

Determinants of digital competence among English language teachers in Indonesian madrasahs

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ABSTRACT

Digital competence seems to be important for teachers in today's disruptive era. However, research on the determinants of digital competence among language teachers, especially in Islamic schools or madrasahs, remains scarce. This study investigates the determinants of digital competence among English language teachers in Indonesian madrasahs by examining the roles of pedagogical ability, digital learning motivation, digital literacy identity, and perceived barriers. Using a quantitative cross-sectional design, data were collected via a 116-item questionnaire administered to 186 English teachers across multiple Indonesian regions and teaching-experience strata. After establishing internal consistency and construct validity, multiple regression analysis was employed to estimate the predictive contribution of each factor to teachers' digital competence. The results indicate that digital literacy identity emerged as the most potent positive predictor, followed by digital learning motivation and pedagogical ability, while perceived barriers showed a small but negative association. These findings suggest that strengthening teachers' identity as digitally capable professionals, alongside sustained motivational and pedagogical support, may be more impactful than focusing solely on technical training. The study contributes to applied linguistics and digital pedagogy by clarifying how identity- and motivation-related mechanisms shape the integration of technology in EFL teaching within faith-based, resource-diverse schooling contexts.

Keywords: Digital competence; digital literacy; digital pedagogy; English language teachers

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INTRODUCTION

In today's fast-changing digital era, digital technologies have become an inseparable aspect of everyday life. Because digital technology is pervasive, services-based, and increasingly 'intelligent', it is arguably better described as the digital environment because we are enmeshed within it. Therefore, this environment needs to be understood as much more than a collection of tools, and it also presents challenges relating to safety, privacy, and responsible use. It also presents

challenges to the acquisition of adequate skills (World Economic Forum, 2023). One of the domains most affected by the development of digital technology is the field of education (Barboutidis & Stiakakis, 2023; Zhu & Andersen, 2022). Currently, digital technology is widely used in teaching and learning to facilitate access to content, increase the effectiveness and efficiency of the teaching-learning process, and provide a more interactive and creative learning experience for students (Dias-Trindade et

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al., 2020; Dias-Trindade & Moreira, 2020a). Traditionally, education in Indonesia has been teacher-centric, using textbooks, blackboards, and group discussions. However, recent technological advances provide networked connectivity allowing teachers and students to utilise various digital media, such as e-books, videos, and online learning platforms, to facilitate teaching and learning (Fursykova et al., 2022). These developments place significant pressure on teachers to continually acquire and develop competence in engaging with the digital environment. In applied linguistics, teachers' digital competence is closely tied to CALL-informed pedagogy, teacher cognition, and the design of technology-mediated language learning tasks. Understanding digital competence in Indonesian madrasahs is therefore essential for explaining how digital tools become meaningful mediators of EFL learning opportunities in culturally distinctive and resource-diverse schooling contexts.

In English language education, teachers hold a vital position in utilizing digital technologies to enhance communication, language learning, and cultural exchange. Compared to other disciplines, English instruction has become more dependent on online platforms, interactive media, and digital evaluation systems that require advanced technological literacy. Hence, exploring how digitally competent Indonesian English teachers are becomes a relevant and important area of study today.

Given this situation, conducting a comprehensive exploration of how digital technology affects education in Indonesia is highly important. The growing availability and everyday use of digital tools have begun to reshape conventional teaching methods into more interactive and inclusive learning environments. Nevertheless, the effectiveness of such transformation largely depends on teachers' digital proficiency. Their capability to apply technology in a meaningful and innovative way plays a key role in determining how successful technology-based learning can be.

This study contributes by modelling pedagogical ability, digital learning motivation, digital literacy identity, and perceived barriers simultaneously to estimate their unique contributions to EFL teachers' digital competence. By foregrounding Indonesian madrasahs, it extends applied linguistics discussions of CALL and teacher cognition to a faith-based and resource-variable educational setting that remains underrepresented in prior research.

Moreover, the growing presence of digital technology in education draws attention to how various factors, such as teaching skills, motivation in digital learning, digital identity, and existing obstacles, may influence teachers' level of digital competence in this era of digital transformation.

Therefore, this study seeks to address the lack of understanding within the Indonesian context by examining how these factors relate to educators' digital abilities and by providing broader insights into the challenges and opportunities involved in developing learning environments that keep pace with technological progress.

In Indonesia, the integration of digital technology into the learning process has become a key strategy to enhance educational quality (Muliastri, 2022; Nuryani & Handayani, 2020). Nevertheless, the implementation of technology in classrooms still faces various complex challenges. These include teachers' limited preparedness and understanding of digital tools, unequal access to technological infrastructure, and disparities in digital literacy among students (Akbar & Noviani, 2019; Cayeni & Utari, 2019; Syamsuar & Reflianto, 2019). Thus, understanding the factors that influence digital competence within the Indonesian educational setting is crucial in addressing these challenges and in formulating more effective strategies and policies for improvement. Conceptually, pedagogical ability is interpreted through the TPACK perspective, emphasizing teachers' integration of technological, pedagogical, and content knowledge in language teaching. Digital learning motivation is framed by self-determination theory, digital literacy identity draws on social identity/teacher identity perspectives, and perceived barriers are treated as ecological constraints that may limit enactment even when competence is present.

Although the concept of digital competence continues to develop over time, this paper defines it in a straightforward manner as the ability to understand, utilize, and engage with digital technology (Bawden, 2008; European Commission, 2022; Fursykova et al., 2022; Galimullina et al., 2022; Gilster, 1997). No doubt, this construct will be further informed by the recent emergence of generative artificial intelligence, but these developments are beyond the scope of this paper. In the educational context, digital competence is necessary to help individuals understand and use digital technology effectively and efficiently for learning (Yelubay et al., 2022). A number of elements play a role in shaping digital competence within the digital learning environment, including pedagogical ability, motivation for digital learning, digital literacy identity, and the obstacles encountered when applying technology in teaching. Pedagogical ability refers to the teacher's capacity to apply effective instructional methods that incorporate digital tools. Meanwhile, digital learning motivation describes the willingness and drive of teachers to integrate technology into their teaching practices. Digital literacy identity refers to teachers' understanding and skills in using digital technology and utilising content obtained through digital

technology. Meanwhile, obstacles in using digital technology can affect teachers' abilities and confidence (Dias-Trindade & Moreira, 2020b; Fursykova et al., 2022; Hobbs & Coiro, 2016; Zhu & Andersen, 2022).

Teachers must have adequate digital competence to use digital technology effectively in teaching and learning (Napal Fraile et al., 2018). Moreover, for nearly two decades, the relationship between technological knowledge, pedagogical knowledge, and content knowledge, expressed as TPACK, has been an important guiding framework for teachers wishing to integrate technology into their teaching (Harris et al., 2009). Digital competence covers a broad range of skills beyond mere technical expertise. It also includes pedagogical understanding, motivation for engaging in digital learning, a sense of digital literacy identity, and the capacity to overcome difficulties encountered when integrating technology into teaching. Among these aspects, pedagogical competence is particularly vital, as it ensures that digital resources are applied effectively to enhance and support the overall learning experience (Arteaga & Valdiviezo, 2022; Biggins et al., 2017). Educators are required to develop and implement instructional approaches that encourage the innovative and efficient integration of digital technology within the teaching and learning process. According to Schmid et al. (2021), teachers' pedagogical competence has a positive influence on the development of students' digital skills. In contrast, Dong et al. (2020) reported that although pedagogical ability contributes to enhancing students' digital competence, its effect on improving students' capacity to use technology productively remains relatively minor. Pedagogical skills describe the educator's capacity to design, carry out, and assess learning activities that are both effective and meaningful (Darling-Hammond et al., 2017). It encompasses a thorough understanding of teaching and learning principles, along with the capacity to adjust instructional approaches in accordance with students' diverse needs, backgrounds, and learning preferences (Shulman, 1986). In the digital era, pedagogical competence involves the capacity to integrate technology with subject content, choose suitable digital tools that align with learning goals, and apply instructional methods that encourage conceptual understanding and critical thinking. Nevertheless, existing literature still provides limited insight into how teachers cultivate these pedagogical abilities within a technological context. This gap highlights the need for further investigation into effective strategies and approaches for enhancing teaching practices that are responsive to digital transformation. Hence, it becomes essential to understand how educators can strengthen their pedagogical skills in technology-based learning environments and how elements such

as motivation, institutional context, and available support contribute to this development.

Motivation toward digital learning is also an important factor that contributes to the enhancement of digital competence (Kotlyarova et al., 2022; Lilian, 2022). Individuals with strong motivation to learn tend to be more engaged and effective in making use of digital technologies to support their learning activities (Lilian, 2022). Digital learning motivation can also be understood as a combination of internal and external factors that encourage individuals to engage in learning and interact with digital technologies within educational settings (Ryan & Deci, 2020). This form of motivation consists of internal elements such as curiosity and the desire for self-improvement, and external influences, including social acknowledgment and the practical advantages of using digital technology in education. The factors shaping digital learning motivation may vary across individuals. Several studies have indicated that aspects such as the quality of digital content, the attractiveness of instructional design, and the presence of social support can enhance a person's motivation to learn (Chen & Jang, 2010). Previous research by Marna et al. (2020) revealed a positive correlation between motivation in digital learning and the level of digital competence. This result aligns with the study by Hobbs and Coiro (2016), which indicated that strong learning motivation enhances students' ability to use digital technology effectively. Motivation for digital learning may be shaped by several factors, including the user friendliness of technology, the accessibility of digital learning materials, and the presence of social support (Martín-Gutiérrez et al., 2022; Velandia Rodriguez et al., 2022). However, there remains a limited understanding of how unsatisfactory digital learning experiences or technical difficulties might influence learning motivation. Within this framework, the central question concerns how intrinsic and extrinsic elements shape motivation in digital learning and how technological challenges may hinder it. Future studies could further investigate strategies that effectively promote and sustain learning motivation within digital learning environments.

According to Firda (2022), digital literacy identity is another key element that contributes to the development of digital competence. This concept reflects an individual's experience, confidence, and awareness in using digital technologies responsibly, including understanding their ethical and safe applications. Possessing a strong digital literacy identity enables individuals to navigate and manage various challenges encountered when utilizing digital technology (Martzoukou et al., 2020; Mezinov et al., 2022). Martin et al. (2018) found that both digital literacy identity and technological proficiency are positively associated with students' capacity to use digital

tools. This suggests that individuals who possess a strong sense of digital literacy and well-developed technology skills are more likely to demonstrate higher levels of digital competence. Furthermore, digital literacy identity reflects how individuals perceive themselves as capable and proficient in using digital technologies to access, interpret, and share information (Jenkins et al., 2006). Digital literacy identity encompasses cognitive, emotional, and behavioral aspects, which involve technological knowledge, confidence in using digital tools, and attitudes toward technology. However, there remains a limited understanding of how this identity develops and transforms alongside the rapid evolution of digital technologies. Future exploration could examine how digital literacy identity interacts with other dimensions, such as learning motivation and the practical use of technology in educational contexts.

Although digital technology offers numerous advantages that can enhance the learning experience, its implementation is often accompanied by various challenges and limitations (Dufva & Dufva, 2019; Kotlyarova et al., 2022). A number of barriers, such as limited access to resources, technical difficulties, and concerns about data security, can impede the effective use of digital technology in educational settings. According to Galarce-Miranda et al. (2023), obstacles in utilizing digital technology are associated with lower levels of digital competence. The findings of their study revealed a negative correlation between inhibitory factors and an individual's ability to use digital tools effectively. These findings are supported by the study of Ariansyah et al. (2021), which revealed that limiting factors—such as insufficient technological skills and low confidence in using digital tools—are linked to weaker levels of digital competence. Therefore, examining the influence of pedagogical abilities, motivation for digital learning, digital literacy identity, and barriers in technology use on digital competence is essential for improving the quality of education in an increasingly digital era. This study explores these relationships in greater depth, aiming to provide insights that can inform the development of more effective strategies and policies to strengthen digital competence within Indonesia's education system.

In the context of English Language Teaching (ELT), digital competence plays a vital role since technology not only supports instructional delivery but also facilitates language interaction and assessment (Arteaga & Valdiviezo, 2022). English teachers are expected to design multimodal learning experiences, integrate AI-based language tools, and foster learners' autonomy through digital environments. However, studies focusing on Indonesian EFL teachers' digital competence remain limited, creating a significant research gap that this study aims to address.

Although numerous studies have examined teachers' digital competence across various educational contexts (Dias-Trindade & Moreira, 2020b; Fursykova et al., 2022; Galimullina et al., 2022), most have focused on teachers in general and paid little attention to English language teachers, particularly within the context of Islamic-based schools (madrasahs) in Indonesia. English language teaching (ELT) is distinct in that technology is not merely a supporting tool but an essential medium for communication, interaction, and linguistic practice (Arteaga & Valdiviezo, 2022). Furthermore, previous research has often investigated only one or two factors affecting digital competence (Hobbs & Coiro, 2016; Lilian, 2022), neglecting the simultaneous interaction between pedagogical skills, digital learning motivation, digital literacy identity, and perceived barriers. Hence, the present study offers novelty by comprehensively examining these four determinants within the EFL teaching context through a quantitative approach. This integrative framework provides empirical insights into how these variables collectively shape the digital competence of English language teachers in Indonesian madrasahs. The purpose of this paper is to provide a unique contribution to the discourse by connecting four important constructs (pedagogical skills, teacher motivations, and digital literacy identity) with the real-world barriers present in the context of Indonesian schools. The overarching question that has shaped this study is: *What are the factors influencing the acquisition of teacher digital competence in Indonesian schools?* This question necessitated an in-depth study of the literature that elaborates on the skills associated with digital competence to identify the kinds of questions used in the survey instrument.

METHOD

Research Design

This study employed a quantitative approach within a survey research design to delve into the complex interplay of variables affecting digital competence among teachers. The selected research approach enabled the acquisition of comprehensive data suitable for statistical examination, aiming to generate meaningful insights into the educational context. A total of 186 teachers participated in this study, intentionally chosen from multiple regions throughout Indonesia to represent diverse geographical backgrounds. The number of participants was established based on the sampling criteria proposed by Lemeshow (1997) to ensure the reliability of statistical analysis. A stratified sampling approach was utilized, taking into account variables such as teaching experience with digital tools, subject area diversity, educational qualifications, and regional representation. Strata

were defined by region and teaching experience, and participants were recruited within each stratum to ensure representation across both dimensions (with proportional allocation where feasible). To minimize recruitment bias, the same invitation protocol was used across strata, only one response per teacher was retained, and incomplete or duplicate submissions were screened out prior to analysis. This method was intended to obtain a broad and inclusive overview while maintaining the general applicability of the results. Data were gathered using a systematically designed online survey that aimed to capture detailed insights into participants' experiences and perceptions regarding digital competence. Utilizing a digital platform enabled the efficient dissemination of the questionnaire and allowed responses to be collected from participants across various regions.

Respondents

The participants consisted of 186 English language teachers (EFL teachers) working in Islamic-based schools (madrasahs) across Indonesia. They represent a variety of educational levels and institutional types, including public and private madrasahs. The respondents consisted of 71 male and 115 female teachers. Their education level ranged from Diploma Education (n= 1), Bachelor's (n=149), and Master's (n=36). There were teachers from Private (n=108) and Public Schools (n=78). Based on position, there are also permanent teachers (n= 119) and non-permanent teachers (n=67). All respondents were currently teaching English as a subject, either as part of general or religious education curricula. The focus on English teachers allows for a more specific understanding of how digital competence manifests within the EFL teaching context, where technology integration is often central to language pedagogy.

Instruments

The questionnaire used for data collection consisted of five sections, namely Digital Competence, Pedagogy, Digital Learning Motivations, Digital Literacy Identity, and Barriers. The questionnaire was designed using a Likert scale, ranging from 1 to 5. For example, the respondents were asked to rate from very low to very high their capabilities in supporting students in using digital technologies. Another question asked the respondents to rate from very low to very high their confidence in exploring and demonstrating the use of new and emerging technologies in the classroom. The research instrument in this study comprises a comprehensive array of 116 items, strategically designed to unravel the intricate layers of the variables under investigation. The 116 items were developed by integrating indicators from established frameworks and then operationalized for the Indonesian madrasah EFL context through expert review and

pilot testing. The pedagogy construct consisted of nine indicators that reflect various aspects of effective instructional practices. The digital literacy identity dimension included forty-four items describing how individuals perceive and position themselves in the digital environment. The barriers construct contained twenty-two items addressing the difficulties teachers face when integrating technology, while eighteen items examined factors that motivate digital learning. Finally, the digital competence variable comprised twenty-three items assessing the knowledge, skills, and attitudes necessary for proficient engagement with digital technologies. The careful design of these instruments reflects a strong intention to capture the intricate nature of each construct. This approach allows for a deeper exploration of the complex relationships among pedagogical abilities, digital literacy identity, existing challenges, motivational factors, and overall digital competence.

A reliability assessment was carried out to confirm the internal consistency of each construct within the research instrument. Cronbach's Alpha coefficients were computed using JASP software, and the findings revealed that all variables scored above 0.90, indicating an excellent degree of reliability across the measures (Hair et al., 2019). In particular, the Digital Competence construct achieved a reliability coefficient of 0.982, followed by Pedagogy at 0.961, Digital Learning Motivation at 0.948, Digital Literacy Identity at 0.973, and Barriers at 0.974. Based on widely accepted statistical conventions, coefficients above 0.70 indicate satisfactory reliability for studies in the social sciences. Consequently, all measurement instruments utilized in this research can be regarded as both reliable and consistent in evaluating their respective constructs.

Beyond assessing reliability, the study also carried out a validity test to evaluate how accurately each questionnaire item reflected its intended construct. The validity assessment employed an item-total correlation analysis with a significance threshold of 0.05 and an r-table value of 0.144 (n = 186). Findings revealed that all 116 items produced correlation coefficients higher than the critical value, confirming that every item fulfilled the validity requirements and none required removal. Therefore, the instrument utilized in this research can be considered both valid and reliable, ensuring its suitability for examining factors that affect the digital competence of English language teachers.

Data Analysis

Data analysis involved the application of both descriptive statistics and multiple regression techniques. The descriptive approach was employed to summarize and present the general characteristics of each variable, whereas multiple regression analysis was carried out to determine how each

factor contributed to digital competence. Prior to conducting the regression analysis, the underlying statistical assumptions were verified to ensure that the dataset met the necessary analytical conditions. All statistical procedures were performed using SPSS software.

FINDINGS

The results emphasize the main elements that influence the development of digital competence among English language educators. Given that English teaching often involves the use of multimedia materials, online resources, and digital communication platforms, the positive influence of pedagogical skills and digital literacy identity aligns with the technological nature of English instruction.

Descriptive Analysis

In this study, we analyzed five variables related to digital competence in the context of digital learning, as can be seen in Table 1. These variables include digital competence, pedagogy, digital learning motivation, digital literacy identity, and barriers. Data collected from 186 respondents were used to provide a comprehensive insight into the digital competence profile and the contributing factors.

Table 1

Descriptive Analysis of Each Research Variable

	Valid	Mean	SE
Digital Competence (Y)	186	3.370	0.031
Pedagogy (X1)	186	3.462	0.038
Digital Learning Motivations (X2)	186	3.435	0.032
Digital Literacy Identity (X3)	186	3.849	0.029
Barriers (X4)	186	3.037	0.040

It was found that the Digital Literacy Identity variable had the highest mean score, which was 3.849, with a standard deviation of 0.693 and a standard error of 0.029, while the Barriers variable was in the lowest position, with a mean score of 3.037 and a standard error of 0.040. Overall, the descriptive statistics suggest that participants reported moderate-to-high levels across the key constructs, indicating a generally positive readiness for digitally mediated EFL teaching. Notably, variability across indicators implies that competence and its determinants may not develop uniformly, pointing to specific domains where targeted professional support may be more urgently needed.

The descriptive analysis above provides an initial overview of the distribution and variation of each variable in the study. The mean indicates the central value of the data, while the standard deviation measures the extent to which the data is spread out from the mean. The standard error estimates the potential error that may arise from the sample mean to the population. These findings will serve as a basis for further analysis concerning the relationships between these variables and their

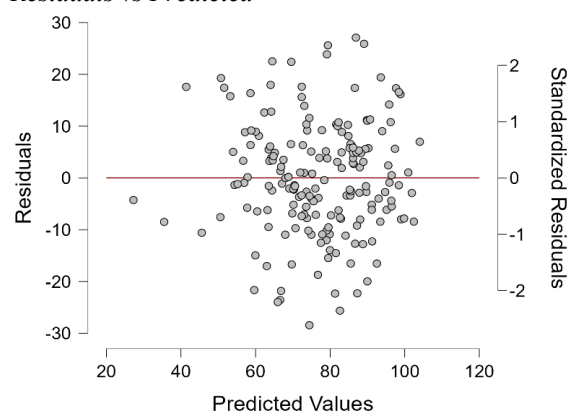
implications for digital competence in digital learning.

Assumption Tests

Heteroscedasticity

A heteroscedasticity test was performed to assess whether the residuals from one observation displayed variations compared to others. As shown in Figure 1, the residuals are evenly dispersed around the reference line (depicted in red), suggesting that the homoscedasticity assumption is satisfied and no violations are present.

Figure 1
Residuals vs Predicted



The heteroscedasticity analysis was carried out to examine whether any systematic pattern appeared in the residual distribution. Based on the visual assessment, the residuals are evenly dispersed and closely follow the reference line, as illustrated by the red line in Figure 1. This pattern suggests that the homoscedasticity assumption is fulfilled, meaning the variance of the residuals remains stable across different values of the independent variables. In essence, the residuals show a relatively uniform spread across different values of the independent variables. Such a balanced pattern reflects that the variability of the dependent variable stays consistent throughout varying levels of predictors. This finding is favorable since the presence of heteroskedasticity could otherwise undermine the dependability of regression analysis by distorting coefficient estimates and weakening hypothesis testing accuracy.

Multicollinearity

The multicollinearity test aims to identify whether intercorrelations exist among the independent variables. The hypotheses are formulated as follows: Ho indicates no relationship between the variables (absence of multicollinearity), while Ha suggests the presence of such a relationship (existence of multicollinearity). According to the testing criteria displayed in Table 2, if the Variance Inflation Factor (VIF) value is below 10 and the tolerance exceeds

0.1, the regression model can be regarded as free from multicollinearity issues.

Table 2
Tolerance and VIF

	Collinearity Statistics	
	Tolerance	VIF
Pedagogy (X1)	0.570	1.755
Digital Learning Motivations (X2)	0.534	1.872
Digital Literacy Identity (X3)	0.472	2.120
Barriers (X4)	0.927	1.079

Table 2 shows that the Tolerance values for variables X1, X2, X3, and X4 are 0.570, 0.534, 0.472, and 0.927, respectively. All four variables demonstrated tolerance values above 0.1, and their Variance Inflation Factor (VIF) scores were all

Table 3
Results of ANOVA

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	p
H1	Regression	35164.756	4	8791.189	72.844	< .001
	Residual	21844.110	181	120.686		
	Total	57008.866	185			

Note: The intercept model is omitted, as no meaningful information can be shown.

The regression analysis demonstrated that the independent variables exert a statistically significant effect on the dependent variable, as indicated by a p-value below the conventional threshold of 0.05. Substantively, the significant overall regression (F-test) indicates that the four predictors, when considered together, provide a meaningful explanatory account of why digital competence varies among EFL teachers in Indonesian madrasahs. In other words, differences in teachers' digital competence are systematically associated with a combination of pedagogy, motivation, digital literacy identity, and perceived barriers rather than being largely random. This supports the study's central claim that these factors function as key determinants that can inform targeted teacher education and school-level support, although the cross-sectional design warrants cautious interpretation regarding causality.

The ANOVA (Analysis of Variance), as depicted in Table 3, corresponds to the regression model, further confirming the statistical significance of the relationships between the variables. This analysis quantifies the degree of variation in the dependent variable explained by the regression model.

As depicted in Table 4, Approximately 55% of the variability in the dependent variable is accounted for by the independent variables included in the analysis. That is, over half of the variability in the outcome variable can be attributed to the joint impact of the four independent variables under investigation: Pedagogy, Digital Learning Motivations, Digital Literacy Identity, and Barriers.

below 10, specifically 1.755 for X1, 1.872 for X2, 2.120 for X3, and 1.079 for X4. These results indicate that the assumption of multicollinearity has been satisfied for the independent variables in the model. This suggests that the variables exhibit relatively low intercorrelation, supporting the reliability and validity of the regression analysis outcomes.

Regression

The regression results indicate that the independent variables examined have a significant impact on the dependent variable, with a p-value below 0.001, which is also smaller than the 0.05 threshold (see Table 3).

Consequently, the examined independent variables collectively have a substantial influence on the dependent variable (Digital competence). This relationship is statistically significant, reinforcing the notion that these variables are key determinants of the observed phenomenon. This result strengthens the overall credibility and validity of the regression model in explaining the variation in the dependent variable.

Table 4
Model Summary

Model	R	R ²	Adjusted R ²	RMSE
Ho	0.000	0.000	0.000	17.554
H1	0.785	0.617	0.608	10.986

Based on the regression analysis results, it is known that B0 = 4.909; B1 = 0.413; B2 = 0.366; B3 = 0.244; and B4 = -0.065 (see Table 5). Thus, the regression model obtained is as follows:

$$Y = 4.909 + 0.413 X1 + 0.366 X2 + 0.244 X3 - 0.065 X4$$

The Model Summary table, which focuses on predicting digital competency, offers significant insights into the regression analysis. The predictor variables and digital competence have a moderately positive connection, as indicated by the R value of 0.785. According to the R2 and Adjusted R2 values of 0.617 and 0.608, respectively, the predictor variables in this model can account for around 61.7% of the variation in digital competence scores. Model H1's predictions appear to be more accurate

than the null model's predictions, according to the drastically lower RMSE of 10.986. Table 5 shows that Pedagogy (X1), Digital Learning Motivations (X2), and Digital Literacy Identity (X3) positively affect the variable Digital Competence (Y). This

means that the larger the values of X1, X2, and X3, the larger the value of Y. On the other hand, Barriers (X4) has a negative effect on the variable Y. Therefore, if the value of X4 increases, the value of Y will decrease.

Table 5
Coefficients

Model		Unstandardised	Standard Error	Standardised	t	p
H ₀	(Intercept)	77.027	1.287		59.843	< .001
H ₁	(Intercept)	4.909	5.027		0.977	0.330
	Pedagogy (X1)	0.413	0.128	0.197	3.235	0.001
	Digital Learning Motivations (X2)	0.366	0.081	0.286	4.539	< .001
	Digital Literacy Identity (X3)	0.244	0.039	0.424	6.332	< .001
	Barriers (X4)	-0.065	0.038	-0.083	-1.741	0.043

These findings illuminate the nature and magnitude of the relationships between the variables under investigation, shedding light on how changes in the independent variables contribute to variations in the dependent variable. These insights are essential for comprehending the complex interactions within the examined phenomena and for guiding the development of interventions or strategies to enhance the targeted outcomes.

DISCUSSION

This study seeks to examine how pedagogical skills, digital learning motivation, digital literacy identity, and barriers significantly affect teachers' digital competence. Overall, the regression pattern suggests that teachers' digital competence is not shaped by pedagogy alone, but by an interplay of professional knowledge, sustained motivational engagement, and teachers' self-concept in digital spaces—within an institutional ecology that can enable or constrain enactment. While all four predictors are statistically significant, the standardized coefficients indicate meaningful differences in practical influence: digital literacy identity shows the strongest association ($\beta = 0.424$), followed by digital learning motivation ($\beta = 0.286$) and pedagogy ($\beta = 0.197$), whereas barriers show a small but negative association ($\beta = -0.083$). This ranking matters substantively because it implies that identity- and motivation-supportive conditions may produce larger gains in teachers' digital competence than technical or pedagogical support alone, even though reducing barriers remains necessary for sustainable implementation.

Pedagogical skills were found to positively contribute to digital competence in learning. Strong teaching abilities allow educators to integrate digital technology effectively, thereby enhancing students' digital skills (Silva et al., 2019). This finding is supported by constructivist learning theory, which emphasizes that meaningful learning occurs through direct experiences and active engagement with the surrounding environment (Bull, 2013).

Research on technology integration has also suggested that pedagogical decision-making is central to effective digital learning, as it shapes how tools are used to support interaction, feedback, and scaffolding rather than functioning as add-ons (Harris et al., 2009; Hew & Brush, 2007). Research by Harris et al. (2009) and Hew and Brush (2007) indicated that employing a constructivist approach in digital learning can enhance students' proficiency in using digital technologies. In contrast, conventional teacher-centered methods may restrict the development of students' digital competence. According to Harris et al. (2009), previous research revealed a positive link between pedagogical skills and digital competence. In line with these findings, participants in this study who demonstrated strong teaching abilities also exhibited higher levels of digital competence. Comparable findings were reported by Schmid et al. (2021), who observed that teachers' pedagogical skills had a positive effect on students' digital competence. Conversely, Dong et al. (2020) noted that pedagogical capacity alone may have limited effects on productive technology use if other conditions—such as school support, curriculum constraints, or resource availability—are not aligned. Our results nuance this literature by showing that pedagogy remains an important predictor, but its practical contribution is smaller than identity and motivation, indicating that “knowing how” to teach with technology may require “wanting to” and “seeing oneself as able and legitimate” to do so in real classroom conditions. Conversely, Dong et al. (2020) noted that while strong pedagogical abilities can enhance students' digital competence, their impact on students' productive use of technology is limited. This is attributed to the influence of additional factors, such as the availability of resources, curriculum design, and the learning environment.

Digital learning motivation was also found to have a positive effect on digital competence. Teachers with strong motivation to engage in digital learning are better able to acquire new skills and knowledge efficiently and effectively. This finding

is supported by self-determination theory, which posits that higher levels of motivation enhance learning outcomes (Reeve, 2002). Previous research by Marna et al. (2020) indicated a positive association between digital learning motivation and digital competence. Importantly, the practical ranking of predictors indicates that motivation is not a peripheral factor; it is one of the strongest drivers after digital literacy identity. This suggests that professional development initiatives should be designed not only to transmit skills but also to maintain teachers' motivational conditions—through attainable goals, feedback, peer support, and opportunities to see immediate instructional value from technology use.

Digital literacy identity was also shown to have a significant impact on digital competence. Individuals with a well-developed digital literacy identity tend to be more confident and capable in utilizing digital technologies for both learning and professional purposes. This finding is underpinned by social identity theory, which suggests that a strong sense of identity influences individual behavior. According to Mäkitalo-Siegl et al. (2010), environmental factors, including social and cultural contexts, play a role in shaping digital competence. The findings suggest that individuals with a strong digital literacy identity and well-developed technology skills are more likely to exhibit higher levels of digital proficiency.

Our findings extend this line of work by showing that digital literacy identity is the strongest practical determinant among the tested predictors. This implies that digital competence development is partly an identity project, not merely a skills project: teachers who identify as digitally capable professionals may be more willing to experiment, seek peer feedback, and continue learning despite setbacks. In madrasahs, where institutional norms and community expectations may shape what is seen as appropriate digital practice, identity may function as a key mechanism that organizes motivation and pedagogical experimentation.

Conversely, obstacles to using digital technology in learning were found to negatively affect digital competence. Challenges such as limited access to technological resources, insufficient support from colleagues or institutions, and gaps in technological skills can impede teachers' capacity to effectively integrate digital tools into their teaching practices. These findings align with Kay and Knaack's (2009), who reported that perceived technological barriers can influence the effectiveness of online learning. Similarly, Galarce-Miranda et al. (2023) found that obstacles to using digital technology are associated with lower levels of digital competence. In line with these findings, our study shows a negative association between inhibitory factors and an individual's digital competence. This is further supported by

Ariansyah et al. (2021), who reported that limitations such as insufficient technological skills and low confidence in using technology contribute to reduced digital abilities.

However, the barrier coefficient is comparatively small in practical terms, suggesting two plausible interpretations. First, teachers with strong identity and motivation may partially compensate for infrastructural limitations through improvisation (e.g., using personal devices, lightweight tools, or peer assistance), thereby attenuating barrier effects. Second, barriers may constrain the frequency and quality of classroom enactment more strongly than self-reported competence, indicating that future studies should distinguish perceived competence from observed technology integration.

In today's digital era, this study is particularly relevant for educators aiming to enhance their digital competence in teaching and learning. Numerous studies have explored ways to improve digital competence (Alam et al., 2018; Arteaga & Valdiviezo, 2022; Napal Fraile et al., 2018). This research provides deeper insights into the factors that shape digital competence, helping educators identify specific areas for skill development. At present, both teachers and educational institutions require comprehensive guidance to implement effective strategies and approaches that can foster students' digital competence (Fursykova et al., 2022; Napal Fraile et al., 2018; Yelubay et al., 2022). The results of this study can support teachers and educational institutions in designing effective strategies and approaches to strengthen students' digital competence. The results of this study can support teachers and educational institutions in designing effective strategies and approaches to strengthen students' digital competence. These findings also contribute to a better understanding of the factors that influence the development of digital competence and offer guidance for both individuals and institutions on optimizing the use of digital technology in learning. Nevertheless, further research is necessary to gain deeper insights into the determinants of digital competence and to identify more effective methods for enhancing individual digital skills.

Beyond individual-level predictors, institutional culture and school leadership are likely to shape how competence develops and is enacted in madrasahs. Leadership that legitimizes digital pedagogy—through recognition of teachers' digital efforts, provision of time for collaborative lesson design, and supportive norms for experimentation—may strengthen teachers' digital identity and sustain motivation, thereby amplifying competence growth. Moreover, Islamic school values may influence technology uptake by shaping what counts as appropriate content and interaction (e.g., emphasis on ethical use, responsible online participation, and

alignment with religious community expectations). These contextual factors can help explain why teachers with similar skills may differ in their willingness to adopt, persist, and innovate in digitally mediated EFL teaching.

This study has several limitations. It is possible that other factors affecting an individual's digital competence in digital learning were not fully captured. Additionally, data collection relied solely on a survey questionnaire, which may introduce biases or inaccuracies. Future research could address these limitations by using larger sample sizes, including a wider range of influencing factors, and employing more detailed data collection methods, such as interviews or observations, to obtain more comprehensive and accurate insights.

CONCLUSION

Based on survey data from 186 English language teachers, this study demonstrates that pedagogical skills, digital learning motivation, and digital literacy identity play significant roles in shaping teachers' digital competence. The findings reveal both challenges and opportunities for English teachers in integrating digital technologies into language instruction. The analysis indicates that several factors have notable effects on digital competence. First, pedagogical ability exerts a positive influence on digital competence, suggesting that teachers with stronger instructional and classroom management skills are better equipped to utilize digital technologies effectively. This highlights the importance of pedagogical skills in preparing educators to navigate the digital era. Second, digital learning motivation also positively affects digital competence. Teachers who are more motivated to engage with digital technology tend to perform better in its application, with motivation arising from factors such as personal interest or the desire for self-improvement. Third, digital literacy identity, which encompasses knowledge, skills, and attitudes toward digital technology, positively contributes to digital competence. A stronger digital literacy identity enables teachers to utilize technology more effectively in teaching and learning activities. Fourth, barriers to using digital technology in education negatively impact digital competence. Such obstacles may include limited access to resources or inadequate support from the surrounding environment, emphasizing the need to address these challenges to enhance the effectiveness of digital learning. Overall, this study highlights that pedagogical skills, digital learning motivation, digital literacy identity, and technological barriers are key factors influencing teachers' digital competence. Consequently, developing these areas is essential for educators to thrive in an increasingly digitalized educational landscape.

Based on these findings, teacher education and professional development programs should move beyond short, tool-focused workshops and prioritize identity- and motivation-supportive approaches. Practically, programs can (a) embed TPACK-informed CALL modules where teachers design and trial digital language tasks, (b) establish mentoring and peer-learning communities to normalize experimentation and sustain motivation, and (c) use reflective digital portfolios to assess pedagogical alignment, interactional scaffolding, and task quality—not merely tool use. At the policy level, madrasah leaders and authorities can operationalize support by allocating dedicated time for collaborative digital lesson design, ensuring access to low-bandwidth or shared-device solutions, and providing clear guidance on ethically appropriate digital resources aligned with Islamic school values.

To gain a deeper understanding of the complex relationships among pedagogical skills, digital learning motivation, digital literacy identity, barriers, and digital competence, future research could consider conducting longitudinal studies to track how these variables develop over time in teachers. Further investigations could also examine these relationships across different educational contexts, incorporate intervention-based approaches to strengthen specific skills, use qualitative methods for richer insights, and explore potential mediating or moderating factors. Additionally, cross-cultural studies, analyses of the impact of emerging technologies, and validation of measurement instruments would provide a more comprehensive perspective on how these factors collectively influence digital competence in diverse learning environments. It is also recommended that teacher training programs and professional development initiatives place emphasis on integrating digital pedagogy in EFL contexts, with attention to multimedia-based instruction, AI-assisted feedback, and online communication tools.

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