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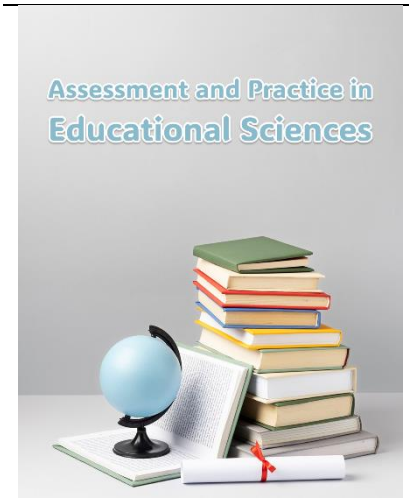

Predicting EFL Teachers' Pedagogical Digital Competence Through Growth Mindset and Peer-Coaching Experience

ABSTRACT

The increasing integration of digital technologies into educational settings has intensified the need for teachers to develop pedagogical digital competence. In EFL contexts, teachers are expected not only to possess linguistic and pedagogical knowledge but also to integrate digital technologies into instruction in pedagogically meaningful ways. Despite growing research on digital competence, limited attention has been paid to the psychological and collaborative factors that may contribute to its development, particularly in the Iranian EFL context. Therefore, the present study investigated whether growth mindset and peer-coaching experience significantly predict Iranian EFL teachers' pedagogical digital competence. Employing a quantitative descriptive–correlational design, the study was conducted with 150 EFL teachers selected through convenience sampling. Data were collected using questionnaires measuring pedagogical digital competence, growth mindset, and peer-coaching experience. The instruments were validated through expert review, and their reliability was confirmed using Cronbach's alpha coefficients. The data were analyzed through descriptive statistics, Pearson correlation, and multiple regression analysis. The findings revealed significant positive relationships among growth mindset, peer-coaching experience, and pedagogical digital competence. Moreover, both growth mindset and peer-coaching experience significantly predicted pedagogical digital competence, with growth mindset demonstrating the stronger predictive role. The findings suggest that teachers' digital pedagogical development may be influenced not only by technical knowledge and access to technology but also by adaptive professional beliefs and collaborative learning experiences. The study offers implications for teacher education programs, professional development initiatives, and future research on digital competence in EFL settings.

Keywords: pedagogical digital competence, growth mindset, peer coaching, EFL teachers, professional development

1. Amir Hossein. Rezazadeh Jabalbarezi*: Foreign Languages Department, Faculty of Literature and Humanities, Shahid Bahonar University of Kerman, Kerman, Iran (Email: amirhoseseinrezazadeh@ens.uk.ac.ir)

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Introduction

The rapid expansion of digital technologies has transformed educational systems worldwide and significantly altered the nature of teaching and learning processes. In contemporary educational environments, teachers are increasingly expected to integrate digital technologies into classroom instruction in ways that support meaningful learning experiences, foster student engagement, and facilitate access to diverse educational resources. The emergence of online learning platforms, digital communication tools, multimedia resources, and artificial intelligence applications has expanded the possibilities for instructional innovation and personalized learning. Consequently, teachers' ability to employ digital technologies effectively has become a central dimension of professional competence in modern education (1-3). In language education contexts, especially in English as a Foreign Language (EFL) classrooms, digital technologies provide valuable opportunities for authentic

communication, collaborative interaction, individualized instruction, and exposure to real-world linguistic input. However, the successful implementation of these technologies depends largely on teachers' pedagogical digital competence and their willingness to adapt to changing educational demands (4-6).

Pedagogical digital competence refers to teachers' ability to integrate digital technologies into instructional practices in pedagogically meaningful, ethical, and effective ways. This competence extends beyond technical proficiency and includes the capacity to select appropriate digital tools, design technology-enhanced learning activities, facilitate online interaction, evaluate digital resources critically, and support students' digital literacy development. In contemporary educational discourse, pedagogical digital competence is increasingly viewed as a multidimensional construct encompassing technological, pedagogical, cognitive, and professional dimensions (2, 3, 5). As schools continue to adopt digital learning environments, teachers are expected to navigate complex technological ecosystems while simultaneously maintaining instructional quality and student-centered pedagogy. Therefore, understanding the factors that contribute to the development of pedagogical digital competence has become a major concern for educational researchers and policymakers.

Despite the increasing emphasis on digital transformation in education, many teachers continue to encounter substantial challenges in integrating digital technologies effectively into classroom instruction. These challenges may include insufficient technological infrastructure, limited access to professional development opportunities, inadequate institutional support, technostress, resistance to change, and uncertainty regarding the pedagogical value of digital tools (2, 6, 7). Research has also shown that technological integration is influenced not only by external resources and institutional conditions but also by teachers' psychological beliefs, professional identity, and collaborative learning experiences. Teachers who perceive technology as difficult or beyond their capabilities may avoid experimentation with digital tools, whereas teachers who approach technological learning with confidence and openness may be more likely to develop effective digital pedagogical practices (8-10).

One of the psychological constructs that has gained increasing attention in educational research is growth mindset. The concept of growth mindset refers to the belief that abilities and competencies are not fixed but can be developed through effort, persistence, learning, and experience. Individuals with a growth mindset tend to perceive challenges as opportunities for improvement and are generally more willing to engage in sustained learning efforts when facing difficulties. In contrast, individuals with a fixed mindset often perceive abilities as stable traits and may avoid situations that could expose their perceived limitations (8, 9, 11). Within educational settings, teachers' mindset orientations may significantly influence their attitudes toward innovation, professional learning, and technology integration.

Teachers who hold a growth mindset are generally more likely to engage in reflective practice, seek constructive feedback, and participate actively in professional development activities aimed at improving their instructional competence. They also tend to demonstrate greater resilience when encountering instructional challenges and may show stronger motivation to experiment with emerging educational technologies. Such teachers are often more open to adopting innovative pedagogical strategies because they view learning as a continuous and improvable process rather than a reflection of fixed ability (8, 9, 11). In technology-rich educational environments, these dispositions may play a particularly important role because digital competence requires ongoing learning, adaptation, and problem-solving. Teachers who believe that their abilities can improve through effort may therefore be more inclined to explore digital resources, learn new software applications, and integrate technological tools into classroom instruction despite initial challenges.

Recent studies have further highlighted the relationship between growth mindset and various positive educational outcomes. Research has demonstrated that growth mindset is associated with higher academic engagement, stronger self-efficacy, improved psychological well-being, and greater adaptability in educational contexts (8, 12). In teacher education, growth

mindset has also been linked to intercultural competence, instructional innovation, and openness to collaborative learning experiences (9). Moreover, studies indicate that teachers' support for growth mindset can positively influence students' engagement, motivation, and academic achievement (10, 12). These findings suggest that growth mindset not only shapes teachers' personal learning behaviors but may also contribute to broader educational processes related to teaching effectiveness and classroom innovation.

In addition to psychological beliefs such as growth mindset, collaborative professional learning experiences represent another important factor influencing teachers' professional competence. Contemporary theories of teacher development emphasize that professional learning is inherently social and often occurs through interaction, reflection, and shared practice among educators. One collaborative approach that has received increasing attention in educational research is peer coaching. Peer coaching refers to a structured process through which teachers collaborate with colleagues to observe classroom practices, exchange feedback, discuss instructional challenges, and reflect on teaching strategies in supportive professional environments (13, 14). Unlike traditional top-down professional development programs, peer coaching is grounded in reciprocal learning and collegial collaboration, allowing teachers to learn from each other's practical experiences.

Peer coaching has been recognized as an effective strategy for enhancing instructional quality, promoting reflective teaching practices, and fostering professional growth. Through collaborative observation and dialogue, teachers can identify strengths and weaknesses in their instructional approaches, gain exposure to alternative teaching strategies, and receive practical suggestions for improvement. In language education contexts, peer coaching may be especially valuable because EFL teachers frequently face complex pedagogical challenges related to learner diversity, communicative interaction, language anxiety, and technology-supported instruction (13-15). Collaborative professional interaction can therefore provide EFL teachers with emotional support, practical guidance, and opportunities for shared problem-solving.

Research findings consistently indicate that peer learning and peer collaboration positively influence educational outcomes across various contexts. Studies on peer-assisted learning have demonstrated improvements in instructional effectiveness, learner engagement, communication skills, and academic achievement (16, 17). In teacher professional development, peer coaching has been associated with increased teacher self-confidence, enhanced instructional quality, and greater willingness to implement innovative teaching strategies (13, 14). Moreover, collaborative learning environments can facilitate the exchange of technological knowledge and encourage teachers to experiment with digital tools within authentic classroom settings.

The relationship between peer interaction and learning effectiveness has also been highlighted in recent educational research. Collaborative learning processes enable individuals to negotiate meaning, exchange perspectives, and construct knowledge through social interaction. In EFL contexts, peer collaboration has been shown to enhance writing quality, reading comprehension, communicative competence, and learner autonomy (4, 17, 18). Digital technologies further expand opportunities for peer interaction by enabling online collaboration, feedback exchange, and cooperative learning activities. AI-supported peer feedback systems, for example, have recently emerged as innovative tools for improving feedback quality and writing performance among university EFL learners (4). Such developments demonstrate the growing interconnectedness between digital competence and collaborative educational practices.

In educational environments increasingly shaped by artificial intelligence and digital innovation, teachers are expected not only to master technological tools but also to adapt continuously to evolving educational demands. Research on teacher competence development emphasizes that digital transformation in education requires ongoing professional learning and adaptive professional identities (5-7). Teachers who actively participate in collaborative learning communities may be better positioned to navigate technological changes because peer interaction can reduce uncertainty and facilitate knowledge sharing.

Simultaneously, teachers' psychological orientations, such as growth mindset, may influence the extent to which they embrace technological innovation and engage in continuous learning.

Another important aspect of contemporary educational research concerns the role of teacher and peer support in promoting engagement, motivation, and well-being. Studies have shown that supportive educational relationships contribute significantly to learners' academic engagement and psychological adjustment (19, 20). Similar processes may also apply to teachers themselves, as supportive professional environments can encourage experimentation, collaboration, and professional growth. Peer coaching relationships may therefore function as both instructional and emotional support systems that facilitate teachers' adaptation to technologically enriched educational contexts.

Within the field of EFL education, the integration of digital technologies has become increasingly important due to the communicative and interactive nature of language learning. Digital tools such as multimedia applications, online communication platforms, virtual learning environments, and AI-based language systems provide opportunities for authentic language exposure and interactive learning experiences. However, effective implementation of such technologies requires teachers to possess both pedagogical expertise and digital competence. At the same time, EFL teachers often face additional challenges related to language proficiency differences, limited classroom time, and the need to maintain student motivation and interaction. Consequently, identifying the psychological and collaborative factors that contribute to teachers' pedagogical digital competence is particularly important in EFL contexts (4, 18, 21).

Although previous research has separately examined growth mindset, peer collaboration, and digital competence, relatively limited attention has been given to the relationships among these constructs within a unified framework. Existing studies often focus on technological competence independently from teachers' psychological beliefs or collaborative professional experiences. As a result, there remains a significant gap in understanding how growth-oriented beliefs and peer-coaching experiences jointly contribute to the development of pedagogical digital competence among EFL teachers. Furthermore, limited empirical research has explored these relationships specifically within Iranian EFL educational contexts, where teachers may encounter unique institutional, technological, and pedagogical challenges.

Given the increasing importance of digital technologies in language education and the growing need for professionally adaptive teachers, examining the factors that contribute to pedagogical digital competence is of substantial theoretical and practical significance. Understanding how teachers' growth mindset and peer-coaching experiences relate to digital pedagogical competence may provide valuable insights for designing more effective teacher education programs and professional development initiatives. Such knowledge can help educational institutions create supportive learning environments that encourage both psychological resilience and collaborative professional growth among teachers.

Therefore, the present study aims to investigate the extent to which growth mindset and peer-coaching experience predict pedagogical digital competence among Iranian EFL teachers.

Methods and Materials

The present study employed a quantitative descriptive–correlational research design to investigate the predictive roles of growth mindset and peer-coaching experience in shaping EFL teachers' pedagogical digital competence. Quantitative research designs are widely utilized in educational studies when researchers seek to examine measurable relationships among variables using statistical procedures. This approach enabled the researchers to collect numerical data systematically, identify statistical patterns, and examine the associations among the study variables in an objective and empirically grounded manner. The descriptive component of the study aimed to provide a comprehensive overview of teachers' levels of pedagogical digital competence, growth mindset orientation, and peer-coaching experience, while the correlational component focused on

examining the degree and direction of relationships among these variables without manipulating them experimentally. A descriptive–correlational design was considered particularly appropriate because the study sought to examine naturally occurring psychological and professional variables within authentic educational settings rather than under controlled experimental conditions.

The participants of the study consisted of 150 EFL teachers working in public secondary schools in Districts 1 and 2 of Kerman, Iran, during the 2023–2024 academic year. The participants were selected through convenience sampling based on accessibility and willingness to participate in the study. The sample included both male and female teachers with varying levels of teaching experience and educational qualifications, thereby increasing the diversity and representativeness of the participants. Among the participants, 88 teachers were female and 62 were male. Regarding age distribution, 39 participants were between 20 and 30 years old, 67 were between 31 and 40 years old, 32 were between 41 and 50 years old, and 12 participants were above 50 years of age. In terms of teaching experience, 34 teachers had between one and five years of experience, 51 had between six and ten years, 39 had between eleven and fifteen years, and 26 participants had more than fifteen years of teaching experience. Concerning educational qualifications, 73 participants held bachelor's degrees, 68 possessed master's degrees, and 9 participants had doctoral degrees. The inclusion of teachers with diverse demographic characteristics contributed to the credibility of the findings and provided a more comprehensive understanding of the relationships among pedagogical digital competence, growth mindset, and peer-coaching experience in EFL educational contexts.

Prior to data collection, permission to conduct the study was obtained from the relevant educational authorities and school administrations. Ethical principles were strictly observed throughout the research process. Participants were informed about the objectives of the study and were assured that participation was entirely voluntary. They were also informed that their responses would remain anonymous and confidential and that the collected data would be used solely for academic research purposes. To facilitate participation and accessibility, questionnaires were distributed both in printed format during school visits and electronically through online survey platforms. Participants were provided with clear instructions regarding the completion of the questionnaires, and sufficient time was allocated for responding carefully to all items. After data collection, incomplete questionnaires containing substantial missing data were excluded from the analysis in order to maintain the quality and reliability of the dataset.

To collect the required data, three structured questionnaires were employed to measure the primary variables of the study, namely pedagogical digital competence, growth mindset, and peer-coaching experience. All instruments consisted of close-ended items measured on a five-point Likert scale ranging from strong disagreement to strong agreement. The use of standardized questionnaires enabled the researchers to obtain consistent responses from participants and conduct statistical analyses examining the relationships among the variables.

The Pedagogical Digital Competence Questionnaire was designed to assess teachers' competence in integrating digital technologies into instructional practices effectively and pedagogically. The instrument was developed based on contemporary conceptualizations of digital competence in education and reflected multidimensional aspects of technology integration, including technological knowledge, pedagogical application, and professional digital engagement. The questionnaire consisted of 22 items examining several dimensions of teachers' digital competence, such as the use of digital technologies for lesson planning, online instruction, classroom management, assessment practices, and multimedia integration. Additional items assessed teachers' ability to evaluate digital resources critically, manage technology-supported learning activities, and promote responsible and ethical use of digital technologies among students. Participants were asked to indicate the extent to which each statement reflected their own teaching experiences and professional practices. Higher scores on the questionnaire indicated

stronger pedagogical digital competence. The instrument was reviewed by experts in TEFL and educational technology to establish content validity, and reliability analysis using Cronbach's alpha yielded a coefficient of 0.89, indicating a high level of internal consistency.

The Growth Mindset Questionnaire was employed to assess teachers' beliefs regarding the malleability of their professional abilities and competencies. The instrument was theoretically grounded in Dweck's conceptualization of growth mindset, which emphasizes the belief that abilities can be developed through sustained effort, persistence, and learning. The questionnaire consisted of 8 items measuring teachers' attitudes toward professional learning, effort, adaptability, and instructional improvement. The items evaluated the extent to which participants believed that teaching skills, technological competence, and instructional expertise could improve over time through experience and continuous professional development. Some items also examined teachers' willingness to engage with challenging instructional tasks and experiment with innovative teaching strategies, including technology-enhanced instruction. Participants responded using a five-point Likert scale ranging from strong disagreement to strong agreement, with higher scores indicating a stronger growth mindset orientation. The questionnaire underwent expert review to ensure content validity, and the Cronbach's alpha coefficient for the instrument was calculated at 0.85, demonstrating acceptable reliability and internal consistency.

The Peer-Coaching Experience Questionnaire was utilized to measure teachers' engagement in collaborative professional learning activities related to peer coaching. Peer coaching is recognized as a collaborative professional development strategy in which teachers support each other through classroom observation, reflective dialogue, feedback exchange, and shared instructional experiences. The questionnaire consisted of 12 items designed to capture multiple aspects of peer-coaching participation. The items assessed the frequency of peer observation activities, collaborative instructional reflection, feedback exchange among colleagues, and participation in professional dialogue related to teaching practices and technology integration. Additional items examined teachers' perceptions regarding the usefulness of peer coaching for improving instructional effectiveness and exploring innovative pedagogical methods. Participants were asked to indicate either the frequency of engagement in peer-coaching activities or their degree of agreement with statements related to collaborative professional learning experiences. Higher scores indicated greater involvement in peer-coaching practices. Content validity was established through expert evaluation, and reliability analysis yielded a Cronbach's alpha coefficient of 0.87, indicating strong internal consistency for the instrument.

Collectively, the three instruments provided comprehensive quantitative data regarding teachers' pedagogical digital competence, growth mindset orientation, and collaborative professional learning experiences. The acceptable reliability coefficients demonstrated that the instruments were sufficiently stable and appropriate for investigating the relationships among the study variables.

The collected data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Initially, descriptive statistics including means, standard deviations, frequencies, and percentages were calculated to summarize participants' demographic characteristics and provide an overview of the main study variables. Descriptive analysis enabled the researchers to examine the central tendencies and variability of participants' responses related to pedagogical digital competence, growth mindset, and peer-coaching experience.

To investigate the relationships among the variables, Pearson product–moment correlation analysis was conducted. Pearson correlation coefficients were calculated to determine the strength and direction of the relationships between growth mindset, peer-coaching experience, and pedagogical digital competence. Correlation analysis enabled the researchers to identify whether increases or decreases in one variable were associated with corresponding changes in another variable.

In addition to correlation analysis, multiple regression analysis was employed to determine the predictive roles of growth mindset and peer-coaching experience in explaining variations in pedagogical digital competence. Multiple regression analysis was considered appropriate because it allowed the researchers to examine the combined predictive contribution of the independent variables while simultaneously identifying the relative strength of each predictor. Before conducting regression analysis, several statistical assumptions were examined to ensure the validity and reliability of the regression model. Normality of data distribution was assessed using skewness and kurtosis statistics, and the results indicated that the variables were approximately normally distributed and fell within acceptable ranges. Multicollinearity was examined through Variance Inflation Factor (VIF) values, which remained below the commonly accepted threshold of 5, indicating the absence of problematic multicollinearity among the predictor variables. Homoscedasticity was evaluated through scatterplot inspection, and the results suggested that the variance of residuals remained constant across predicted values. Furthermore, the independence of errors assumption was assessed using the Durbin–Watson statistic, which yielded a value of 1.89, indicating acceptable independence among residuals.

After confirming that the assumptions for regression analysis were satisfied, the regression model was conducted to examine the extent to which growth mindset and peer-coaching experience predicted pedagogical digital competence among EFL teachers.

Findings and Results

The findings of the present study are reported in three stages. First, descriptive statistics were calculated to summarize the central tendency and dispersion of the main variables. Second, Pearson correlation analysis was conducted to examine the relationships among growth mindset, peer-coaching experience, and pedagogical digital competence. Third, multiple regression analysis was performed to determine the predictive roles of growth mindset and peer-coaching experience in explaining EFL teachers' pedagogical digital competence.

Table 1: Descriptive Statistics of the Study Variables

Variable	Mean	SD	Minimum	Maximum
Growth Mindset	3.91	0.54	2.31	4.88
Peer-Coaching Experience	3.74	0.63	2.10	4.91
Pedagogical Digital Competence	3.86	0.57	2.25	4.93

Table 1 shows that the mean score of growth mindset was 3.91 with a standard deviation of 0.54, indicating that the participating EFL teachers generally reported a relatively high level of growth-oriented beliefs. The mean score of peer-coaching experience was 3.74 with a standard deviation of 0.63, suggesting that teachers had a moderate to relatively high level of engagement in peer-coaching activities. Pedagogical digital competence had a mean score of 3.86 and a standard deviation of 0.57, indicating that the teachers generally perceived themselves as competent in integrating digital technologies into instructional practices. The minimum and maximum values further show that there was sufficient variability in participants' responses across all three variables, supporting the suitability of the data for subsequent correlation and regression analyses.

Table 2: Pearson Correlation Matrix Among the Study Variables

Variable	1	2	3
1. Growth Mindset	—		
2. Peer-Coaching Experience	.48**	—	
3. Pedagogical Digital Competence	.67**	.54**	—

**p < .01.

Table 2 presents the results of Pearson correlation analysis. The findings indicate that growth mindset had a positive and significant relationship with pedagogical digital competence ($r = .67$, $p < .01$). This result shows that teachers with stronger growth-oriented beliefs tended to report higher levels of competence in using digital technologies pedagogically. Peer-coaching experience was also positively and significantly correlated with pedagogical digital competence ($r = .54$, $p < .01$), suggesting that teachers who had greater experience in collaborative peer-coaching activities demonstrated higher digital pedagogical competence. In addition, growth mindset was positively associated with peer-coaching experience ($r = .48$, $p < .01$), indicating that teachers with stronger growth mindset orientations were more likely to engage in collaborative professional learning experiences.

Table 3: Multiple Regression Analysis Predicting Pedagogical Digital Competence

Predictor Variable	B	SE	Beta	t	p
Constant	1.12	0.29	—	3.86	.000
Growth Mindset	0.51	0.07	0.56	7.28	.000
Peer-Coaching Experience	0.29	0.06	0.33	4.91	.000

Model Summary: $R = .71$; $R^2 = .50$; Adjusted $R^2 = .49$; $F(2,147) = 73.45$, $p < .001$.

Table 3 shows the results of multiple regression analysis conducted to predict pedagogical digital competence based on growth mindset and peer-coaching experience. The overall regression model was statistically significant, $F(2,147) = 73.45$, $p < .001$, indicating that the two predictor variables collectively explained a meaningful proportion of variance in pedagogical digital competence. The model produced an R value of .71 and an R^2 value of .50, showing that growth mindset and peer-coaching experience together explained 50% of the variance in teachers' pedagogical digital competence. Growth mindset was a significant positive predictor of pedagogical digital competence ($B = 0.51$, $\beta = 0.56$, $t = 7.28$, $p = .000$), and peer-coaching experience was also a significant positive predictor ($B = 0.29$, $\beta = 0.33$, $t = 4.91$, $p = .000$). Comparison of standardized beta coefficients indicates that growth mindset was the stronger predictor, although both variables made significant contributions to explaining teachers' pedagogical digital competence.

Discussion and Conclusion

The findings of the present study demonstrated that growth mindset and peer-coaching experience were both significantly associated with EFL teachers' pedagogical digital competence. More specifically, the results indicated that teachers who reported stronger growth-oriented beliefs tended to demonstrate higher levels of competence in integrating digital technologies into their instructional practices. In addition, teachers who had greater experience participating in peer-coaching activities also reported stronger pedagogical digital competence. Furthermore, the regression analysis revealed that both variables significantly predicted pedagogical digital competence, with growth mindset emerging as the stronger predictor. These findings provide important insights into the psychological and collaborative factors that may support teachers' ability to adapt to increasingly digital educational environments.

One of the most important findings of the study was the significant positive relationship between growth mindset and pedagogical digital competence. This result suggests that teachers who believe their professional abilities can be developed through effort, learning, and persistence are more likely to engage effectively with digital technologies in educational settings. This finding is consistent with the theoretical assumptions underlying growth mindset theory, which emphasize that individuals who perceive abilities as malleable tend to approach challenges more positively and demonstrate greater resilience when encountering obstacles (8, 11). In the context of digital education, technology integration frequently requires teachers to learn unfamiliar tools, adapt instructional methods, solve technological problems, and continuously update their knowledge.

Teachers with growth-oriented beliefs may therefore be more willing to invest effort in developing technological competence and less likely to perceive technological difficulties as indicators of inability.

The present finding aligns with previous studies emphasizing the role of growth mindset in promoting adaptive professional behaviors among educators. For example, He et al. reported that teachers with stronger growth mindset orientations demonstrated higher levels of psychological well-being, resilience, and professional engagement (8). Similarly, Rissanen and Kuusisto found that growth mindset contributed positively to teachers' openness toward professional learning and intercultural competence development (9). These findings collectively suggest that growth mindset functions as an important psychological resource that encourages teachers to remain flexible, reflective, and open to innovation in their professional practices. Because digital competence requires continuous learning and adaptation, teachers who hold growth-oriented beliefs may be better prepared to cope with rapidly evolving technological demands.

The results are also consistent with studies examining the relationship between growth mindset and educational engagement. Vestad and Bru demonstrated that teachers' support for growth mindset was positively associated with students' academic engagement and achievement (12). Likewise, Zhang and Wu found that growth mindset contributed significantly to academic achievement when supported by positive educational environments (10). Although these studies primarily focused on student outcomes, they indirectly support the present findings by illustrating how growth-oriented beliefs promote persistence, motivation, and engagement in learning processes. Teachers who themselves possess growth-oriented beliefs may therefore become more willing to explore technological innovations and experiment with digital pedagogical approaches.

Another significant finding of the study was the positive relationship between peer-coaching experience and pedagogical digital competence. Teachers who engaged more frequently in peer-coaching activities reported stronger competence in integrating digital technologies into teaching practices. This result highlights the importance of collaborative professional learning environments in supporting teachers' technological development. Peer coaching creates opportunities for teachers to exchange experiences, observe colleagues' practices, discuss instructional challenges, and receive constructive feedback in authentic educational contexts. Through these collaborative interactions, teachers may gain practical insights into effective technology integration strategies and develop greater confidence in using digital tools for pedagogical purposes.

This finding corresponds closely with previous literature emphasizing the value of collaborative professional development. Afshar and Doosti found that peer-coached professional development programs positively influenced EFL teachers' instructional practices and professional learning outcomes (13). Similarly, Amini and Gholami reported that rotatory peer supervision facilitated teachers' professional development by encouraging collaborative reflection and shared learning experiences (14). These findings support the argument that peer interaction provides teachers with opportunities to engage in reflective dialogue and practical knowledge sharing, which can contribute substantially to professional competence development.

The positive association between peer coaching and pedagogical digital competence can also be explained through social and collaborative learning theories. Learning often occurs through observation, interaction, and participation in communities of practice. Teachers who participate in peer-coaching activities may observe colleagues' use of digital tools, discuss successful technological strategies, and collaboratively solve instructional problems related to technology integration. Such experiences can reduce uncertainty and technostress while increasing teachers' confidence in applying digital technologies in classroom settings (2, 7). In this sense, peer coaching may function not only as a source of technical learning but also as a supportive professional environment that encourages experimentation and innovation.

The findings of the present study are further supported by research on peer collaboration and learning effectiveness in EFL contexts. Ghaneiarani et al. demonstrated that peer and teacher feedback implementation enhanced Iranian EFL learners'

writing ability through collaborative learning-oriented assessment processes (18). Likewise, Kai et al. found that AI-supported peer feedback significantly improved feedback quality and writing performance among university EFL students (4). Yu-peng et al. also reported that peer collaboration positively influenced learning effectiveness and communicative engagement among EFL learners (17). Although these studies focused primarily on student learning, they reinforce the broader educational principle that collaborative interaction facilitates learning, reflection, and competence development. Similar mechanisms may operate among teachers engaged in peer-coaching activities.

The regression analysis provided additional insight by demonstrating that both growth mindset and peer-coaching experience significantly predicted pedagogical digital competence, with growth mindset emerging as the stronger predictor. This finding suggests that psychological factors may play a particularly influential role in shaping teachers' readiness to engage with digital technologies. Teachers who believe their abilities can improve through effort may be more motivated to pursue professional learning opportunities, experiment with digital tools, and persist despite technological challenges. Such beliefs may strengthen teachers' confidence and reduce fear of failure when encountering unfamiliar technological environments.

The stronger predictive role of growth mindset may also indicate that technological competence development begins with teachers' underlying beliefs about learning and professional growth. Even when technological resources and professional development opportunities are available, teachers who lack confidence in their capacity to improve may hesitate to engage fully with digital innovation. Conversely, teachers who adopt a growth-oriented perspective may actively seek opportunities to improve their technological skills and view challenges as opportunities for development rather than threats to competence (8, 11). This interpretation is consistent with findings showing that growth mindset contributes to self-efficacy, academic engagement, and psychological adaptability in educational contexts (8, 12).

At the same time, the significant contribution of peer coaching demonstrates that collaborative professional experiences remain highly important for teachers' digital competence development. Psychological motivation alone may not be sufficient unless teachers also have access to supportive professional communities where they can exchange knowledge and receive practical guidance. Peer coaching may therefore serve as a mechanism through which teachers translate their growth-oriented beliefs into concrete pedagogical practices. Teachers who are motivated to learn may benefit substantially from collaborative environments that provide opportunities for observation, reflection, and shared experimentation with digital technologies.

The findings also support broader perspectives emphasizing the importance of teacher support systems in educational environments. Li et al. reported that teacher and peer support positively influenced academic engagement through motivational and psychological pathways (19). Similarly, Núñez-Regueiro and Wang highlighted the importance of teacher and peer relatedness for educational well-being and engagement (20). Although these studies focused on students, the underlying principle that supportive relationships facilitate learning and adaptation may apply equally to teachers. Teachers who experience supportive professional interactions through peer coaching may develop greater confidence and willingness to engage in digital pedagogical innovation.

Another important implication of the findings concerns the increasing role of digital transformation in education. Contemporary educational systems increasingly require teachers to possess advanced digital competencies in order to manage online learning environments, AI-supported educational tools, multimedia resources, and interactive digital platforms (1-3). However, technological integration is not merely a technical process; it also involves emotional, cognitive, and professional adaptation. Teachers who demonstrate resilience, openness to learning, and collaborative engagement may therefore be more successful in adapting to technologically enriched educational environments.

The findings additionally reinforce the importance of continuous professional development in supporting teachers' digital competence. Norman et al. emphasized that leadership, professional development, and digital innovation are central

components of teacher competence improvement in modern education (7). Likewise, Matovic highlighted the effectiveness of in-service teacher training for developing digital competencies required in contemporary educational systems (6). The present study extends these findings by demonstrating that teachers' internal psychological beliefs and collaborative learning experiences significantly contribute to digital competence development beyond formal training programs alone.

Overall, the findings of the study suggest that pedagogical digital competence is shaped through the interaction of psychological and collaborative factors. Growth mindset appears to provide motivational and cognitive readiness for learning, while peer coaching offers practical and social support that facilitates the application of digital technologies in instructional settings. Together, these factors may create conditions that encourage teachers to engage more confidently and effectively with digital pedagogical innovation.

One limitation of the present study is that the participants were selected through convenience sampling from a limited geographical region, which may restrict the generalizability of the findings to other educational settings or teacher populations. In addition, the study relied exclusively on self-report questionnaires, which may introduce response bias and may not fully reflect teachers' actual classroom practices or digital competence performance. Furthermore, the cross-sectional nature of the study prevents definitive conclusions regarding causal relationships among growth mindset, peer-coaching experience, and pedagogical digital competence.

Future research may expand the scope of investigation by employing longitudinal or experimental research designs to examine how teachers' growth mindset and collaborative learning experiences influence digital competence development over time. Researchers may also benefit from integrating qualitative approaches such as interviews, classroom observations, and teaching portfolios to obtain deeper insights into teachers' experiences with digital pedagogy and peer collaboration. In addition, future studies could compare teachers from different educational contexts, institutional settings, or cultural backgrounds in order to identify contextual factors influencing pedagogical digital competence development.

From a practical perspective, the findings suggest that educational institutions should design professional development initiatives that simultaneously address teachers' psychological beliefs and collaborative professional learning needs. Schools and teacher education programs may benefit from implementing structured peer-coaching systems that encourage collaborative reflection, instructional observation, and shared experimentation with digital technologies. Educational policymakers and administrators should also create supportive environments that foster growth-oriented beliefs, reduce fear of technological failure, and encourage continuous professional learning. Strengthening both teachers' psychological readiness and collaborative learning opportunities may ultimately contribute to more effective technology integration and improved educational quality in digitally enriched learning environments.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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