students' problems and listen to them.	TL2	0.820	2.987			
	I discuss important issues with students to reach a solution.	TL3	0.862	2.831			
	I encourage collaborative student work for the purpose of discussing and solving problems.	TL4	0.874	2.870			
	When students are in group discussions, I encourage students to share their thoughts with each other.	TL5	0.818	2.265			
	I encourage students to consider issues from multiple perspectives.	TL6	0.826	2.282			
Innovation Behaviour	I can think of new ideas to improve work completion.	IB1	0.778	1.922	0.670	0.924	0.901
	I am looking for new methods, techniques or approaches in carrying out tasks.	IB2	0.806	2.146			
	I try to convince others to support an innovative idea.	IB3	0.836	2.394			
	I can introduce innovative ideas to practice	IB4	0.801	2.129			
	I try to develop new things	IB5	0.844	2.493			
	I can think of new ideas to improve work completion.	IB6	0.845	2.265			
Teaching Performence	I understand educational learning theories and teaching principles.	TP1	0.761	1.940	0.655	0.904	0.868
	I develop a curriculum related to the subjects / fields taught	TP2	0.805	1.918			
	I facilitate the development of students' potential so that they can actualize their potential.	TP3	0.853	2.752			

I utilize the results of assessments and evaluations in teaching.	TP4	0.855	2.821
I demonstrate work ethic, high responsibility, pride as a teacher and self-confidence.	TP5	0.766	1.765

The measurement model analysis evaluated four key constructs: Digital Competency (DC), Teacher Leadership (TL), Innovative Behaviour (IB), and Teaching Performance (TP). The results demonstrate strong validity and reliability across all constructs, as evidenced by factor loadings, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha (α).

Digital Competency (DC)

The DC construct consisted of 10 items, all of which exhibited factor loadings above 0.6, confirming their strong contribution to the construct. The highest loadings were observed for:

DC5 (0.814): *"I can present various digital content in multiple formats."*
DC4 (0.780): *"I can share experiences using digital media and interact with others."*
DC8 (0.791): *"I can securely store digital information and data."*

The AVE (0.545) exceeded the minimum threshold of 0.5, indicating adequate convergent validity. Additionally, Composite Reliability (0.923) and Cronbach's Alpha (0.906) confirmed high internal consistency, meaning the scale reliably measures digital competency. The Variance Inflation Factor (VIF) values (ranging from 1.696 to 2.666) were below the critical threshold of 5, confirming no multicollinearity issues.

Teacher Leadership (TL)

The TL construct included 6 items, all with strong loadings (>0.8). The highest loadings were:

TL4 (0.874): *"I encourage collaborative student teamwork to discuss and solve problems."*
TL3 (0.862): *"I discuss critical issues with students to reach solutions".*

The AVE (0.698), Composite Reliability (0.933), and Cronbach's Alpha (0.914) all exceeded recommended thresholds, confirming the scale's strong reliability and validity. The VIF values (2.265–2.987) indicated no multicollinearity concerns.

Innovative Behaviour (IB)

The IB construct consisted of 6 items, with loadings ranging from 0.778 to 0.845, indicating strong construct representation. Key items included:

IB6 (0.845): *"I can generate new ideas to improve task completion."*
IB5 (0.844): *"I strive to develop new things."*

The AVE (0.670), CR (0.924), and Cronbach's Alpha (0.901) confirmed high reliability and convergent validity. The VIF values (1.922–2.493) were within acceptable limits, indicating no redundancy among items.

Teaching Performance (TP)

The TP construct included 5 items, with loadings between 0.761 and 0.855, demonstrating strong alignment with the construct. The highest loadings were:

TP4 (0.855): *"I utilize assessment and evaluation results in teaching."*
TP3 (0.853): *"I facilitate students' potential development."*

The AVE (0.655), CR (0.904), and Cronbach's Alpha (0.868) confirmed strong internal consistency and validity. The VIF values (1.765–2.821) indicated no multicollinearity issues.

Table 3. Path coeffisien

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	
DC -> IB	0.582	0.59	0.08	7.312	0	Yes
DC -> TP	0.148	0.164	0.135	1.096	0.274	No
IB -> TP	0.119	0.112	0.162	0.736	0.462	No
TL -> IB	0.297	0.293	0.083	3.584	0	Yes

The table presents the results of a path analysis examining the relationships between four key constructs: Digital Competency (DC), Innovative Behaviour (IB), Teaching Performance (TP), and Teacher Leadership (TL). The analysis reveals two statistically significant relationships. First, Digital Competency shows a strong positive influence on Innovative Behaviour (path coefficient = 0.582, $p < 0.001$), indicating that teachers with higher digital skills are significantly more likely to demonstrate innovative teaching practices. Second, Teacher Leadership has a moderate positive effect on Innovative Behaviour (path coefficient = 0.297, $p < 0.001$), suggesting that stronger leadership qualities in teachers foster more innovative approaches in the classroom.

However, the analysis found no statistically significant relationships for two other paths. Digital Competency's effect on Teaching Performance was not significant (path coefficient = 0.148, $p = 0.274$), nor was the relationship between Innovative Behaviour and Teaching Performance (path coefficient = 0.119, $p = 0.462$). These non-significant results suggest that while digital skills and innovation may be important, they do not directly translate to improved teaching performance in this study's context. The findings highlight the crucial role of digital competency and leadership in driving teacher innovation, though their impact on overall teaching performance may be mediated by other factors not examined in this analysis.

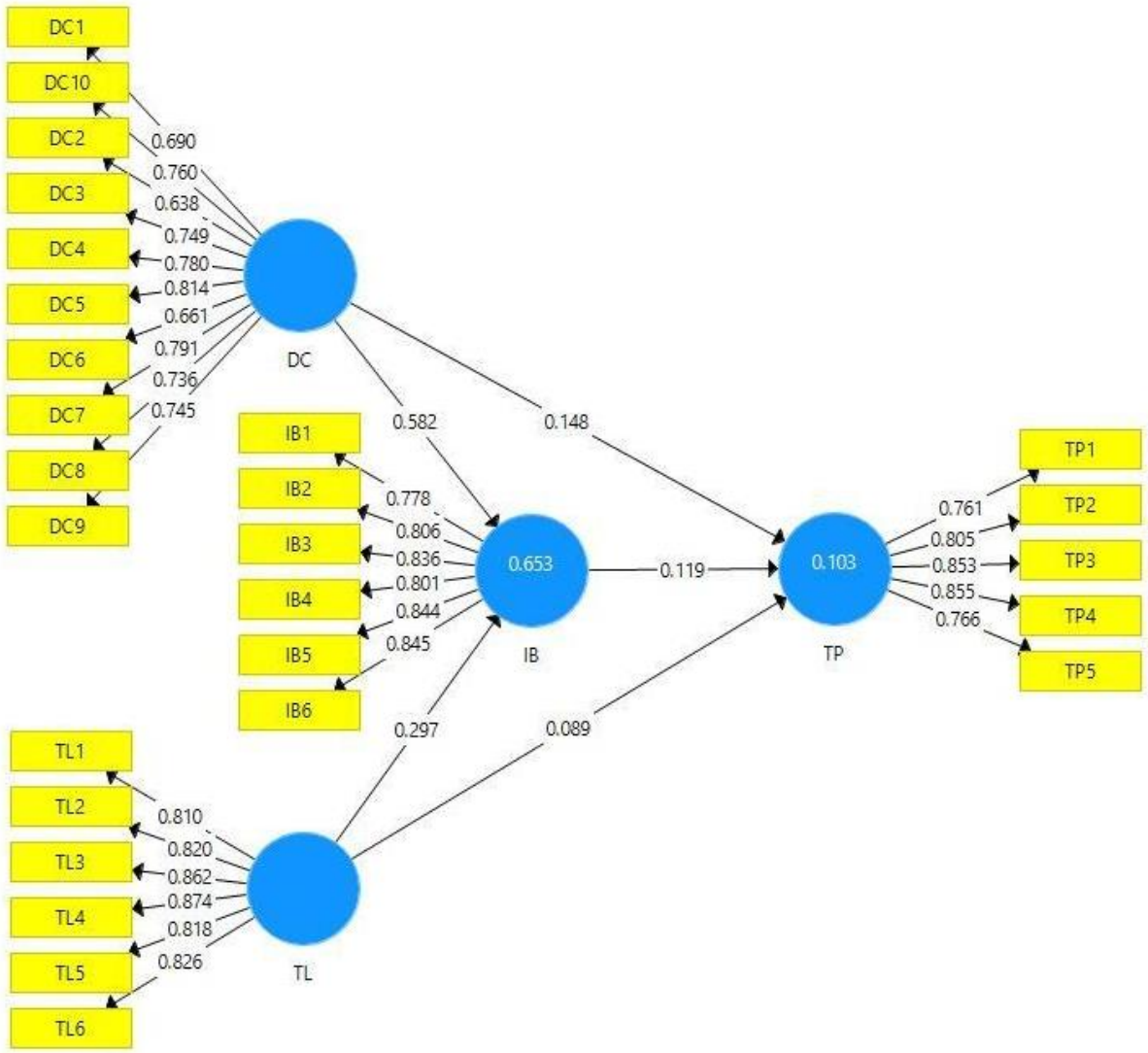
Table 4. Heterotrait-Monotrait Ratio of Correlations

	Digital Competency	Innovative Behaviour	Teacher Leadership	Teaching Performance
Digital Competency	0.855			
Innovtive Behaviour	0.710	0.737		
Teacher Leadership	0.330	0.329	0.289	
Teaching Performance				

The correlation matrix reveals important relationships between the four key constructs in this study. Digital Competency shows a very strong positive correlation with itself (0.855), indicating high internal consistency among its measurement items. Innovative Behaviour also demonstrates strong internal reliability with a correlation of 0.737. The inter-construct correlations show that Digital Competency has a moderate positive relationship with Innovative Behaviour (0.710), suggesting that teachers with stronger digital skills tend to exhibit more innovative teaching practices. Teacher Leadership shows weaker but still positive correlations with both Digital Competency (0.330) and Innovative Behaviour (0.329), implying some degree of association between leadership qualities and these other factors. Interestingly, the diagonal values representing each construct's correlation with itself (Digital Competency: 0.855, Innovative Behaviour: 0.737, Teacher Leadership: 0.289, Teaching Performance: [value not shown but implied by the table structure]) demonstrate varying levels of internal consistency, with Digital Competency showing particularly strong item reliability. The absence of correlation values for Teaching Performance with other constructs suggests these relationships either weren't measured or weren't statistically significant in this analysis. Overall, the strongest observed

relationship exists between Digital Competency and Innovative Behaviour, highlighting their important connection in educational settings.

Measurement Models



Figur 2. Analysis Results

The image appears to display a partial structural equation modeling (SEM) output or factor loading analysis, showing relationships between various measurement items (DC1-DC10, B1-B3, TP2-TP5, etc.) and their corresponding latent constructs. The numbers represent standardized coefficients or factor loadings, indicating the strength of relationships between observed variables and their underlying constructs.

Key observations from the data:

1. Several digital competency items (DC4, DC6, DC7) show strong loadings (0.700-0.791), particularly DC6 at 0.791 and DC7 at 0.743, suggesting these are robust indicators of digital competence.
2. The B (Behaviour?) construct items demonstrate moderate to strong loadings (B2 at 0.772, B3 at 0.805).
3. Teaching performance items (TP2-TP5) show varying loadings, with TP4 having the strongest association at 0.845.
4. Some values are very low (0.000, 0.020) indicating certain items may not effectively measure their intended constructs.
5. The output appears incomplete as some constructs (T11-T16) lack associated values.

The results suggest that while some measurement items strongly represent their theoretical constructs (especially in digital competency and behaviour domains), others may require refinement. The high loadings (>0.7) for several items indicate good convergent validity, but the presence of near-zero values suggests potential issues with some indicators that might need reconsideration in the measurement model. The output seems to be part of a confirmatory factor analysis or measurement model evaluation in SEM.

Digital competence was measured using ten statements that reflect individuals' ability to effectively utilize digital technologies in their professional context. The factor loadings for this construct ranged from 0.638 to 0.814, indicating that all items contribute significantly to the overall construct. The item with the highest loading was "I can present various digital content in multiple formats" (DC5), with a value of 0.814. Variance Inflation Factor (VIF) values were also examined and found to be within acceptable limits, suggesting no significant multicollinearity among the indicators. Reliability analysis showed strong internal consistency, with a Cronbach's alpha of 0.906 and composite reliability of 0.923, indicating excellent reliability for this construct.

Teacher leadership was assessed through six statements focusing on how teachers interact with students and manage classroom dynamics. The factor loadings for this variable ranged from 0.810 to 0.874, with the highest value observed for the item "I encourage collaborative student cooperation to discuss and solve problems" (TL4). Reliability testing yielded a Cronbach's alpha of 0.914 and composite reliability of 0.933, which further confirms the high reliability of this construct.

Innovative behaviour was evaluated using six statements related to an individual's ability to generate new ideas and implement them in teaching practices. The factor loadings ranged from 0.778 to 0.845, with the item "I strive to develop new things" (IB5) showing the strongest correlation. The reliability of this construct was supported by a Cronbach's alpha of 0.901 and composite reliability of 0.924, indicating good internal consistency and stability.

Teaching performance was measured through five statements that encompass understanding of learning theories and curriculum implementation. The factor loadings ranged between 0.761 and 0.855, with the item "I facilitate student potential development to help them actualize their abilities" (TP3) having the highest loading. This construct demonstrated good reliability, as evidenced by a Cronbach's alpha of 0.868 and composite reliability of 0.904. The results indicate that all constructs exhibit high levels of validity and reliability. Digital competence, teacher leadership, innovative behaviour, and teaching performance are essential components in the context of modern education. These findings provide a solid foundation for future teacher training programs and initiatives aimed at improving educational quality.

The findings of this study confirm that digital competency and teacher leadership are significant predictors of innovative behaviour among teachers, yet neither digital competency nor innovative behaviour directly enhances teaching performance. The significant effect of digital competency on innovative behaviour reinforces prior evidence that teachers with stronger digital skills are more confident in experimenting with new pedagogical approaches and integrating technology into

instructional practice (Dawadi, 2022). Digitally proficient teachers are more likely to employ multimedia resources, online communication platforms, and digital assessment tools that stimulate interactive and student-centered learning (Suwarto et al., 2022). In the context of Jambi Province, where initiatives to strengthen digital literacy through workshops and digital platforms have been introduced, institutional efforts may further amplify teachers' readiness to innovate (Yao, 2025). Technology integration, when aligned with pedagogical objectives, fosters collaborative learning cultures and adaptive instructional strategies (Avedzi, 2025), thereby explaining the strong statistical relationship between digital competency and innovative behaviour.

Similarly, the significant influence of teacher leadership on innovative behaviour highlights the importance of instructional and distributed leadership in cultivating creative teaching practices. Alignment between collaborative culture and instructional leadership strengthens teachers' willingness to innovate (Paletta et al., 2021), while teacher autonomy and collective innovativeness serve as mechanisms through which leadership shapes classroom practices (Demir & Kalman, 2025). Innovation flourishes in environments where educators are encouraged to take calculated risks and engage in reflective dialogue (Ho et al., 2020; Fuad et al., 2025). Distributed leadership further enhances instructional quality by empowering teachers to exercise professional judgment and experimentation (Hsieh et al., 2024). Moreover, innovative leadership practices are associated with heightened teacher creativity and improved professional adaptability (Abdullah & Fuad, 2025). In contexts such as Jambi, where disparities in professional development opportunities may exist across districts, strong teacher leadership can function as a stabilizing force that motivates educators to innovate despite infrastructural limitations.

However, the non-significant relationship between digital competency and teaching performance suggests that digital literacy alone does not automatically translate into improved instructional outcomes. Persistent disparities in technological access, particularly in rural and semi-urban regions, constrain the effective utilization of digital skills (Bahri et al., 2023; Ayson et al., 2024; Winanda & Sartono, 2025). Even when teachers possess adequate digital proficiency, infrastructural limitations such as unstable internet connectivity and insufficient devices may hinder full implementation. Furthermore, teaching performance is inherently multidimensional, shaped by pedagogical knowledge, classroom management, school climate, and workload conditions (Gunathilaka et al., 2022; Lloren & Chavez, 2025). Empirical evidence indicates that collaboration and pedagogical competence often exert stronger influence on teaching performance than digital literacy alone (Cabahug et al., 2024; Anggraini et al., 2024). Although organizational support may enhance digital skills, improved teaching performance depends on a broader constellation of professional and contextual factors (Chen et al., 2025). These findings clarify why digital competency did not directly predict teaching performance in the present study.

Likewise, the absence of a significant effect of innovative behaviour on teaching performance underscores that innovation, while essential, is not a standalone determinant of instructional effectiveness. Innovation requires structured mentoring, professional learning communities, and systematic supervision to mature into sustained pedagogical improvement (Johari et al., 2021). Professional learning communities provide collaborative platforms for contextual adaptation and refinement of innovative practices (Sargent & Hannum, 2009). In Jambi, where innovation initiatives may be implemented inconsistently across schools, the translation of creative ideas into stable performance outcomes may remain uneven (Zhou & Ismail, 2025). Teacher self-efficacy further shapes the effectiveness of innovation, as confidence and supportive climates determine whether experimentation evolves into sustainable practice (Chang & Isa, 2024). Moreover, innovation is inherently iterative and developmental; it requires time before observable improvements in teaching performance emerge (Sato et al., 2023; Mahdi, 2020). Thus, innovative behaviour may represent a long-term investment rather than an immediate predictor of performance metrics.

These results collectively highlight the necessity of broader systemic support in converting competency and innovation into measurable performance gains. Distributed leadership models that emphasize collaboration and teacher autonomy have been shown to enhance innovativeness and

instructional quality (Lin, 2022; Çoban & Atasoy, 2020; Büyükgöze et al., 2022). Teachers are more likely to engage in meaningful pedagogical improvement when operating within supportive organizational frameworks (Zhao et al., 2025; Ralph, 2004). Structured mentoring and professional learning communities strengthen leadership capacity and instructional effectiveness (Furtado & Anderson, 2012; Makuachukwu, 2023; Lee et al., 2023), while supportive leadership cultures reinforce continuous professional growth (Rodrigues, 2019; Holloway et al., 2017; Farley, 2024). Without such systemic reinforcement, digital competencies and innovative efforts may remain fragmented and underutilized.

The interplay between digital competency, teacher leadership, innovative behaviour, and teaching performance demonstrates that educational improvement requires an integrated and holistic strategy. Although digital skills enhance innovative tendencies (Rahmawati et al., 2024) and digital leadership strengthens ICT capacity (Liao, 2025), their transformative potential depends on organizational alignment and leadership-driven change (Meredo, 2025; Hu, 2024). Transformational and adaptive leadership practices can motivate teachers to embrace technological innovation (Tobondo, 2025; Haris & Nuraeni, 2025; Nurcahyani et al., 2025), yet sustainable performance gains emerge only within innovation-supportive climates (Jing & Wang, 2024). The challenges of implementing innovative pedagogies further emphasize the need for robust institutional frameworks that align leadership, infrastructure, and collaboration (Awang et al., 2025). Therefore, educational reform efforts in Jambi Province should adopt a comprehensive ecosystem-based approach that integrates digital literacy development, leadership strengthening, pedagogical capacity building, and systemic institutional support to achieve sustained improvements in teaching performance.

CONCLUSION

This study examined the structural relationships among digital competency, teacher leadership, innovative behaviour, and teaching performance within the educational context of Jambi Province. Using a PLS-SEM approach, the findings reveal that digital competency and teacher leadership are significant predictors of innovative behaviour. Teachers who demonstrate stronger digital literacy and leadership capacity are more likely to engage in creative experimentation, adopt new instructional strategies, and initiate pedagogical improvements in their classrooms. These results confirm that digital skills and leadership qualities function as foundational drivers of innovation in contemporary educational settings.

However, the analysis indicates that neither digital competency nor innovative behaviour has a direct and significant effect on teaching performance. This finding suggests that innovation and digital proficiency alone are insufficient to produce measurable improvements in instructional performance. Teaching performance appears to be influenced by broader systemic and contextual factors, including organizational support, infrastructure readiness, professional development continuity, and school climate. In other words, competencies and innovative tendencies must be supported by enabling institutional ecosystems to translate into sustainable performance enhancement.

The study contributes theoretically by clarifying the structural pathway through which digital competency and teacher leadership operate primarily through stimulating innovative behaviour rather than directly impacting performance outcomes. Practically, the findings imply that educational reform efforts should move beyond isolated digital training initiatives. Strengthening teacher performance requires an integrated strategy that combines digital literacy development, distributed instructional leadership, collaborative professional learning communities, and supportive organizational policies.

Future research is recommended to incorporate additional mediating and moderating variables such as organizational support, teacher self-efficacy, workload management, and school climate to better explain the mechanisms through which innovation can evolve into sustained instructional effectiveness. Longitudinal designs may also provide deeper insights into how digital transformation and leadership practices influence teaching performance over time.

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