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Digital Education Ecosystems And Teacher Commitment: The Roles Of Instructional Leadership, Learning Culture, And Digital Pedagogical Competence Through Psychological Empowerment

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Abstract

This study aims to analyze the influence of Instructional Leadership, Organizational Learning Culture, and Digital Pedagogical Competence on Teacher Professional Commitment through the mediation of Psychological Empowerment in the context of the digital education ecosystem. The study used a quantitative explanatory approach with a sample of 100 high school teachers in Ambon City selected using purposive sampling. Data were collected through an indicator-based questionnaire for each variable and analyzed using Structural Equation Modeling based on Partial Least Square (SEM-PLS). The results showed that the three independent variables had a positive and significant effect on Psychological Empowerment, and Psychological Empowerment significantly mediated the relationship between Instructional Leadership and Organizational Learning Culture with Teacher Professional Commitment. Conversely, the effect of Digital Pedagogical Competence on Teacher Professional Commitment through Psychological Empowerment was not significant, indicating that teachers' mastery of digital competencies needs to be supported by psychological factors and the organizational environment to increase professional commitment. These findings emphasize the importance of the role of the principal and organizational learning culture in empowering teachers psychologically so that they can increase their professional attachment to the profession. This research provides practical implications for the development of digital leadership strategies, strengthening organizational

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culture, and psychological empowerment of teachers as an effort to create adaptive, innovative, and sustainable education in the era of digital transformation.

Keywords: Instructional Leadership, Psychological Empowerment, Teacher Commitment, Digital Competence, Learning Culture

INTRODUCTION

The digital transformation in education has fundamentally changed the way schools manage learning, leadership, organizational culture, and teacher professional development. Digital education ecosystems are no longer understood solely as the use of technology in the teaching and learning process, but as the comprehensive integration of school leadership, organizational learning culture, teacher digital competency, and psychological systems that support adaptation to 21st-century educational changes. In this context, the success of digital education transformation is largely determined by the level of professional commitment of teachers, the primary actors implementing learning. Teachers with high professional commitment tend to demonstrate loyalty to the institution, involvement in self-development, readiness for innovation, and the ability to maintain the quality of learning amidst rapid technological change.

However, the reality on the ground shows that digital transformation in education has not always been accompanied by increased professional commitment from teachers. Many teachers still experience digital fatigue, resistance to technological change, low confidence in using digital learning platforms, and an inability to effectively integrate digital pedagogy into the learning process. This situation has led some teachers to use technology only administratively, rather than as a transformative pedagogical instrument. This problem becomes increasingly complex when schools are unable to build a digital ecosystem that supports the psychological empowerment of teachers in facing changes in the technology-based education system.

In this context, instructional leadership is a crucial factor influencing the success of digital transformation in education. The principal's instructional leadership is no longer limited to conventional academic supervision but has evolved into digital instructional leadership, capable of directing, guiding, and facilitating teachers in implementing technology-based learning. Research by Yang, Alias, and Nor (2025) shows that principal technology leadership significantly influences teachers' ICT integration by strengthening their professional capacity and sustaining

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digital education. This finding is supported by Rasdiana et al. (2024), who stated that instructional e-supervision and technology leadership can improve teachers' professional digital competence by creating an adaptive school digital culture. This demonstrates that instructional leadership plays a strategic role in shaping the direction of digital education transformation while strengthening teacher engagement in organizational change.

In addition to leadership, organizational learning culture is also a crucial foundation for building a sustainable digital education ecosystem. An organizational learning culture reflects a school's ability to create a collaborative, reflective, innovative, and adaptive environment for developments in educational technology. Schools with a strong organizational learning culture tend to encourage teachers to continuously learn, share knowledge, and collectively develop digital pedagogical practices. Connolly, O'Brien, and O'Ceallaigh (2023) emphasized that the sustainability of digital transformation in education is highly dependent on digital educational leadership, which is able to build knowledge sustainability through a learning organizational culture. Meanwhile, Siswadi et al. (2025) found that digital leadership contributes to the formation of an organizational quality culture in education in the era of digital disruption. Thus, an organizational learning culture is not only an administrative factor but also a social mechanism that strengthens teachers' readiness to face changes in educational technology.

On the other hand, digital pedagogical competence is a key competency that teachers must possess in the digital education ecosystem. This competency encompasses teachers' ability to integrate technology with pedagogical strategies, digital learning design, technology-based assessment, virtual communication, and the effective and ethical use of digital media. The greatest challenge in education today is no longer simply providing technology, but ensuring teachers are able to use it pedagogically to improve the quality of learning. Norman et al. (2025) explain that improving teacher competence in the digital era is heavily influenced by integrated leadership, professional development, and digital innovation. Lukman and Yune (2025) also emphasize that digital leadership and teacher digital competence are key to the successful integration of digital culture into modern education. Thus, digital pedagogical competence is a crucial element determining the success of educational transformation and influencing teachers' professional commitment to their work.

Although instructional leadership, organizational learning culture, and digital pedagogical competence are believed to increase teacher professional commitment, this relationship is not always direct. In many cases, teachers continue to demonstrate low professional commitment

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even though their schools have provided digital facilities and innovative policies. This situation suggests the existence of internal psychological factors that mediate the relationship between the organizational environment and teacher professional behavior. One relevant factor is psychological empowerment. Psychological empowerment reflects the psychological state of an individual who feels they have meaning in their work, self-competence, autonomy, and influence over their work environment. Teachers who feel psychologically empowered tend to have higher intrinsic motivation, confidence in using technology, and stronger professional engagement.

Research by Ta'yid, Nazarzāde Zāre, and Khākpoor (2023) found that digital leadership influences teachers' digital teaching through the mediation of psychological empowerment. These findings indicate that the success of digital transformation in education is highly dependent on the organization's ability to build teachers' self-confidence and psychological empowerment. Furthermore, Aithal and Aithal (2023) emphasized that the development of digital pedagogy and faculty development strategies must be directed at empowering educators to adapt to continuous changes in digital learning. Thus, psychological empowerment becomes a strategic variable that bridges the relationship between organizational factors and teacher professional behavior in the digital education ecosystem.

Theoretically, research on teacher professional commitment in the context of digital transformation still shows several research gaps. First, most previous studies have focused on the influence of technology leadership on teachers' digital competence, while the simultaneous relationship between instructional leadership, organizational learning culture, digital pedagogical competence, and teacher professional commitment is still relatively limited. Second, previous research tends to position psychological empowerment as an individual variable without integrating it within a comprehensive digital education ecosystem framework. Third, there is still little research testing an integrated structural model that connects leadership, organizational culture, digital competence, psychological empowerment, and teacher professional commitment in a single empirical model. However, digital educational transformation requires a systemic approach that views schools as interconnected ecosystems.

Furthermore, most previous research has been conducted in the context of general education and focused solely on the technological aspects, rather than on the sustainability of teachers' professional commitment in the face of the pressures of digital change. Xu (2025) explains that technology-based educational leadership transformation requires an ecosystem leadership approach that positions people, culture, and innovation as an integrated system.

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Therefore, research is needed that can explain how instructional leadership, organizational learning culture, and digital pedagogical competence can shape teacher psychological empowerment, thereby impacting increased teacher professional commitment in digital education ecosystems.

Based on this description, this study is crucial to analyze the influence of instructional leadership, organizational learning culture, and digital pedagogical competence on teacher professional commitment through psychological empowerment in the context of digital education ecosystems. This research is expected to provide a theoretical contribution by developing an integrative model of the factors influencing teacher professional commitment in the era of digital transformation. In addition, this research is also expected to provide practical contributions for school principals, educational policy makers, and educational institutions in designing digital leadership strategies, organizational learning culture, strengthening digital pedagogical competencies, and teacher psychological empowerment in order to create an adaptive, innovative, and sustainable education system in the digital era.

LITERATURE REVIEW

Instructional Leadership

The Concept of Instructional Leadership

Instructional leadership is an educational leadership concept that focuses on improving the quality of learning through direction, academic supervision, teacher professional development, and the creation of an effective learning environment. In the era of digital transformation, instructional leadership has evolved into digital instructional leadership, emphasizing not only conventional learning supervision but also the ability of school leaders to direct the integration of digital technology into the learning process. As instructional leaders, principals are responsible for ensuring that all learning components are effective, innovative, and aligned with the demands of 21st-century education.

According to Yang, Alias, and Nor (2025), principals' technological leadership plays a crucial role in building teacher capacity to integrate information and communication technology into learning. Effective instructional leadership can enhance teacher readiness for digital change through policy support, technology-based academic supervision, and the provision of an innovative work environment. This demonstrates that instructional leadership functions not only

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as an organizational control mechanism but also as a catalyst for digital educational transformation.

Rasdiana et al. (2024) explained that instructional e-supervision is a crucial part of modern instructional leadership because it can systematically improve teachers' professional digital competencies. Principals who actively supervise digital learning tend to succeed in creating an academic culture that adapts to technological change. Furthermore, instructional leadership is also related to the school leader's ability to provide vision, motivation, and emotional support to teachers so they can adapt to the challenges of digital learning.

From an organizational behavior perspective, instructional leadership is seen as a leader's ability to direct educational human resources toward the effective achievement of learning goals. Good instructional leaders not only manage school administration but also build a collaborative, reflective learning system that is oriented toward improving the quality of education. Therefore, instructional leadership is a crucial factor in building teacher professional commitment in the digital era.

Organizational Learning Culture

The Concept of Organizational Learning Culture

Organizational learning culture is an organizational culture that encourages individuals within the organization to continuously learn, share knowledge, innovate, and adapt to environmental changes. In the context of digital education, organizational learning culture is a crucial element in determining the success of a school's transformation into a technology-based learning ecosystem. Schools with a strong organizational learning culture tend to be able to foster collaboration among teachers, shared knowledge development, and continuous learning innovation.

Connolly, O'Brien, and O'Ceallaigh (2023) state that digital transformation in education requires knowledge sustainability, which can only be achieved through a learning organizational culture. This culture enables teachers to collectively develop digital skills through reflective practice, professional collaboration, and knowledge exchange. In a learning organization, teachers are not only implementers of educational policy but also agents of change who actively develop learning innovations.

Siswadi et al. (2025) explain that organizational quality culture in digital education is influenced by digital leadership that encourages innovation, adaptability, and a quality

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orientation. A positive organizational learning culture can increase teacher engagement in professional development and strengthen the organization's readiness to face technological disruption. Thus, organizational learning culture plays a crucial role in enhancing psychological empowerment and teacher professional commitment.

From an organizational theory perspective, organizational learning culture reflects a system of values, norms, and organizational practices that support continuous collective learning processes. Organizations with a strong learning culture are more adaptable to change and able to create a work environment that supports both individual and organizational development simultaneously.

Dimensions and Indicators of Organizational Learning Culture

Digital Pedagogical Competence

Concept of Digital Pedagogical Competence

Digital pedagogical competence is a teacher's ability to integrate digital technology with pedagogical strategies to create effective, innovative, and student-centered learning. This competency encompasses technical skills in technology use, digital learning design, virtual communication, technology-based assessment, and the ethical use of digital media in education.

The development of educational technology has shifted the paradigm of teacher competency from merely conventional teaching skills to the ability to manage digital learning holistically. Norman et al. (2025) explain that improving teacher competency in the digital era requires the integration of leadership, professional development, and the innovation ecosystem. Teachers with high digital pedagogical competence tend to be able to create more interactive, collaborative, and student-centered learning.

Lukman and Yune (2025) emphasize that teacher digital competence is a key factor in the successful integration of digital culture in schools. Digital pedagogical competence relates not only to the technical ability to use learning applications but also to the pedagogical ability to select digital learning strategies that are appropriate to student needs. Furthermore, Aithal and Aithal (2023) explain that strengthening digital pedagogy must be directed at empowering educators so that teachers can sustainably navigate changes in educational technology.

From a modern pedagogical perspective, digital pedagogical competence is a core competency for 21st-century teachers because it determines the effectiveness of learning in a

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digital environment. Teachers with strong digital pedagogical competence will more easily adapt to educational innovations and demonstrate a stronger professional commitment to their work.

Psychological Empowerment

The Concept of Psychological Empowerment

Psychological empowerment is an individual's psychological state that reflects a sense of meaning, competence, autonomy, and influence over the work they do. This concept emphasizes that individuals will demonstrate high intrinsic motivation when they feel they have control and ability to carry out their tasks.

In the context of digital education, psychological empowerment is a crucial factor influencing teacher readiness to face the transformation of educational technology. Teachers who feel psychologically empowered tend to have greater confidence in using technology, are more open to innovation, and have a stronger professional attachment to the school.

Ta'yid, Nazarzāde Zāre, and Khākpoor (2023) found that digital leadership can improve teachers' digital teaching through psychological empowerment. These findings indicate that the success of digital education transformation depends not only on technological facilities but also on teachers' psychological state in accepting organizational change. Psychological empowerment is also related to increased work motivation, job satisfaction, and organizational commitment.

According to empowerment theory, individuals who feel their work is meaningful and has an impact on the organization will demonstrate higher work engagement. Therefore, psychological empowerment becomes an important mediating variable in the relationship between organizational factors and teacher professional commitment.

Teacher Professional Commitment

The Concept of Teacher Professional Commitment

Teacher professional commitment is the level of psychological attachment of teachers to their profession, reflected in loyalty, professional responsibility, work engagement, and the desire to continuously develop themselves as educators. Teacher professional commitment is a crucial factor in improving the quality of education because it is directly related to work motivation, learning quality, and the successful implementation of educational innovation.

In the digital era, teacher professional commitment faces increasingly complex challenges due to technological change, demands for digital adaptation, and increased technology-based

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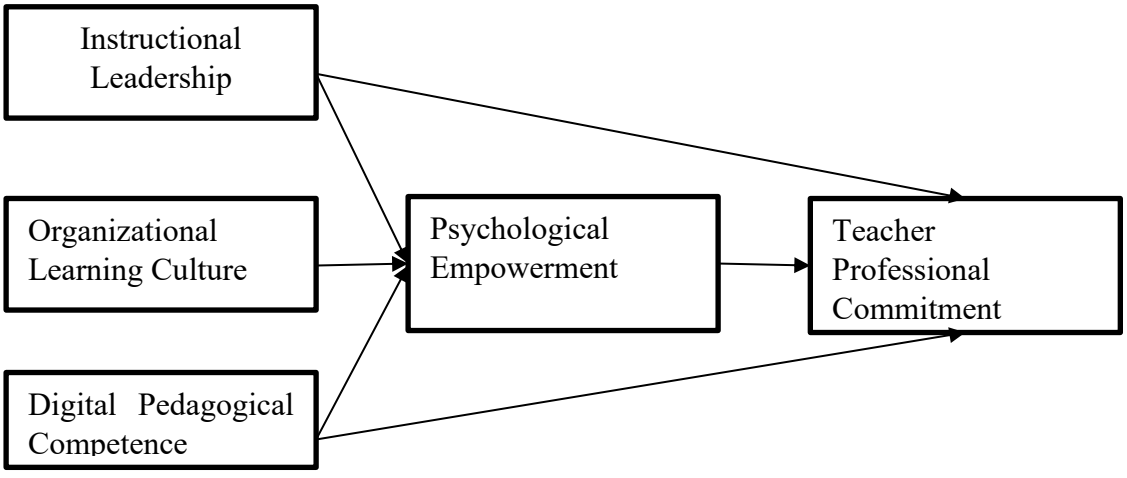
workloads. Teachers with high professional commitment will continue to strive to improve the quality of learning despite the pressures of changes in the digital education system.

Xu (2025) explains that technology-based educational transformation requires an educational leadership ecosystem capable of maintaining teacher engagement and professional commitment in the long term. Teacher professional commitment is not only influenced by individual factors but also by school leadership, organizational culture, professional competence, and the teacher's psychological state.

Teacher professional commitment is an important indicator of the success of educational organizations because highly committed teachers tend to demonstrate organizational loyalty, work engagement, learning innovation, and readiness for digital education changes.

Research Model

This research model describes the relationship between three independent variables, one mediating variable, and one dependent variable. Instructional leadership, organizational learning culture, and digital pedagogical competence are assumed to influence psychological empowerment and teacher professional commitment. Psychological empowerment is also assumed to influence teacher professional commitment and mediate the relationship between the independent and dependent variables.



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RESEACH METHOD

Research Type and Approach

This research uses a quantitative approach with an explanatory approach. This approach aims to examine the relationships between the variables formulated in the research model: instructional leadership, organizational learning culture, digital pedagogical competence, psychological empowerment, and teacher professional commitment. This explanatory approach was chosen because this research not only describes the phenomenon but also explains the direct and indirect influences between variables through hypothesis testing.

This research employed a survey method by distributing questionnaires to high school teachers in Ambon City. The data obtained were then analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS). SEM-PLS was chosen because it is appropriate for testing research models that have several latent variables, reflective indicators, and mediating relationships through psychological empowerment.

Research Location and Time

This research was conducted at high schools in Ambon City, Maluku Province. The selection of the research location was based on the consideration that high schools in Ambon are also facing the demands of digital transformation in education, both in the use of learning platforms, digital academic administration, and strengthening teachers' pedagogical competence. These conditions make high school teachers in Ambon relevant as research subjects regarding the digital education ecosystem and teacher professional commitment.

The research is planned to last several months, encompassing instrument development, data collection, data processing, research analysis, and report preparation.

Research Population and Sample

The population of this study is all high school teachers in Ambon City. This population includes teachers teaching at both public and private high schools that have used digital technology in their teaching and educational administration.

The sample size for this study was 100 high school teachers in Ambon City. This sample size is considered adequate for SEM-PLS analysis because the PLS method can be used with relatively small to medium sample sizes, especially when the research model has several latent

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constructs and measurement indicators. The sampling technique used was purposive sampling, which selects respondents based on specific criteria aligned with the research objectives.

The respondent criteria for this study were: active teachers teaching at the high school level in Ambon City, having experience using digital technology in teaching or school administration, and being willing to complete the research questionnaire. Based on these criteria, the selected respondents are expected to be able to provide information that aligns with the research focus.

Research Variables

This study consists of five main variables: three independent variables, one mediating variable, and one dependent variable. The independent variables in this study are instructional leadership, organizational learning culture, and digital pedagogical competence. The mediating variable is psychological empowerment. Meanwhile, the dependent variable is teacher professional commitment.

Instructional leadership refers to the principal's leadership in directing, fostering, and supporting the learning process, including digital-based learning. Organizational learning culture refers to a school culture that supports continuous learning, collaboration, innovation, and adaptation to change. Digital pedagogical competence refers to teachers' ability to integrate digital technology with learning strategies. Psychological empowerment refers to the psychological state of teachers who feel their work is meaningful, competent, autonomous, and influential within the school environment. Teacher professional commitment refers to teachers' attachment to their profession, reflected in loyalty, responsibility, involvement, and orientation toward professional development.

Operational Definitions of Variables

The operational definitions of the variables in this study are based on the dimensions and indicators described in Chapter II. Each variable is measured using statements in a questionnaire with a Likert scale.

Table 3.1 Operational Definitions of Variables

Variable	Dimension	Indicator
Instructional Leadership	Visionary Digital Leadership	The principal has a vision for digital learning.

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	Academic Supervision	The principal conducts instructional supervision.
	Professional Development Support	The principal supports teacher professional training.
	Learning Environment Management	The principal provides a supportive learning environment.
Organizational Learning Culture	Continuous Learning	The school promotes continuous learning.
	Knowledge Sharing	Teachers share knowledge with one another.
	Innovation Culture	The school supports innovation in teaching and learning.
	Adaptive Organizational Climate	The school is adaptive to technological changes.
Digital Pedagogical Competence	Digital Instructional Design	Teachers are able to design digital learning activities.
	Technology Utilization	Teachers are able to use digital platforms effectively.
	Digital Assessment	Teachers are able to implement technology-based assessments.
	Digital Communication & Ethics	Teachers are able to communicate and use technology ethically.
Psychological Empowerment	Meaning	Teachers perceive their work as meaningful.
	Competence	Teachers have confidence in their own abilities.
	Self-Determination	Teachers have autonomy in their work.
	Impact	Teachers feel they have an influence within the school.
Teacher Professional Commitment	Professional Loyalty	Teachers demonstrate loyalty to their profession.

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	Professional Involvement	Teachers actively participate in professional activities.
	Professional Responsibility	Teachers are responsible for maintaining the quality of instruction.
	Professional Development Orientation	Teachers are committed to continuously improving their competencies.

Data Collection Technique

The data collection technique in this study used a questionnaire. The questionnaire was structured as a closed-ended statement based on the indicators of each variable. Each respondent was asked to provide answers based on their perceptions and experiences as a high school teacher in Ambon City.

The measurement scale used was a five-level Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. This scale was used to measure the respondent's level of agreement with each statement related to the research variables.

In addition to the questionnaire, this study was also supported by secondary data in the form of school documents, digital education policies, academic literature, and relevant previous research findings. Secondary data was used to strengthen the theoretical foundation and interpretation of the research results.

Research Instrument

The research instrument was a questionnaire developed based on the dimensions and indicators of each variable. Each variable was measured through several statement items. This instrument was designed to obtain data on teachers' perceptions of instructional leadership, organizational learning culture, digital pedagogical competence, psychological empowerment, and teacher professional commitment.

Table 3.2 Research Instrument Outline

Variable	Code	Sample Statement
Instructional Leadership	IL1	The principal has a clear vision for the development of digital learning.

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	IL2	The principal provides guidance on the use of educational technology.
	IL3	The principal supervises the implementation of digital learning processes.
	IL4	The principal supports teacher training in the use of technology.
Organizational Learning Culture	OLC1	The school encourages teachers to continuously learn and develop themselves.
	OLC2	Teachers share experiences related to digital learning with one another.
	OLC3	The school provides opportunities for teachers to experiment with innovative teaching practices.
	OLC4	The school is able to adapt to changes in educational technology.
Digital Pedagogical Competence	DPC1	I am able to design learning activities based on digital technology.
	DPC2	I am able to use digital learning platforms effectively.
	DPC3	I am able to use technology to conduct learning assessments.
	DPC4	I use digital technology ethically in the teaching and learning process.
Psychological Empowerment	PE1	I feel that my work as a teacher is meaningful and important.
	PE2	I am confident in my ability to carry out digital teaching and learning tasks.
	PE3	I have the autonomy to determine instructional strategies.
	PE4	I feel that I can make a positive impact on the school.
Teacher Professional Commitment	TPC1	I am proud to be a teacher.
	TPC2	I actively participate in professional development activities.
	TPC3	I am responsible for maintaining the quality of instruction.

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	TPC4	I am committed to continuously improving my professional competencies.

Data Analysis Technique

The data analysis technique in this study used Structural Equation Modeling based on Partial Least Squares (SEM-PLS). SEM-PLS analysis was conducted to test the direct and indirect relationships between variables in the research model. Data processing was performed using SmartPLS software.

The SEM-PLS analysis in this study consisted of two main stages: testing the measurement model or outer model and testing the structural model or inner model. The outer model was used to test the validity and reliability of the indicators in measuring the latent constructs. The inner model was used to test the relationships between variables, including the mediating effect of psychological empowerment.

Testing the Measurement Model or Outer Model

Outer model testing was conducted to ensure that the indicators used in the study were valid and reliable. This testing included convergent validity, discriminant validity, composite reliability, and Cronbach's alpha.

Convergent validity was used to measure the extent to which the indicators represented the constructs being measured. An indicator was considered valid if its outer loading value was greater than 0.70. However, in social research, a loading value between 0.60 and 0.70 is still acceptable if the Average Variance Extracted (AVE) value meets the criteria. AVE is considered good if it is greater than 0.50.

Discriminant validity is used to ensure that each construct is distinct from other constructs. This test can be performed by examining the Fornell-Larcker Criterion or cross-loading values. A construct is considered to have good discriminant validity if the square root of the AVE value is higher than the correlation with other constructs.

Construct reliability is tested using Cronbach's alpha and composite reliability values. A construct is considered reliable if the Cronbach's alpha value is greater than 0.70 and the composite reliability value is greater than 0.70. Thus, the research instrument can be considered consistent in measuring each variable.

Structural Model or Inner Model Testing

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Inner model testing is conducted to determine the strength of the relationships between variables in the research model. This test includes the R-square value, path coefficient, t-statistic, p-value, and mediation effect.

The R-square value is used to determine the ability of the independent variable to explain the dependent variable. In this study, the R-square value was used to determine the extent to which instructional leadership, organizational learning culture, and digital pedagogical competence can explain psychological empowerment and teacher professional commitment.

The path coefficient is used to determine the direction and strength of the influence between variables. A positive path coefficient value indicates that an increase in the independent variable will be followed by an increase in the dependent variable. Conversely, a negative value indicates a relationship in the opposite direction.

Significance testing is performed by examining the t-statistic and p-value. The relationship between variables is considered significant if the t-statistic is greater than 1.96 and the p-value is less than 0.05 at the 5% significance level.

DISCUSSION

The Results chapter provides a detailed overview of the research findings, further elaborating on the results generally described in the Results chapter through the subchapters.

Measurement Model Evaluation (Outer Model)

Four outer model measurement criteria—Convergent Validity, Discriminant Validity, Composite Reliability, and Cronbach's Alpha—were considered during the evaluation of the outer model. The following figure shows the research model.

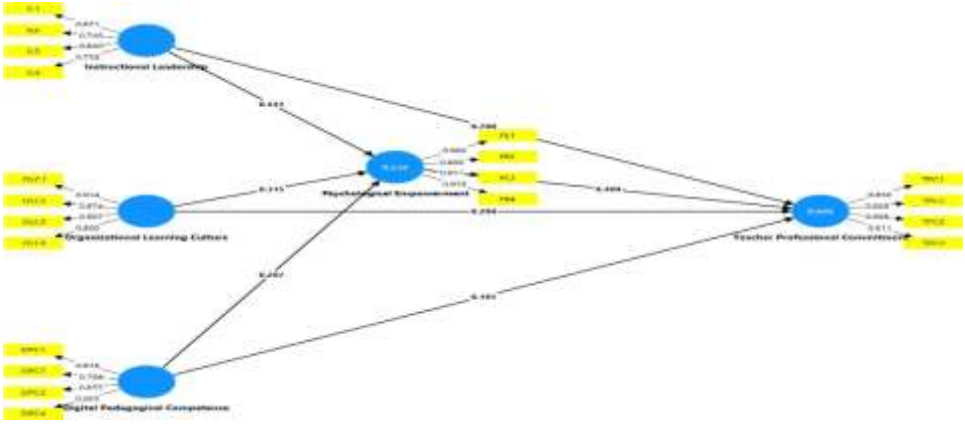


Figure 1. Outer Model

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Figure 1 illustrates the outer loading values of the variables in the study. In this figure, all outer loading values meet validity criteria because they exceed 0.7.

Validity Test

Validity testing is used to measure the validity of a questionnaire. In this study, validity testing was conducted using convergent validity and AVE. Validity was used in convergent validity, where the measurement model and indicator reflection were assessed based on the correlation between item scores/component scores calculated using PLS. An individual reflection measure is considered high if it correlates more than 0.7 with the construct being measured. However, according to Dahri (2017), for initial research on developing a measurement scale, a loading value of 0.5 to 0.6 is considered sufficient.

Table 1. Validity Test Results

Variabel		Outer Loading	AVE	Keterangan
Digital Pedagogical Competence	DPC1	0.816	0.657	Valid
	DPC2	0.764		Valid
	DPC3	0.855		Valid
	DPC4	0.805		Valid
Instructional Leadership	IL1	0.871	0.649	Valid
	IL2	0.748		Valid
	IL3	0.840		Valid
	IL4	0.758		Valid
Organizational Learning Culture	OLC1	0.914	0.765	Valid
	OLC2	0.874		Valid
	OLC3	0.907		Valid
	OLC4	0.800		Valid
Psychological Empowerment	PE1	0.900	0.821	Valid
	PE2	0.888		Valid
	PE3	0.917		Valid
	PE4	0.919		Valid
Teacher Professional Commitment	TPC1	0.850	0.739	Valid
	TPC2	0.868		Valid

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	TPC3	0.908	Valid
	TPC4	0.811	Valid

Based on the results of the instrument validity test, all indicators were declared valid.

Reliability Test

This study used two types of reliability tests: the Cronbach Alpha test and the Composite Reliability Test. Cronbach Alpha measures the lowest value (lower bound) of reliability. Data is considered reliable if it has a Cronbach Alpha value >0.7. Composite reliability measures the actual reliability value of a variable. Data is considered highly reliable if it has a composite reliability score >0.7.

Table 2: Reliability Test Results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Digital Pedagogical Competence	0.828	0.847	0.885
Instructional Leadership	0.821	0.842	0.881
Organizational Learning Culture	0.897	0.910	0.929
Psychological Empowerment	0.927	0.927	0.948
Teacher Professional Commitment	0.882	0.889	0.919

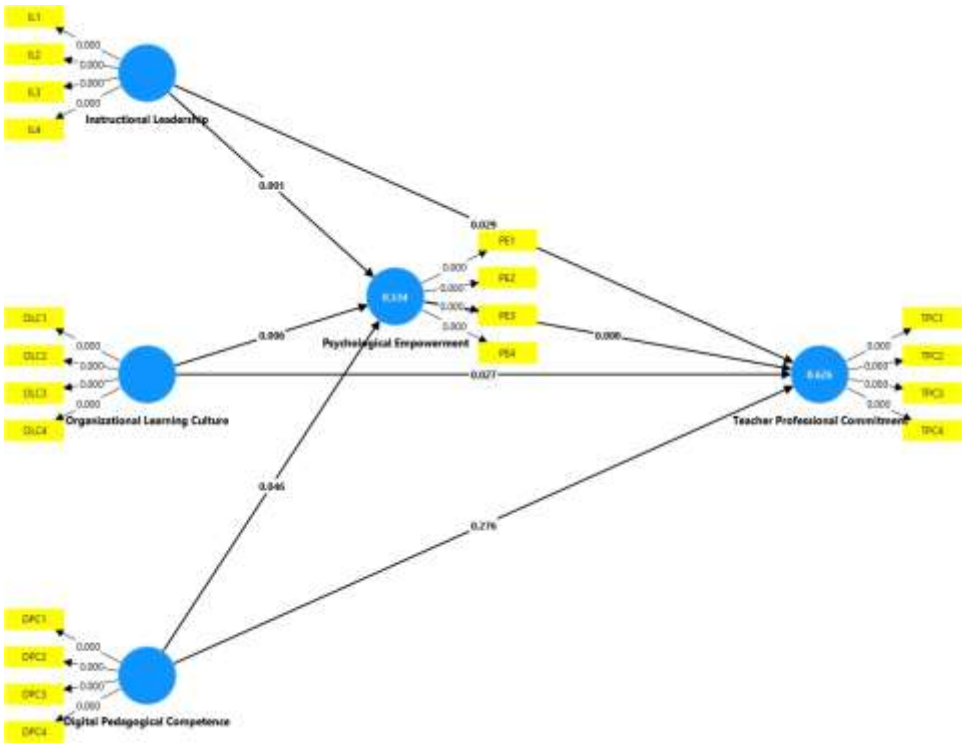
The test results showed that all instruments were reliable, with Cronbach's Alpha and Composite Reliability scores >0.7.

Inner Model Structural Model Evaluation

Evaluating the hypothesized relationships between latent constructs is the core of the inner model assessment. The inner model evaluation can be explained as follows:

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R-Square Test

The R-Square Coefficient Determination (R-Square) test is used to measure the extent to which an endogenous variable is influenced by other variables. Based on data analysis conducted using the smartPLS program, the R-Square values obtained are as shown in the following table:

Table 3 R-Square Test

	R-square	R-square adjusted
Psychological Empowerment	0.534	0.520
Teacher Professional Commitment	0.626	0.610

Based on the R-Square test results in Table 3, the R-Square value for Psychological Empowerment was 0.534, with an Adjusted R-Square of 0.520. These results indicate that Instructional Leadership, Organizational Learning Culture, and Digital Pedagogical Competence

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explain 53.4% of the variation in Psychological Empowerment, while the remaining 46.6% is influenced by factors outside the research model.

Furthermore, the R-Square value for Teacher Professional Commitment was 0.626, with an Adjusted R-Square of 0.610. This indicates that Instructional Leadership, Organizational Learning Culture, Digital Pedagogical Competence, and Psychological Empowerment collectively explain 62.6% of the variation in Teacher Professional Commitment, while the remaining 37.4% is explained by other variables not included in the research model.

Hypothesis Testing

The results can be used to answer the research hypotheses based on the data processing performed. T-statistics and P-values were used to test the hypotheses in this study. We can say that the research hypothesis is accepted if the P-value is less than 0.05. The following are the findings from the research hypothesis testing obtained from the inner model:

Table 7. Research Hypothesis Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	Pvalues
Digital Pedagogical Competence -> Psychological Empowerment	0.207	0.202	0.104	1.993	0.046
Digital Pedagogical Competence -> Teacher Professional Commitment	0.101	0.107	0.093	1.088	0.276
Instructional Leadership -> Psychological Empowerment	0.331	0.334	0.101	3.269	0.001
Instructional Leadership -> Teacher Professional Commitment	0.208	0.219	0.095	2.188	0.029
Organizational Learning Culture -> Psychological Empowerment	0.315	0.305	0.115	2.730	0.006
Organizational Learning Culture -> Teacher Professional Commitment	0.204	0.196	0.092	2.210	0.027
Psychological Empowerment -> Teacher Professional Commitment	0.409	0.394	0.094	4.344	0.000

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Digital Pedagogical Competence -> Teacher Professional Commitment	0.085	0.083	0.051	1.649	0.099
Instructional Leadership -> Teacher Professional Commitment	0.136	0.128	0.042	3.245	0.001
Organizational Learning Culture -> Teacher Professional Commitment	0.129	0.121	0.056	2.282	0.023

Based on the results of the hypothesis test, it was found that Digital Pedagogical Competence had a positive and significant effect on Psychological Empowerment (β = 0.207; p = 0.046), but did not significantly influence Teacher Professional Commitment (β = 0.101; p = 0.276). Furthermore, Instructional Leadership had a positive and significant effect on Psychological Empowerment (β = 0.331; p = 0.001) and Teacher Professional Commitment (β = 0.208; p = 0.029). Similarly, Organizational Learning Culture had a positive and significant effect on Psychological Empowerment (β = 0.315; p = 0.006) and Teacher Professional Commitment (β = 0.204; p = 0.027).

The results also show that Psychological Empowerment has a positive and significant effect on Teacher Professional Commitment (β = 0.409; p = 0.000), with the largest path coefficient compared to other relationships. In addition, testing of indirect effects shows that Instructional Leadership (β = 0.136; p = 0.001) and Organizational Learning Culture (β = 0.129; p = 0.023) have a significant indirect effect on Teacher Professional Commitment through Psychological Empowerment. Conversely, the indirect effect of Digital Pedagogical Competence on Teacher Professional Commitment through Psychological Empowerment is not significant (β = 0.085; p = 0.099). Thus, it can be concluded that Psychological Empowerment acts as an effective mediator in the relationship between Instructional Leadership and Organizational Learning Culture on Teacher Professional Commitment, but does not significantly mediate the relationship between Digital Pedagogical Competence and Teacher Professional Commitment.

H1. Digital Pedagogical Competence → Psychological Empowerment

The results indicate that Digital Pedagogical Competence has a positive and significant effect on Psychological Empowerment (β = 0.207; p = 0.046). This finding suggests that the higher teachers' ability to design, implement, and evaluate digital-based learning, the higher their self-confidence, autonomy, sense of work meaning, and perceived influence in carrying out their professional responsibilities. Digital competence not only enhances teachers' technical

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capabilities but also strengthens their belief that they can effectively respond to the demands of educational transformation in the digital era.

This finding is consistent with the study of Aithal and Aithal (2023), which explained that mastery of digital pedagogy contributes to increasing educators' self-efficacy and empowerment in responding to digital educational transformation. Furthermore, Norman et al. (2025) found that improvements in teachers' digital competence positively influence professional confidence and readiness to embrace instructional innovation. Teachers with higher levels of digital competence tend to feel more capable of controlling the learning process, thereby enhancing their psychological empowerment.

H2. Digital Pedagogical Competence → Teacher Professional Commitment

The results show that Digital Pedagogical Competence does not have a significant effect on Teacher Professional Commitment (β = 0.101; p = 0.276). This finding indicates that teachers' digital competence is not sufficient to directly enhance their professional commitment. The ability to use educational technology does not necessarily translate into increased professional loyalty, occupational attachment, or commitment to continuous professional development.

This phenomenon may be explained by the fact that professional commitment is influenced more by psychological and organizational factors than by technical competence alone. Teachers may possess strong digital competencies; however, without a supportive work environment, effective leadership, and a sense of psychological empowerment, professional commitment may not improve significantly. This finding is supported by Ta'yid et al. (2023), who argued that the influence of digital competence on teachers' professional behavior tends to operate through psychological empowerment as a mediating mechanism. Likewise, Lukman and Yune (2025) found that digital competence contributes more to instructional effectiveness than to teachers' professional commitment directly.

H3. Instructional Leadership → Psychological Empowerment

The results reveal that Instructional Leadership has a positive and significant effect on Psychological Empowerment (β = 0.331; p = 0.001). This finding suggests that school principals who provide instructional guidance, academic supervision, professional support, and a vision for digital learning can enhance teachers' confidence and psychological empowerment.

From the perspective of empowerment theory, leaders who provide support and opportunities for participation can increase employees' sense of meaning, competence, and influence. This result is consistent with Yang, Alias, and Nor (2025), who found that principals'

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technology leadership enhances teachers' professional capacity through strengthened organizational support. Rasdiana et al. (2024) also demonstrated that instructional e-supervision and technology leadership improve teachers' psychological readiness to face digital transformation in education.

H4. Instructional Leadership → Teacher Professional Commitment

The results indicate that Instructional Leadership has a positive and significant effect on Teacher Professional Commitment (β = 0.208; p = 0.029). This finding suggests that the more effective the principal's instructional leadership, the higher the teachers' professional commitment.

Principals who actively provide supervision, mentoring, and professional development support create a work environment that encourages teachers' engagement with their profession. This finding aligns with Hallinger (2022), who identified instructional leadership as one of the primary predictors of teacher commitment because it promotes organizational focus on instructional quality. Norman et al. (2025) also found that educational leadership contributes to increased teacher motivation and professional engagement in responding to educational change.

H5. Organizational Learning Culture → Psychological Empowerment

The results show that Organizational Learning Culture has a positive and significant effect on Psychological Empowerment (β = 0.315; p = 0.006). This finding indicates that an organizational culture that supports continuous learning, collaboration, innovation, and knowledge sharing can enhance teachers' confidence and psychological empowerment.

A learning-oriented organizational culture provides opportunities for teachers to develop competencies, share experiences, and participate in decision-making processes, thereby increasing their sense of ownership and influence within the organization. This finding supports Connolly, O'Brien, and O'Ceallaigh (2023), who explained that digital educational leadership and learning culture play important roles in building teacher empowerment during digital transformation processes. Siswadi et al. (2025) also found that an adaptive organizational culture enhances educators' engagement and psychological readiness in the era of disruption.

H6. Organizational Learning Culture → Teacher Professional Commitment

The results indicate that Organizational Learning Culture has a positive and significant effect on Teacher Professional Commitment (β = 0.204; p = 0.027). This finding suggests that schools with a strong learning culture can increase teachers' loyalty, involvement, and professional responsibility.

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A learning organization culture creates an environment that supports professional growth, making teachers feel valued and motivated to continue developing themselves. This finding is consistent with Watkins and Marsick (2021), who stated that learning organizations influence members' commitment through continuous learning processes. In addition, Connolly et al. (2023) found that a learning culture is an important factor in sustaining teachers' professional engagement within digital education environments.

H7. Psychological Empowerment → Teacher Professional Commitment

The results show that Psychological Empowerment has a positive and significant effect on Teacher Professional Commitment (β = 0.409; p = 0.000). This coefficient is the largest in the research model, indicating that psychological empowerment is the most dominant factor in enhancing teachers' professional commitment.

Teachers who perceive their work as meaningful and who possess competence, autonomy, and influence within their work environment are more likely to demonstrate higher levels of loyalty and dedication to their profession. This finding supports Spreitzer's (1995) theory, which posits that psychological empowerment enhances intrinsic motivation and work engagement. Ta'yid et al. (2023) also demonstrated that empowerment is a critical factor in strengthening teachers' professional attachment in the digital era.

H8. Mediating Role of Psychological Empowerment in the Relationship between Digital Pedagogical Competence and Teacher Professional Commitment

The results indicate that the indirect effect of Digital Pedagogical Competence on Teacher Professional Commitment through Psychological Empowerment is not significant (β = 0.085; p = 0.099). This finding suggests that although digital competence enhances psychological empowerment, the increase is not sufficiently strong to produce a significant improvement in professional commitment.

This result implies that teachers' professional commitment is influenced more by organizational factors than by individual technical capabilities. The finding differs from several previous studies that identified digital competence as an important factor in fostering professional engagement, thereby opening opportunities for future research to examine other moderating variables such as job satisfaction or organizational support.

H9. Mediating Role of Psychological Empowerment in the Relationship between Instructional Leadership and Teacher Professional Commitment

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The results show that Psychological Empowerment significantly mediates the relationship between Instructional Leadership and Teacher Professional Commitment (β = 0.136; p = 0.001). This finding indicates that effective instructional leadership not only directly influences teachers' professional commitment but also strengthens it through increased psychological empowerment.

This result supports the findings of Ta'yid et al. (2023), who found that digital leadership enhances teachers' professional behavior through psychological empowerment. Principals who empower teachers can increase their confidence and work engagement, which ultimately strengthens professional commitment.

H10. Mediating Role of Psychological Empowerment in the Relationship between Organizational Learning Culture and Teacher Professional Commitment

The results reveal that Psychological Empowerment significantly mediates the relationship between Organizational Learning Culture and Teacher Professional Commitment (β = 0.129; p = 0.023). This finding indicates that a strong organizational learning culture can enhance teachers' professional commitment through increased psychological empowerment.

Teachers who work in collaborative and innovative environments tend to feel more valued, have greater opportunities for growth, and possess a stronger sense of influence within the organization. These conditions enhance psychological empowerment, which in turn strengthens professional commitment. This finding is consistent with the studies of Connolly et al. (2023) and Siswadi et al. (2025), which emphasized that learning culture serves as an important mechanism for fostering teacher engagement and sustaining professional commitment in the era of digital transformation.

CONCLUSION

Based on the research results, it can be concluded that Instructional Leadership, Organizational Learning Culture, and Digital Pedagogical Competence collectively influence teacher Psychological Empowerment, while Psychological Empowerment acts as a significant mediator in increasing Teacher Professional Commitment. In other words, effective leadership, a strong organizational learning culture, and teachers' digital competence can enhance teachers' sense of psychological empowerment, ultimately strengthening their engagement and commitment to the profession.

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Based on these findings, the practical implications of this study are the need for school principals to strengthen Instructional Leadership through supervision and professional support, build a collaborative and innovative Organizational Learning Culture, and optimize the development of teachers' Digital Pedagogical Competence with psychological support. Schools can also implement psychological empowerment programs such as coaching, feedback, and performance recognition to increase teacher engagement in the profession.

This study has limitations, including a sample size of 100 high school teachers in Ambon City, variables that do not include other factors such as job satisfaction or digital stress, and a quantitative approach that relies on teacher perceptions through questionnaires. Therefore, generalization of research results needs to be done with caution, and further research is recommended incorporating qualitative approaches to capture the psychological and organizational dynamics of teachers in more depth.

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