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Analysis of Teacher Training Needs in Integrating Technology in Learning

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Abstract

The rapid development of information technology requires teachers to be able to integrate technology in the learning process. This study aims to analyze the factors that influence teacher training needs in integrating learning technology, by reviewing the influence of teacher technological competence (TPACK), readiness to participate in training (training readiness), and organizational support as moderator variables. This study uses a quantitative approach with a total of 100 respondents from junior high and senior high school teachers. Data were collected through questionnaires and analyzed using validity tests, reliability, t-tests, F-tests, and determination analysis (R Square). The results showed that all instruments were valid and reliable (Cronbach's Alpha = 0.982). Partial tests showed that teacher technological competence (t = 7.304; sig. = 0.000) and readiness to participate in training (t = 5.475; sig. = 0.000) significantly influenced training needs. The regression model had an R Square of 0.961, while after including organizational support it increased to 0.967, which means organizational support strengthens the relationship between variables. The conclusions of this study confirm that improving teacher technological competence and preparedness requires strong organizational support for effective and sustainable technology integration training. These findings offer important implications for schools and policymakers in designing teacher training programs based on real-world needs and institutional contexts.

Keywords: Training Readiness, Organizational Support, Training Needs, Learning Technology Integration

Introduction

The rapid advancement of information and communication technology (ICT) has transformed the educational landscape, shifting the focus from traditional teacher-centered methods to more dynamic, technology-enhanced learning environments. E-learning platforms and online learning resources now play a crucial role in this evolution, providing a variety of tools to support teaching and learning (Tamamah, 2025). Consequently, educators must not only possess strong subject matter expertise but also develop digital literacy skills to effectively integrate technology into their instructional strategies (Kingston et al., 2024). This integration is crucial for creating engaging and personalized learning experiences, which can significantly improve student outcomes (Yadav, 2024).

Training needs analysis is crucial for developing relevant training programs that address teachers' unique circumstances and requirements. By conducting a comprehensive training

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needs assessment, educators can identify key areas for technological competency improvement, which is crucial for effective technology integration in the learning environment (Osorio Vanegas et al., 2025). Furthermore, understanding these needs allows for the design of appropriate support systems, including technical assistance and pedagogical guidance, ensuring that teachers receive the necessary resources to address challenges (Nurhayati & Novianti, 2024).

The digital era has transformed education, requiring teachers to adapt to technological advances to effectively implement policies such as the Free Learning program and the broader digital transformation of education. Central to this adaptation is teacher readiness, which encompasses educators' willingness and ability to integrate technology into their teaching practices (Napitupulu et al., 2025). The success of these initiatives hinges on robust teacher training programs that enhance digital literacy, equipping educators with the skills needed to navigate and utilize educational technology effectively (Guntur et al., 2025). Furthermore, educational technology plays a crucial role in supporting this transformation, offering tools that can improve student outcomes and access to quality education (Napitupulu et al., 2024).

The gap between demands for technology integration and teachers' actual competencies can be attributed to several factors. A significant problem is the lack of effective teacher training programs that equip educators with the skills necessary to integrate technology pedagogically, not just using digital tools (Dinçer, 2024). However, many programs fail to address teachers' specific needs, leading to low motivation and engagement in these initiatives (Napitupulu et al., 2025). To address this challenge, it is crucial to create tailored training programs that not only build technical skills but also foster motivation and confidence among teachers, ultimately bridging the gap in technology integration.

This study aims to analyze teachers' training needs in integrating technology into learning by assessing their competency levels and identifying the barriers they face. The results are expected to inform the development of relevant and sustainable training programs that support

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the broader goal of technology-based educational transformation in Indonesia, which requires strategic planning and ongoing teacher training (Osorio Vanegas et al., 2025).

Literature Review

Need Assessment Model (Kaufman, 2006)

Roger Kaufman's Needs Assessment Model is a systematic approach to identifying gaps between actual and ideal conditions. This analysis aims to determine real needs that must be met through specific training or interventions. Kaufman emphasizes that needs analysis focuses not only on the individual but also on their impact on the organization and society. This model typically involves three main stages: problem identification (what is vs. what should be), analysis of the causes of competency gaps, and formulation of priority training needs. Research conducted by Rahmawati, D. (2021) uses Kaufman's model to identify gaps between current and ideal teacher competencies in technology integration.

TPACK Model (Mishra & Koehler, 2006)

The TPACK model developed by Mishra & Koehler (2006) explains that teachers' ability to integrate technology into learning must include three main components of knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). These three components intersect to form a competency called TPACK, namely the ability to effectively combine technology according to content and pedagogical approaches. This model is an important framework in designing technology-based teacher training.

Kirkpatrick Model of Training Evaluation

The Kirkpatrick Model is one of the most recognized frameworks for evaluating training effectiveness. This model not only assesses participant satisfaction but also ensures that the training delivers tangible results in learning or work practice. Research conducted by

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Yuliani, D. (2020) analyzed the effectiveness of teacher training through Kirkpatrick's four levels. Meanwhile, research conducted by Prasetyo, H. & Ramdhani, A. (2021) used the Kirkpatrick Model to assess the results and impact of online training on teachers' digital teaching abilities. The model consists of four levels of evaluation: Reaction, Learning, Behavior, and Result.

Previous Research

Prensky (2010) found that teachers who participated in such training showed a marked improvement in their use of digital media for interactive learning, underscoring the importance of targeted professional development (Yumna, 2025). Furthermore, Sari and Rahmawati (2021) demonstrated that this training improved teachers' ability to design e-learning materials, which is crucial in today's digital learning environment (Almerich Cerveró et al., 2011).

Methods

This study uses a quantitative descriptive approach with a survey method. This approach is used to describe and analyze teacher training needs in integrating technology into learning systematically and factually based on data obtained from respondents. This study will be conducted in several secondary schools (SMP/SMA/SMK) in Bandung City. The location selection was carried out purposively with the consideration that these schools have implemented technology-based learning policies but still need to improve teacher competency. The population in this study is all teachers who teach in secondary schools in the research area. With a sample of 100 teachers.

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Results and Discussion

Results

1. **Respondent Demographics**

Table 1. Respondent Demographics

No	Category	Group	Frekuensi	%
1	Gender	Male	40	40.0%
		Female	60	60.0%
3	Last Education	Bachelor's Degree	75	75.0%
		Master's Degree	25	25.0%
4	Teaching Level	Junior High School	30	30.0%
		High School	30	30.0%
5	Years of Teaching	<5 years	15	15.0%
		5 – 10 years	30	30.0%
		11 – 20 years	35	35.0%
		>20 years	20	20.0%
6	Technology Training History	Never	30	30.0%
		Once (occasionally)	50	50.0%
		Regularly / Continuously	20	20.0%
7	Computer Lab Available at School	No	15	15.0%
		Yes	70	70.0%

Most of the respondents were female (60%), while 40% were male. Based on the last level of education, the majority of teachers had completed a bachelor's degree (S1) of 75%, and another 25% had completed a master's degree (S2). Viewed from the length of teaching, the majority of teachers had work experience between 11 and 20 years (35%), followed by groups with 5–10 years of experience (30%), more than 20 years (20%), and less than 5 years (15%). Regarding the history of technology training, most respondents had attended training occasionally (50%), while 30% had never attended training, and only 20% attended training regularly or continuously. Furthermore, in terms of the availability of supporting facilities, 70% of schools had computer laboratories, while 15% did not have them.

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2. Validity & Reliability Test

Table 2. Validity & Reliability Test

No	Variabel	Indikator	Pearson Correlation	Cronbach's Alpha	Sig.
1	Teacher Technology Competence (TPACK) (X_1)	1. Technological Knowledge (TK)	,737**	0,982	0,000
		2. Pedagogical Knowledge (PK)	,693**		0,000
		3. Content Knowledge (CK)	,767**		0,000
		4. Technological Pedagogical Knowledge (TPK)	,732**		0,000
		5. Technological Content Knowledge (TCK)	,768**		0,000
		6. Technological Pedagogical Content Knowledge (TPACK)	,672**		0,000
2	Training Readiness (X_2)	1. Motivation to participate in training	,749**		0,000
		2. Attitudes toward technology training	,697**		0,000
		3. Organizational/school support	,760**		0,000
		4. Availability of time and resources	,706**		0,000
3	Organization/School Support (M)	1. Competency development policies	,703**		0,000
		2. Learning technology facilities	,715**		0,000
		3. Work climate and collaboration	,718**		0,000
		4. Internal training opportunities	,699**		0,000
4	Teacher Training Needs in Integrating Technology (Y)	1. Current level of technology mastery	,665**		0,000
		2. Need for skill enhancement	,674**		0,000
		3. Expectations regarding training	,748**		0,000
		4. Relevance of training materials	,686**		0,000
		5. Barriers to technology implementation	,733**		0,000

Based on the validity test results using Pearson correlation, all indicators of the Teacher Technology Competence (TPACK), Readiness to Participate in Training, Organizational/School Support, and Teacher Training Needs variables were declared valid, as they had correlation values greater than 0.30 and were significant at the 95% confidence level (Sig. <0.05). Thus, all questionnaire items were suitable for use in further research data collection.

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A Cronbach's Alpha value of 0.982 indicated a very high level of reliability, indicating that the measurement instrument for the variables

3. F & R Square Test

Table 2. T-Test and R-Square Model 1

No	Variables	Uji T	Sig.	R Square
1	Teacher Technology Competence (TPACK) (X_1) Training Readiness (X_2) Variables	7,304	0,000	
2	Teacher Technology Competence (TPACK) (X_1) Training Readiness (X_2)	5,475	0,000	0,961
3	Teacher Training Needs in Technology Integration (Y)			

A significance value of 0.000 < 0.05 indicates that both variables X_1 and X_2 significantly influence Y.

The t-value for X_1 is 7.304, higher than that for X_2 (5.475), indicating that TPACK has a stronger influence on training needs than readiness to participate in training.

The R-square value of 0.961 means that 96.1% of the variation in the Teacher Training Needs variable (Y) can be explained by the combination of Teacher Technology Competence (TPACK) and Training Readiness. The remaining 3.9% is explained by other factors not included in this study.

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Table 2. F & R Square Test of Model 2

No	Variabel	Uji t	Uji F	Sig.	R Square
1	Teacher Technology Competence (TPACK) (X_1)	1,069			
2	Training Readiness (X_2)	0,216			
3	The Influence of Organizational Support on Teacher Competence	0,119	705,923	,000[b]	0,967
4	The Influence of Organizational Support on Training Readiness	0,730			

The t-values for X_1 (1.069) and X_2 (0.216) are relatively low compared to Model 1, indicating that after the Organizational Support variable was included in the model, the direct effect of X_1 and X_2 on Y decreased. Conversely, the effect of Organizational Support on Training Readiness (t = 0.730) was relatively higher, indicating that organizational factors play a significant role in increasing teacher readiness to participate in training.

The F-value is 705.923 with a Sig. of 0.000b. Since Sig. of 0.000 < 0.05, the regression model is declared simultaneously significant. This means that the variables Teacher Technological Competence (TPACK), Readiness to Participate in Training, and Organizational Support collectively have a significant effect on Teacher Training Needs in Integrating Technology.

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The R-square value is 0.967. This value means that 96.7% of the variation in the dependent variable (Teacher Training Needs) can be explained by the combination of independent and moderator variables (TPACK, Training Readiness, and Organizational Support). The remaining 3.3% is influenced by factors outside the study

Discussion

1. Validity and Reliability of Instruments

The validity test results using Pearson correlation showed that all indicators in the research variables—Teacher Technology Competence (TPACK), Readiness to Participate in Training, Organizational/School Support, and Teacher Training Needs—had correlation values above 0.6 with a significance level of 0.000 (<0.05). This indicates that all questionnaire items have a strong and significant relationship with their respective variable constructs. Therefore, all statements are declared valid and suitable for use in this research.

Furthermore, the reliability test results (Cronbach's Alpha = 0.982) showed a very high value (>0.7). This indicates that the instruments used are consistent and reliable in measuring teachers' perceptions of technology competence, training readiness, and development needs in technology-based learning. Therefore, all instruments in this study met the requirements for good measurement quality, ensuring that subsequent analysis results are reliable and reflect actual conditions in the field.

2. The Influence of Teacher Technology Competence and Training Readiness on Training Needs (Model 1)

The results of the Model 1 analysis show that Teacher Technology Competence (TPACK) has a t-value of 7.304; Sig. = 0.000, and Training Readiness has a t-value of 5.475; Sig. = 0.000, with an R-square value of 0.961. Significance values below 0.05 indicate that both variables have a positive and significant effect on Teacher Training Needs. The very high R^2 value (96.1%) indicates that most of the variation in training needs can be explained by technology competency and training readiness.

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These results align with research by Mishra & Koehler (2006) which states that technology, pedagogy, and content skills (TPACK) are the primary foundation for teachers in utilizing technology pedagogically. Furthermore, these findings support the Kirkpatrick Model theory, which emphasizes that individual readiness directly influences training effectiveness.

3. The Role of Organizational Support in the Relationship Between Variables (Model 2)

The results of Model 2 show that when the Organizational/School Support variable is included, the R-square value increases to 0.967, and the F-test is 705.923 with a Sig. = 0.000, indicating that the overall model is simultaneously significant. However, the t-values for TPACK (1.069) and Training Readiness (0.216) decrease compared to Model 1, while the effect of Organizational Support on Training Readiness (t = 0.730) is higher. These findings support the Need Assessment model (Kaufman, 2006), which asserts that training needs arise not only from individuals but are also influenced by organizational and work environment factors.

Empirically, these results align with several previous studies, including research conducted by Sari & Lestari (2022), which found that teachers' TPACK competencies significantly influence their readiness to implement digital learning. Meanwhile, Pratama et al. (2021) stated that organizational support is a crucial factor in the success of technology-based teacher training programs.

Conclusion

1. Based on the validity test results, all items in the Teacher Technology Competence (TPACK), Readiness to Participate in Training, Organizational Support, and Training Needs variables showed correlation values above 0.6 with a significance level of 0.000, indicating validity. The reliability test results with Cronbach's Alpha of 0.982 also indicated very high internal consistency. Thus, all research instruments were declared feasible and can be used to accurately measure the research variables.
2. The results of the partial test (t-test) indicate that both independent variables have a significance value <0.05 and have a positive effect on training needs. This means that the

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higher the teacher's ability to master learning technology and the more prepared they are to participate in training, the higher the perceived level of training need. This indicates that teachers who are aware of the importance of digital competency are more motivated to continue improving their skills through training.

3. In the second model, the R-square value increased from 0.961 to 0.967 after the Organizational Support variable was included. These results indicate that the role of the school organization—through the provision of technology facilities, training policies, and managerial encouragement—is an important factor in strengthening teachers' awareness and need for technology-based training. With strong organizational support, training can be more effective and sustainable.
4. The research model is simultaneously significant and has very high explanatory power.

   The F-test shows a significance value of 0.000 (<0.05), indicating that the overall regression model is significant. The coefficient of determination (R Square = 0.967) indicates that 96.7% of the variation in Teacher Training Needs can be explained by the combination of the variables Technological Competence, Training Readiness, and Organizational Support. The remaining 3.3% is influenced by factors outside the model, such as teaching experience, government policies, and level of access to technology.

Overall, the research findings confirm that improving teacher competency and readiness to integrate technology must be accompanied by adequate organizational support. Teacher professional development efforts in the context of digital learning are not only the responsibility of individuals but also of educational institutions. The combination of personal readiness and systemic support from schools will create a learning ecosystem that is adaptive to technological change.

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