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# Digital Literacy and Teaching Experience as Predictors of Pedagogical Competence in the Digital Era

**Theresia Anggraini, Masduki Ahmad, Ivan Hanafi**

*Universitas Negeri Jakarta, Indonesia*
e-mail: anggrainithere5@gmail.com, masduki@unj.ac.id, ivan.hanafi@unj.ac.id

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**ABSTRACT**. This study investigates the influence of digital literacy and teaching experience on teachers' pedagogical competencies and essential skills, which are crucial for ensuring effective and high-quality learning processes. In the digital era, digital literacy empowers teachers to integrate technology into teaching, while teaching experience shapes their ability to manage classrooms and deliver effective instruction. Despite the increasing importance of these factors, there still needs to be a gap in understanding how they interact to enhance pedagogical competence. Data was gathered by administering questionnaires to 136 private senior high school teachers in the Cengkareng sub-district, who were chosen proportionately at random using a quantitative technique and multiple linear regression analysis. The findings indicate that digital literacy and teaching experience significantly influence teachers' pedagogical competence. These results underscore the importance of promoting digital literacy and fostering teaching experience as strategic measures to improve pedagogical competence. The study suggests that targeted professional development initiatives should enhance these factors to improve teaching effectiveness and ultimately elevate school learning outcomes.

**Keywords**: *Digital literacy, pedagogical competence, teachers, teaching experience*

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## INTRODUCTION

Teachers are a crucial asset in education (Day, 2007; He, 2009; Gu & Day, 2007). Their role as educators in schools is paramount, and improving their quality requires skills and competencies that facilitate a smooth teaching and learning process (Lim et al., 2011; Zhu et al., 2013; De-Juanas Oliva et al., 2016). Competence is often defined as proficiency, talent, or ability. It is a determining factor for individual success and organizational effectiveness (Madjid, 2016). Teachers must possess four key competencies: pedagogical, professional, personality, and social. These four competencies are interconnected and define the characteristics of a professional teacher. A professional teacher is proficient in the content of the subjects they teach and requires general knowledge for successful teaching, as well as that which is not necessarily tied to a topic or subject. Teachers are expected to utilize this knowledge and weave it into coherent understandings and skills as they deal with students and learning (König et al., 2021).

Teacher pedagogical competence is crucial in supporting successful learning and is vital in enhancing the quality of education in schools (Febriana, 2019). Pedagogical competence refers to the teacher's expertise in managing learning processes, such as understanding the foundations and principles of education, understanding students, developing syllabi or curricula, designing lessons,

conducting educational learning processes, utilizing technology in learning, evaluating learning outcomes, and fostering students' potential (Surahmi et al., 2022). Low pedagogical competence can result from various factors, including digital literacy.

In today's digital era, digital literacy plays an increasingly important role in learning. This is because today's learners are raised in the digital age. Teachers must develop innovative teaching and learning processes (Muggli, 2020). Digital literacy enables teachers to utilize technology to deliver materials creatively, interactively, and in ways relevant to students' needs. Therefore, teachers must at least master digital literacy (Satriani et al., 2022). Digital literacy encompasses understanding, using, and evaluating information from various digital sources (Fahkiroh et al., 2023). Educational technology, such as online learning platforms, educational software, and other digital media, can be practical tools if teachers have sufficient digital literacy. However, low digital literacy can hinder the optimal use of technology. Digital literacy encompasses an individual's knowledge and ability to effectively use digital media, including communication devices and network systems. This includes managing, utilizing, evaluating, and leveraging these technologies responsibly, healthily, carefully, and lawfully. The goal is to foster interaction and communication in everyday life (Nasrullah et al., 2017).

In addition to digital literacy, teaching experience is another factor contributing to teachers' pedagogical competence (Nousiainen et al., 2018; Nurmayuli, 2020; Lucas et al., 2021). Adequate teaching experience, defined as the time a teacher spends performing their duties, contributes to achieving targeted learning outcomes in schools. Therefore, it is critical to determining academic success. Teaching experience refers to everything a teacher acquires while performing their duties as an educator, particularly over a certain period (Laelasari et al., 2020). Teaching experience helps teachers understand classroom dynamics, manage students with diverse characteristics, and develop effective teaching strategies.

A teacher's teaching experience can be assessed based on their tenure, level of expertise, knowledge, and mastery in managing classrooms and teaching activities (Belvis et al., 2013; Welsh, & Schaffer, 2017). Teachers with more experience tend to have more excellent abilities to face learning challenges than those with minimal experience. Teachers with more excellent teaching experience tend to possess a broader knowledge base. The longer a teacher has been in the profession, the more professional they become compared to newer teachers. Experience is not solely gained within the classroom but also through extracurricular activities that contribute to their professional development.

However, there is variation in the levels of digital literacy and teaching experience among teachers, particularly private high school teachers in Cengkareng District, West Jakarta. This variation can influence the quality of teachers' pedagogical competence, affecting the quality of education delivered to students. Therefore, this study aims to examine the extent to which digital literacy and teaching experience affect the pedagogical competence of private high school teachers in this area. The results of this study are expected to contribute to developing strategies to enhance teachers' pedagogical competence through strengthening digital literacy and optimizing the teaching experience. Thus, this research can serve as a reference in efforts to improve the quality of education.

## METHOD

This study adopts a quantitative approach with a survey method, targeting 206 private high school teachers in the Cengkareng District. The research site was selected for its novelty, as no prior studies have explored this topic. A sample of 136 teachers was chosen using proportional random sampling. Data was collected through a Google Form questionnaire, structured into three main sections: digital literacy, teaching experience, and pedagogical competence. Each variable in this study was measured using specific indicators to ensure comprehensive analysis.

Teacher pedagogical competence encompasses critical abilities, including understanding students, designing and implementing effective learning processes, evaluating learning outcomes, and fostering students' potential (Kurniasih & Sani, 2017). Digital literacy involves fundamental skills in using digital media, obtaining information from the internet, and leveraging social and organizational support for effective media use. It also includes awareness of digital media limitations, utilizing digital tools for learning, and creating digital learning products (Lestari et al., 2022). Teaching experience is reflected in work experience, mastery of relevant knowledge and skills, and proficiency in professional tasks (Faizal, 2023).

The data for this study were collected using a questionnaire based on a five-point Likert scale, where response options ranged from 1 (strongly disagree) to 5 (strongly agree), reflecting the level of agreement. Before distribution, the instrument underwent testing to ensure its items' validity and reliability (Demeshkant et al., 2022; Yeşilyurt & Vezne, 2023). This preliminary test was conducted with a separate sample of 30 teachers who were not part of the leading research population. Data analysis employed multiple linear regression to examine the influence of independent variables on the dependent variable, as Riffenburgh and Gillen (2020) described. Specifically, this study investigated the effects of digital literacy ($X_1$) and teaching experience ($X_2$) on teachers' pedagogical competence (Y) among private high school teachers in the Cengkareng District, West Jakarta. In this analysis, digital literacy ($X_1$) and teaching experience ($X_2$) were treated as independent variables, while teachers' pedagogical competence (Y) was the dependent variable.

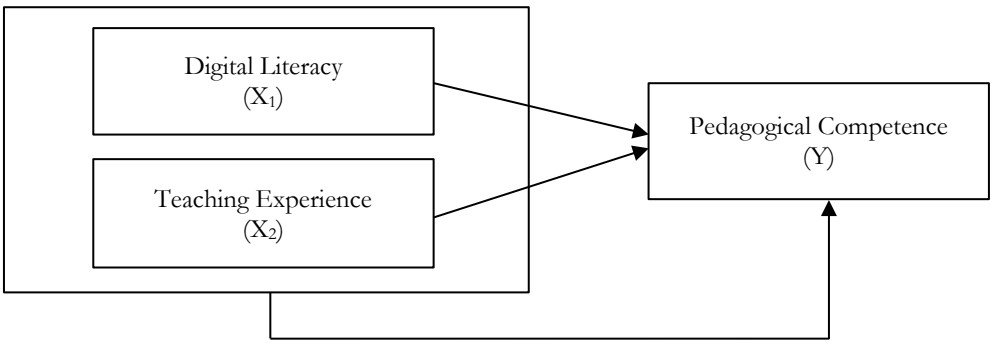


Figure 1. Influence between Variables

## RESULT AND DISCUSSION

### Result

*Descriptive Analysis of Research Variables*

In this study, a descriptive analysis was conducted for each variable as follows:

Table 1. Descriptive Statistics

| | N | Range | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|---|
| Digital Literacy | 136 | 96 | 94 | 190 | 158.32 | 21.894 |
| Teaching Experience | 136 | 84 | 96 | 180 | 153.41 | 15.146 |
| Pedagogical Competence | 136 | 83 | 112 | 195 | 163.30 | 17.244 |
| Valid N (listwise) | 136 | | | | | |

The descriptive analysis results, as presented in Table 1, indicate that the digital literacy variable ($X_1$) has scores ranging from 94 to 190, with a mean of 158.32 and a standard deviation of 21.894, based on responses from 136 participants. Similarly, the teaching experience variable ($X_2$) shows a score range of 94 to 180, a mean of 153.41, and a standard deviation of 15.146. Meanwhile, the pedagogical competence variable (Y) exhibits scores between 112 and 195, with a mean of 163.30 and a standard deviation of 17.244, derived from the same respondent group.

To make analysis easier, each variable's data was divided into three levels—low, medium, and high. The mean (*M*) and standard deviation (*SD*) served as benchmarks for this classification. The following are the classification criteria: A score is classified as low if it is less than *M-1SD*, as medium if it is between *M-1SD* and *M + 1SD*, and as high if it is equal to or greater than *M + 1SD*.

Table 2. Classification of Respondents' Scores

| No. | Variable | Category | Frequensy | Total |
|---|---|---|---|---|
| 1. | Digital Literacy | Low | 24 | |
| | | Medium | 82 | 136 |
| | | High | 30 | |
| 2. | Teaching Experience | Low | 17 | |
| | | Medium | 94 | 136 |
| | | High | 25 | |
| 3 | Pedagogical Competence | Low | 20 | |
| | | Medium | 89 | 136 |
| | | High | 27 | |

As shown in Table 2, the medium category recorded the highest frequency across all variables, with 82 respondents for digital literacy, 94 for teaching experience, and 89 for teacher pedagogical competence. All variables were measured using a five-point Likert scale, where responses ranged from strongly disagree (1) to strongly agree (5), reflecting varying levels of agreement (Robinson, 2024).

*Results of Validity and Reliability Test*

The validity test results indicate that a questionnaire statement item is considered valid if the r-count exceeds the r-table value (r-count > r-table). Conversely, items are deemed invalid if the r-count is less than the r-table value (r-count < r-table). Invalid items should ideally be removed or excluded from further analysis. In this study, the validity test involved 30 teacher respondents with a significance level of 5%, yielding an r-table value of 0.361. For the reliability test, Cronbach's Alpha formula was used to measure the consistency of the research instrument. An instrument is classified as reliable if it has a Cronbach's Alpha coefficient greater than 0.600 ($\alpha > 0.6$), whereas a coefficient below 0.600 ($\alpha < 0.6$) indicates unreliability. The following section presents the results of this study's validity and reliability tests.

Table 3. Teacher Pedagogical Competence Validity Results

| No. | Indicator | Valid | Invalid | Total |
|---|---|---|---|---|
| 1 | Ability to Understand Students | 8 | - | 8 |
| 2 | Ability to Design Learning | 8 | - | 8 |
| 3 | Ability to Implement Learning | 8 | - | 8 |
| 4 | Ability to Evaluate Learning | 8 | - | 8 |
| 5 | Ability to Develop Student Potential | 7 | 1 | 7 |
| | Total | 39 | 1 | 39 |

The validity test results for the teacher pedagogical competence instrument, as shown in Table 3, reveal that out of 40 statement items, one item (item number 40) was found invalid, with an r-count of 0.274, below the r-table value. Additionally, the reliability test for the pedagogical competence instrument demonstrated a high level of reliability, as indicated by a Cronbach's Alpha coefficient of 0.983

Table 4. Digital Literacy Validity Results

| Level | Indicator | Valid | Invalid | Total |
|---|---|---|---|---|
| Digital Competence | Basic skills using digital media | 4 | 1 | 4 |
| | Skills to get information from the internet | 5 | - | 5 |
| Digital Professional | Social influence and organizational support in using digital media | 5 | - | 5 |

| | | | | |
|---|---|---|---|---|
| | Overcoming obstacles in using digital media | 4 | - | 4 |
| | Limitations in using digital media | 6 | 1 | 6 |
| Digital Transformation | Utilizing digital media for learning materials | 9 | - | 9 |
| | Creating digital products in learning | 5 | - | 5 |
| Total | | 38 | 2 | 38 |

The validity test results for the digital literacy instrument, presented in Table 4, showed that two out of the 40 statement items were invalid, as their r-counts were lower than the r-table value. Specifically, item number 5 had an r-count of 0.263, and item number 24 had an r-count of 0.343. However, the reliability test for the digital literacy instrument demonstrated a high level of consistency, with a Cronbach's Alpha value of 0.962, indicating that the instrument is reliable.

Table 5. Teaching Expereience Results

| No. | Indicator | Valid | Invalid | Total |
|---|---|---|---|---|
| 1 | Tenure Experience | 8 | 1 | 8 |
| 2 | Level of Knowledge and Skills | 7 | - | 7 |
| 3 | Work Mastery | 21 | 1 | 21 |
| Total | | 36 | 2 | 36 |

The validity test of the teaching experience instrument identified two out of 38 statement items as invalid, as their r-count values were lower than the r-table threshold. Specifically, item 5 had an r-count of 0.002, and item 38 had an r-count of 0.328. Despite these invalid items, the reliability test demonstrated that the instrument was highly reliable, with a Cronbach's Alpha value of 0.957.

*Prerequisite Analysis Test Results*

Table 6 presents the results of the prerequisite tests conducted to ensure the validity and reliability of the data before conducting further analysis. These tests include normality, linearity, multicollinearity, and heteroscedasticity tests.

Table 6. Prerequisite Test Results

| No. | Type Of Prerequisite Test | | Test Results |
|---|---|---|---|
| 1 | Normality Test Results | Digital Literacy ($X_1$) | 0.065 |
| | | Teaching Experiece ($X_2$) | 0.200 |
| | | Pedagogical Experience (Y) | 0.200 |
| 2 | Linearity Test Results | Linearity Test Results between Digital Literacy and Teacher Pedagogical Competence | 0.393 |
| | | Linearity Test Results between Teaching Experience and Teacher Pedagogical Competence | 0.213 |
| 3. | Multicollinearity Test Results | Tolerance values | 0.818 |
| | | VIF values | 1.223 |
| 4 | Heteroscedasticity Test Results | Digital Literacy ($X_1$) | 0.973 |
| | | Teaching Experiece ($X_2$) | 0.055 |

Table 6 demonstrates that all variables follow a normal distribution, as indicated by significance values exceeding 0.05: 0.065 for digital literacy, 0.200 for teaching experience, and 0.200 for teacher pedagogical competence. The linearity test confirms a linear relationship between digital literacy and teacher pedagogical competence (p-value: 0.393) and between teaching experience and teacher pedagogical competence (p-value: 0.213). Additionally, the multicollinearity test reveals no issues in the regression model, supported by a Tolerance value of 0.818 and a VIF value of 1.223. Finally, the heteroscedasticity test indicates the absence of heteroscedasticity, as the significance values for digital literacy (0.973) and teaching experience (0.055) are above the 0.05 threshold.

*Multiple Linear Regression Analysis Results*

The multiple linear regression analysis using SPSS produced the equation $Y = 19.991 + 0.519X_1 + 0.398X_2$, which reveals the positive influence of both independent variables on the dependent variable. The regression coefficient for digital literacy ($X_1$) is 0.519, indicating that a 1-unit increase in digital literacy corresponds to a 0.519-unit increase in pedagogical competence (Y). Similarly, the regression coefficient for teaching experience ($X_2$) is 0.398, signifying that a 1-unit increase in teaching experience results in a 0.398-unit increase in pedagogical competence. These findings highlight the significant and positive contributions of digital literacy and teaching experience to enhancing pedagogical competence.

*Hypothesis Test Results*

The t-test results from SPSS analysis indicate that both independent variables significantly influence the dependent variable, pedagogical competence (Y). For digital literacy ($X_1$), the t-count is 13.863, which exceeds the critical t-table value of 1.978, with a significance value of 0.000, confirming its significant effect. Similarly, for teaching experience ($X_2$), the t-count is 7.354, surpassing the t-table value of 1.978, with a significance value 0.000. These findings demonstrate that both digital literacy and teaching experience have a statistically significant partial effect on pedagogical competence.

The F-test results reveal that digital literacy and teaching experience, as independent variables, collectively have a significant impact on pedagogical competence (Y), as the F-count (203.74) exceeds the critical F-value (3.06) and the significance value (0.000) is below 0.05. The determination coefficient test also shows that the independent variables explain 75.4% of the variance in pedagogical competence, as indicated by the R-squared value. The combined influence of digital literacy and teaching experience accounts for most of the variation. At the same time, the remaining 24.6% is likely affected by other factors outside the scope of this study.

## Discussion

*The Effect of Digital Literacy on Teacher Pedagogical Competence*

The results of the study showed that digital literacy ($X_1$) has a significant positive relationship with teacher pedagogical competence (Y), as evidenced by the t-test with a calculated t value of 13.863, which exceeds the critical t value (1.978) and a significance level of 0.000. In addition, the regression coefficient of 0.519 indicates that every one-unit increase in digital literacy can increase pedagogical competence by 0.519 units. This finding confirms that digital literacy plays an essential role in developing teacher pedagogical competence, which supports the view that teachers' ability to use technology effectively can enrich learning strategies, increase student engagement, and create a more adaptive learning environment (Fernández-Batanero et al., 2022; Falloon, 2020). It is also in line with the needs of 21st-century education, where integrating technology into learning is a critical element in preparing students to face global challenges (Harris et al., 2009). Thus, strengthening digital literacy through technology training and institutional support is one way to improve the quality of education.

This research aligns with previous studies by Satriani et al. (2022), which found that digital literacy empowers teachers to enhance their teaching practices. Access to information sources through digital media significantly facilitates information gathering and learning. Therefore, teachers must possess at least a basic level of digital literacy. When learning incorporates digital media, student engagement tends to increase. Consequently, teachers must adapt to these advancements by developing an understanding and proficiency in using digital media for teaching, providing students with meaningful learning experiences. Several studies have corroborated these findings, demonstrating a positive and significant effect of digital literacy on teacher pedagogical competence (Putra et al., 2023; Fahkiroh et al., 2023; Na'im & Kholik, 2022; Rohmah, 2019;

Somantri, 2021; Sulistyarini & Fatonah, 2022; Suroya, 2021). However, these previous studies differ from this research in terms of their methodologies. Some studies utilize qualitative data, drawing on sources such as interviews and literature reviews, and employ different research settings and participant samples.

*The Effect of Teaching Experience on Teacher Pedagogical Competence*

The results of this study indicate that teaching experience ($X_2$) has a significant positive relationship with teacher pedagogical competence (Y), as evidenced by the t-test with a calculated t value of 7.354, which exceeds the critical t value (1.978) and a significance level of 0.000. The regression coefficient of 0.398 indicates that every one-unit increase in teaching experience can increase pedagogical competence by 0.398 units. This finding is consistent with the literature highlighting the importance of teaching experience in building teacher core competencies, including mastery of Pedagogical Content Knowledge (PCK) and the ability to design effective learning strategies (Shulman, 2006). Teaching experience allows teachers to learn from practice, reflect on strengths and weaknesses in the learning process, and develop skills to manage complex classroom situations (Darling-Hammond, 2012; Goodwin et al., 2016; Kitchen, 2020). Thus, teaching experience is an indicator and a significant catalyst in forming sustainable pedagogical competence, so it is essential to support teachers through structured experiential learning programs.

This finding confirms that teaching experience ($X_2$) positively influences teachers' pedagogical competence, consistent with the results of previous research, as reported by Nurmayuli (2020). Teaching experience allows teachers to develop practical skills, master classroom management, and understand students' learning needs more deeply. Teachers with more extended experience also tend to be more adaptive to various learning process challenges, such as appropriate methods and creative problem-solving (Darling-Hammond, 2012). Conversely, a lack of teaching experience is often associated with a lack of confidence and pedagogical skills, which can impact the quality of learning. Therefore, teaching experience should be a key element in teachers' professional development, supported by ongoing training programs that provide opportunities for reflection and experiential learning.

Teacher professionalism is essential in creating quality education, focusing on creating a creative, dialogic and dynamic learning environment (Postholm, 2018; Teo, 2019; Hauge, 2019; Sims & Fletcher-Wood, 2021). For example, research by Mulian et al. (2020) shows that the longer a teacher is in the profession, the higher the level of education and specialization achieved, which supports improving the quality of teaching and classroom management. This research is in line with the findings of various studies that confirm that teaching experience has a significant positive impact on teachers' pedagogical competence. Experienced teachers can better design effective learning strategies and adapt their approach to students' needs (Darling-Hammond, 2012). Thus, developing teachers' professionalism through continuous training and practical field experience is critical to ensuring better education quality, which focuses on developing more vital pedagogical skills and being responsive to classroom dynamics.

Teaching experience can enrich classroom management strategies by providing opportunities to reflect on past experiences and activities. Reflecting on teaching practice enhances teacher competence by fostering situational awareness and encouraging the development of alternative actions in the classroom for improved outcomes (Henke et al., 2023). In enhancing classroom management strategies, General Pedagogical Knowledge (GPK) has been identified as a crucial category of teacher knowledge. GPK is a predictor of teachers' teaching experience, highlighting its importance as a valuable resource for teachers. Teachers' use of GPK in preparing, structuring, and evaluating lessons relates to their understanding of instruction. This knowledge encompasses planning and analyzing instruction, including its components and processes. Therefore, both teachers' general pedagogical knowledge and teaching experience can contribute to improving their

ability to prepare, structure, and evaluate lessons, ultimately leading to more effective classroom management in the future (König & Pflanzl, 2016).

*The Effect of Digital Literacy and Teaching Experience on Teacher Pedagogical Competence*

The findings in this study show that the combined effect of digital literacy and teaching experience on teachers' pedagogical competence is highly significant, with the coefficient of determination (R-squared) indicating that the two independent variables can explain 75.4% of the variation in pedagogical competence. The F-count value 203.74, which far exceeds the critical F-value of 3.06, with a significance of 0.000, indicates a strong and significant relationship between digital literacy, teaching experience and pedagogical competence. It supports the theory that improving digital skills and teaching experience can strengthen teachers' ability to design and implement more effective learning (Ningtiyas & Jailani, 2018; Herut & Setlhako, 2024). Teachers who master digital literacy have easier access to educational and technological resources (Radovanović et al., 2015; Rusydiyah et al., 2020; Sulasmi, 2022), which in turn enriches their teaching experience, thereby improving pedagogical abilities in managing the classroom and designing engaging lessons that are responsive to students' needs.

However, although the influence of digital literacy and teaching experience proved significant, the remaining variance of 24.6% indicates that other factors also play an essential role in shaping teachers' pedagogical competence. Factors such as teacher training (Gibbs & Coffey, 2004; Zhang et al., 2024), adequate learning facilities (Abduxakimovna, 2021), and teacher motivation can influence how effective teachers are in applying their pedagogical skills (Orleans, 2010; Mark, 2015). This research highlights the importance of a holistic approach to teacher professional development, which relies not only on digital literacy and teaching experience but also requires support from external factors that can improve the overall quality of learning. Therefore, education policies supporting continuous training and improved access to learning resources should be prioritized to improve teachers' pedagogical competence more effectively.

Digital literacy and teaching experience have a significant influence on teachers' pedagogical competence, as shown by various studies. Digital literacy enables teachers to integrate technology into the learning process, thus increasing interactivity and teaching effectiveness (Mishra & Koehler, 2006). This ability improves the quality of teaching materials and opens opportunities for teachers to apply more innovative and relevant learning methods. Meanwhile, teaching experience provides a deeper understanding of classroom management, adjustments to student characteristics, and the application of various effective teaching strategies. Teachers who have more experience tend to have a better ability to adjust teaching approaches according to the learning context at hand. These findings underscore the importance of both factors in improving teachers' pedagogical competence, which contributes to improving the overall quality of education (Cooper & Nesmith, 2013; Pittas & Adeyemi, 2019; Falloon, 2020).

## CONCLUSION

Digital literacy and teaching experience significantly and positively impact teachers' pedagogical competence, both individually and in combination. The findings suggest that increased teaching experience and digital literacy improve pedagogical effectiveness. Based on these results, it is recommended that education policymakers prioritize the inclusion of digital literacy in teacher training programs and encourage continuous professional development that integrates digital skills with pedagogical strategies. Schools should also encourage collaboration between teachers and experts to exchange best practices and improve teaching methodologies. Future research could further explore the long-term effects of digital literacy and teaching experience on student learning outcomes and teacher satisfaction and examine the role of specific digital tools in improving teaching effectiveness.

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