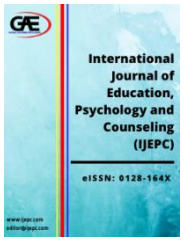
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EXAMINING ENGLISH LANGUAGE TEACHING COMPENTENCY THROUGH TECHNOLOGY INTEGRATION: THE MEDIATING ROLES OF PERCEIVED USEFULNESS AND TEACHER SELF-EFFICACY

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Abstract:

Technology integration is increasingly vital in English language education, yet the internal mechanisms through which it is related to teaching competency remain insufficiently understood. Integrating Technology Acceptance Model (TAM) and Social Cognitive Theory (SCT), this study examines the mediating roles of perceived usefulness and teacher self-efficacy in the relationship between technology integration and English language teaching competency. A quantitative survey was conducted among Chinese higher education EFL teachers (N=333), and data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Results indicate that technology integration directly predicts ELTC (β = .24, p = .001) and indirectly predicts it through perceived usefulness (β = .18, 95% CI [.10, .29]) and teacher self-efficacy (β = .21, 95% CI [.12, .34]). The sequential mediation path (TI → PU → TSE → ELTC) is also significant (β = .24, 95% CI [.15, .36]). This study provides an integrated framework for technology-enhanced language teaching and offers practical insights for strengthening teacher professional development in EFL contexts.

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Keyword:

English Language Teaching Competency; EFL Teachers; Perceived Usefulness; Teacher Self-Efficacy; Technology Integration

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Introduction

The rapid advancement of digital technologies has fundamentally reshaped EFL instruction, making technological integration an essential component of teachers' professional competence (Chai et al., 2024; Ran et al., 2024; Wang & Liu, 2025). Although technology integration can be associated with instructional quality and learner engagement, technology integration in practice depends on whether teachers can successfully integrate digital tools into pedagogical decision-making and classroom practice (Ertmer et al., 2012; Inan & Lowther, 2010; Richards, 2023). Therefore, teachers' instructional competency in technology-enhanced settings has become an important measure of professional competency (Richards, 2015; Wang & Liu, 2025).

There is literature in vast quantity dealing with external factors or with technological knowledge take-up (Ertmer, 1999; Hew & Brush, 2007; Zhang et al., 2025), but little remains under explored about the internal psychological mechanisms by which technology integration becomes a relevant precondition of teaching competency. In particular, it remains unclear how teachers' technology perceptions and instructional confidence jointly foster their competency. Clarifying this psychological mechanism is essential to explain why teachers with comparable technological resources demonstrate varying levels of instructional competency.

Technology Acceptance Model (TAM) is a significant theoretical reference for explaining the acceptance of teachers towards the educational technologies (Davis, 1989; Venkatesh & Davis, 2000). Within the TAM framework, perceived usefulness captures individuals' evaluation of whether a given technology can improve their work performance. Teachers with positive evaluations of educational technologies are likely to use them in lesson preparation, classroom communication, and evaluation processes (Teo, 2011; Ortiz-López at al., 2024). However,

favorable attitudes towards technology do not directly lead to a higher level of instructional competency.

Social Cognitive Theory is the complement of TAM to show the impact of self-efficacy on behavior and professional performance (Bandura, 1997). Teacher self-efficacy refers to instructors' confidence in their capacity to plan and deliver instruction successfully (Tschannen-Moran & Hoy, 2001). Empirical evidence indicates that efficacious teachers are more inclined to experiment with novel pedagogical approaches and to integrate digital tools into their teaching practice (Barton & Dexter, 2020; Peng et al., 2024). Therefore, teacher self-efficacy might be a possible psychological mechanism that mediates between technology integration and English language teaching competency.

On the basis of TAM and SCT, a research framework is designed in this study to address the interrelations among technology integration, perceived usefulness, teacher self-efficacy and English language teaching competency. Specifically, the mediating effects of perceived usefulness as well as teacher self-efficacy of EFL teachers in Chinese higher education institutions are investigated using the Partial Least Square Structural Equation Modeling (Hair et al., 2022; Ali et al., 2024).

However, although there have been a few previous studies focusing on the direct relation between technology integration and teaching competency (Ertmer et al., 2012; Chai et al., 2024), there remain two gaps. First, most studies treat PU and TSE as independent outcomes or separate mediators, and the joint mediating mechanism of PU and TSE, particularly their sequential pathway has rarely been tested empirically. Second, the current research is carried out mainly in western or K-12 settings, and research evidence within the Chinese higher education EFL settings remains scarce, where technology integration policy and teacher development mechanism are very different.

The contribution to literature is threefold. Firstly, it enhances technology adoption, but rather the acquisition of ELT competency. Secondly, perceived usefulness and teacher self-efficacy were jointly considered in an unified explanatory model. Deeper insight into the psychological mechanisms by which technology can be a powerful tool for change integration is related to instructional competency. Thirdly, the results have practical implications for teacher professional development. Further strengthening teachers' positive technology perceptions and self-efficacy for long-term technology integration in EFL education is proposed.

Literature Review

TAM explains how cognitive evaluations of technology shape teachers' behavioral intentions and actual use. However, TAM alone does not explain how these cognitive assessments of technology translate into professional performance. SCT fills this gap by identifying self-efficacy as the motivational mechanism that converts knowledge and perception into behavior. Specifically, TAM addresses the 'what' while SCT addresses the 'can'. Integrating both theories is therefore necessary because technology integration may enhance competency only when teachers both value the technology (PU) and believe in their capability to use it (TSE). This sequential cognitive–motivational process cannot be captured by either theory alone.

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Technology Integration and English Language Teaching Competency

Technology integration has become a feature of contemporary English language teaching, which provides teachers with opportunities to be associated with their instructional practice with the support of digital resources, interactive learning environment, and data-informed pedagogical decision-making. Instead of simply employing technology tools, technology integration involves the purposeful alignment of digital technologies with instructional objectives to enhance teaching effectiveness and student learning outcomes (Mishra & Koehler, 2006; Koehler et al., 2013). Recent studies have demonstrated that technology integration promotes effective learner-centered instruction, increases classroom interaction, and facilitates differentiated instruction in EFL settings (Chai et al., 2024; Ran et al., 2024).

English language teaching competency refers to teachers' ability to effectively design, implement, and evaluate language instruction by integrating pedagogical knowledge, subject expertise, and appropriate technological resources (Richards, 2015, 2023). As digital technologies continue to transform language teaching, competency increasingly depends on teachers' capacity to select and utilize technology to facilitate meaningful learning experiences. Teachers who integrate the use of technology are more likely to utilize more innovative instructional practice, to promote student engagement, and to provide timely feedback, thereby improving overall teaching quality (Wang & Liu, 2025).

While empirical results have indicated largely positive effect of technology integration on teachers' instructional competency (Inan & Lowther, 2010; Ertmer et al., 2012; Chai et al., 2024), its effect is still debatable. According to TPACK, effective instruction depends on teachers' capability to integrate technological, pedagogical and content knowledge to meet the diverse learners' needs (Mishra & Koehler, 2006; Wang & Liu, 2025). Therefore, technology integration is expected to serve as an important antecedent of English language teaching competency.

H1: Technology integration positively predicts English language teaching competency.

Technology Integration and Perceived Usefulness

Perceived usefulness, which is a central construct of TAM, is defined as the degree to which an individual believe it is important or profitable to use a technology (Davis, 1989). TAM states that individuals will adopt technology when they believe that it is useful to their job (Venkatesh & Davis, 2000; Teo, 2011).

Technology integration also provides teachers with first-hand experiences on the pedagogical usefulness of digital tools in actual teaching. When teachers use the learning management system, artificial intelligence applications, and digital platform, they can efficiently predict teaching efficiency and diversify teaching strategies. In addition, these positive experiences again verify the teachers' view that technology is useful to help them teach better and make students more involved (Ran et al., 2024; Zhang et al., 2025). More recent works also confirmed that teachers' continued use of digital tools will strengthen their perceived instructional value of technology use (Chai et al., 2024; Ortiz-López et al., 2024). Similarly, in the context of EFL teaching, when teachers have more positive learning

experiences using technology-assisted instruction, they will perceive the digital tools to be more useful. Thus, more technology integration should lead to greater perceived usefulness.

H2: Technology integration positively predicts perceived usefulness.

Perceived Usefulness and Teacher Self-Efficacy

Teacher self-efficacy refers to the teachers' belief in themselves to organize and execute the instructional activities in a competent manner (Bandura, 1977; Tschannen-Moran & Hoy, 2001). Self-efficacy is based on the Social Cognitive Theory and is determined by cognitive determinations (Bandura, 1997).

Teachers who regard educational technologies as valuable tend to develop greater confidence in incorporating them into classroom instruction. Thus, perceived usefulness of technologies is a cognitive antecedent of teacher self-efficacy in the sense that noticing the instructional value of digital tools prompts teachers to try innovative pedagogies, which are later reinforced and help them gain confidence in managing technology-enhanced classrooms and solving teaching problems (Barton& Dexter, 2020; Peng et al., 2024). In EFL education, teachers who consider digital tools useful tend to have higher efficacy beliefs in enabling students' language learning and classroom interaction. Hence, perceived usefulness is expected to positively influence teacher self-efficacy.

H3: Perceived usefulness positively predicts teacher self-efficacy.

Teacher Self-Efficacy and English Language Teaching Competency

Teacher self-efficacy has been viewed as one of those determinants of instructional effectiveness and professional performance. Highly efficacious teachers are more likely to set challenging instructional goals, persist in the face of pedagogical difficulties, and experiment with innovative teaching approaches (Bandura, 1977, 1997). In technology-enhanced educational settings, teacher self-efficacy is stated as the belief of teachers in their ability to effectively use digital technologies, in their instructional planning, classroom management and learning evaluation. It enables teachers to address a great range of contingencies in a versatile manner, and to make the most of the pedagogical affordances of educational technologies (Tschannen-Moran & Hoy, 2001).

English language teaching competency refers to teachers' capacity to plan, implement, assess and make necessary improvements to their language instruction by adapting to the needs of their learners and changes in the educational context (Richards, 2015, 2023). Teachers with high self-efficacy tend to be more open to try new teaching methods, adopt learner-centred pedagogies, and solve problems in the classroom. Consequently, they display stronger instructional competency and adaptiveness in technology-supported language teaching situations (Farrell, 2015). Empirical recent studies have found that teacher self-efficacy is positively correlated with instructional quality, technology integration, and overall teaching effectiveness (Barton & Dexter, 2020, Peng et al., 2024, Zeng et al., 2022).

Among EFL teachers, those who are more self-confident about their teaching ability are more likely to make use of technological resources, create an interactional atmosphere in

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their classroom and plan fun language learning activities. Their confidence also favor life-long professional development and adoption of new teaching practice to improve the competency in ELT. Therefore, teacher self-efficacy is expected to have positive predicable power to the English language teaching competency.

H4: Teacher self-efficacy positively predicts English language teaching competency.

The Mediating Role of Perceived Usefulness

While technology integration can offer teachers opportunities to engage in new and interesting practices, the impact that technology integration has on teaching competency is mediated by teachers' mental processes through the perceived usefulness. According to TAM, perceived usefulness serves as the key cognitive mechanism linking technology-related experiences to professional behaviors (Davis, 1989; Venkatesh & Davis, 2000). Direct experience with digital tools in authentic teaching situations can lead teachers to perceive the usefulness of technology in their lesson preparation, classroom instruction, and student evaluation (Teo, 2011; Ortiz-López et al., 2024). When teachers believe that technology is beneficial to achieving instructional goals, they are more willing to take risks to change teaching design and enhance professional practice, transforming routine technology use into a competency building activity (Ran et al., 2024; Zhang et al., 2025). Thus, technology integration and English language teaching competency has a mutual influence that technology integration can enhance teachers' beliefs of technology's instructional value.
H5: Perceived usefulness mediates the relationship between technology integration and English language teaching competency.

The Mediating Role of Teacher Self-Efficacy

While technology integration indeed introduces more digital resources to students, teaching competency requires that teachers be confident in utilizing these tools appropriately. Self-efficacy derived from Social Cognitive Theory is the central psychological mechanism to mediate between external experience and behavioral performance (Bandura, 1977, 1997). Mastery experiences of technology integration can build up teachers' self-efficacy in coping with technology-supported instruction (Barton & Dexter, 2020; Peng et al., 2024). Teachers with higher self-efficacy demonstrate greater persistence, cope with classroom situation more flexibly, and convert technology resources to learning opportunities effectively (Zeng et al., 2022). Within EFL education, this self-efficacy supports teachers to smoothly implement pedagogy knowledge and technologies appropriately. Thus, teacher self-efficacy should act as the mediator between technology integration and English language teaching ability.

H6: Teacher self-efficacy mediates the relationship between technology integration and English language teaching competency.

The Sequential Mediation of PU and TSE

Although H5 and H6 have assumed that PU and TSE mediate the relationship between TI and ELTC respectively, the two mediators are not necessarily independent. Integrating TAM and SCT suggests that PU may precede TSE in a sequential mediating process.

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According to TAM, PU is a cognitive appraisal on the instructional usefulness of technology (Davis, 1989; Venkatesh & Davis, 2000). When teachers get and use the digital tools in the real context, they first appraise whether the tools are useful to predict instructional efficiency or student involvement (Teo, 2011; Ortiz-López et al., 2024). The cognitive assessment is the premise of the following psychological transformation. As SCT suggests, self-efficacy is influenced by cognitive judgments (Bandura, 1977, 1997). If teachers find technology useful, they are more confident to accomplish instructional goals with the help of technology, which is associated with their efficacy beliefs (Tschannen-Moran & Hoy, 2001; Barton & Dexter, 2020; Peng et al., 2024).

This reasoning implies a staged process: TI first strengthens PU; this positive appraisal, in turn, fosters stronger TSE; and enhanced TSE ultimately contributes to improved ELTC. That is, PU and TSE may not only be parallel mediators, but sequential mediation, which convey the effect of TI on ELTC in a chained manner. This pathway combines evaluative mechanism of TAM and motivational mechanism of SCT, which is more complete in the explanation of how technology integration is related to the teaching competence. Because this sequential mediation has seldom been examined in the EFL settings, the following hypothesis is formulated.

H7: Perceived usefulness and teacher self-efficacy sequentially mediate the relationship between technology integration and English language teaching competency.

Conceptual Framework

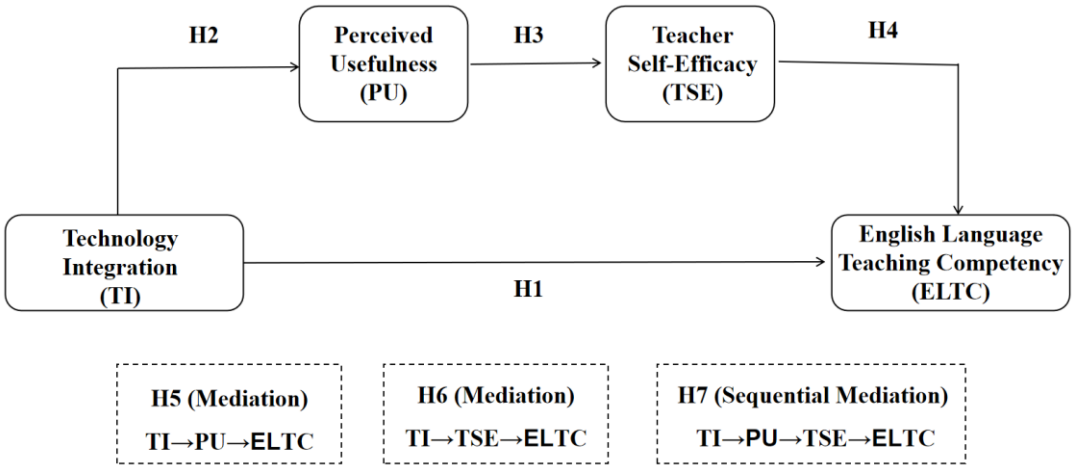


Figure 1: Conceptual Framework

Based on Technology Acceptance Model and Social Cognitive Theory, an integrated conceptual framework is designed in this work to study the relationship between technology integration and English language teaching competency. In this model, technology integration serves as the exogenous variable, English language teaching competency represents the endogenous outcome, and perceived usefulness and teacher self-efficacy act as sequential psychological mediators. Together, seven hypotheses (H1-H7) are constructed to test the direct relations to each other and the paths of cognition-motivation driving competency development in EFL settings. In addition to the independent mediating effects hypothesized in H5 and H6, the framework also implies a sequential mediation path (H7: TI → PU → TSE → ELTC), in

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which perceived usefulness precedes teacher self-efficacy in transmitting the effect of technology integration on English language teaching competency.

Methodology

Research Design

Quantitative research design was adopted to test the relationships among technology integration, perceived usefulness, teacher self-efficacy and English language teaching competency in this study. Cross-sectional survey was employed as it provides convenient way to collect data from relatively large number of participants and can be used to test the theoretical models with several latent constructs. The proposed conceptual framework was formulated based on Technology Acceptance Model and Social Cognitive Theory and it was empirically tested with Partial Least Square Structural Equation modeling (PLS-SEM).

PLS-SEM was selected because PLS-SEM can be used to test complex structural relationships involving several mediating variables, PLS-SEM relaxes the multivariate normality assumption and handles educational survey data well, and PLS-SEM is prediction-based and has been the most used in educational technology research (Hair et al., 2022; Ali et al., 2024).

Participants and Data Collection

The participants were EFL teachers working in higher education institutions in China. It was required that the participants should have experience using digital technologies in English language teaching, including learning management systems, online teaching platforms, artificial intelligence tools, multimedia resources, or other technology-supported instructional applications.

Data was collected using an online questionnaire distributed through Wenjuanxing. A purposive and convenience sampling strategy was employed. Participation was voluntary, and respondents were informed that their responses would remain anonymous and be used solely for academic research purposes. Before filling out the questionnaire, the participants were informed of the consent. After the data screening, incomplete questionnaire and answers with obvious response bias were removed from the analysis, yielding a final set of data that could be used for structural equation modeling.

Measures

Each construct was measured by 4-6 items adapted from the valid scales. All the constructs were measured by already validated scales. They were adapted from validated and reliable research. The English items were double checked by two bilingual experts. All the measurement items were based on five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

Technology Integration (TI) was adapted from previous studies on educational technology integration and TPACK (Mishra & Koehler, 2006; Chai et al., 2024) and was used to measure teachers' cognition on integrating digital technology in instructional planning, classroom teaching, assessment, and learning support.

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Perceived Usefulness (PU) was measured with the items adapted from Technology Acceptance Model by Davis (1989) and studies of educational technology in the classroom (Teo, 2011; Ortiz-López et. al., 2024). The scale measured teacher's beliefs in the usefulness of educational technologies to improve their instructional performance.

Teacher Self-Efficacy (TSE) was constructed following Bandura (1997) and Tschannen-Moran and Hoy (2001) with items that correspond to teachers' self-confidence that they are able to successfully implement technology-supported instruction and to successfully handle technology enhanced classrooms.

English Language Teaching Competency (ELTC) was adapted from Richards (2015, 2023) to evaluate teachers' comprehensive instructional competency in technology-enhanced English language teaching, including lesson design, classroom implementation, instructional assessment, and professional development.

Data Analysis

Data analysis was conducted by SmartPLS 4. The two-step approach in Hair et al. (2022) was followed to test the measurement model, before testing the structural model. Cronbach's alpha, composite reliability (CR) and indicator loadings test the reliability. Average variance extracted (AVE) test the convergent validity and Heterotrait-Monotrait ratio (HTMT) test the discriminant validity (Fornell & Larcker, 1981; Henseler et al., 2015).

Later, the structural model was analyzed with collinearity, path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and bootstrapping. Direct, indirect, and mediating effects were quantified to verify the assumed hypotheses.

Results

Respondent Profile

The final sample involved EFL teachers from Chinese higher education institutions, in which females and males comprised 64.2% and 35.8% respectively. In terms to teaching experience, respondents had been well distributed across the early-career (1-5 years, 28.5%), mid-career (6-15 years, 43.1%) and senior-career (over 15 years, 28.4%) teaching stages, and all of them directly experienced introducing digital technologies in English language teaching. In terms of academic qualification and institutional background, the overall sample was mixed, which provided a suitable and representative starting point on which to test the proposed research model.

Descriptive statistics of the study constructs are also presented in Table 1. Technology Integration (TI) recorded a mean of 3.96 (SD = 0.58), followed by Perceived Usefulness (PU) (M = 4.08, SD = 0.55), Teacher Self-Efficacy (TSE) (M = 3.89, SD = 0.49), and English Language Teaching Competency (ELTC) (M = 4.02, SD = 0.46). The skewness values ranged from -0.72 to -0.35, whereas kurtosis values ranged from –0.58 to –0.64, indicating no serious deviations from normality and suggesting that the data were appropriate for subsequent PLS-SEM analysis.

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Table 1: Descriptive Statistics

Construct	Mean	SD	Skewness	Kurtosis
TI	3.96	0.58	–0.48	–0.36
PU	4.08	0.55	–0.72	–0.64
TSE	3.89	0.49	–0.41	–0.21
ELTC	4.02	0.46	–0.35	–0.58

Source: SPSS 29 Output

Measurement Model Assessment

According to the two-step approach proposed by Hair et al. (2022), the measurement model was assessed prior to the structural relations. The indicator reliability, internal consistency reliability, convergent validity and discriminant validity were assessed.

As shown in Table 2, all indicator loadings exceeded the recommended threshold of 0.70, ranging from 0.742 to 0.911. Cronbach's alpha values ranged from 0.883 to 0.932, while composite reliability (CR) values ranged from 0.900 to 0.941, demonstrating satisfactory internal consistency. Moreover, the average variance extracted (AVE) values ranged from 0.603 to 0.728, exceeding the recommended criterion of 0.50 and confirming convergent validity.

Table 2: Reliability and Convergent Validity

Construct	Loading Range	α	CR	AVE
TI	.742–.894	.918	.929	.686
PU	.761–.905	.910	.921	.661
TSE	.748–.882	.883	.900	.603
ELTC	.781–.911	.932	.941	.728

Source: SmartPLS 4 Output

Discriminant validity was further examined using the heterotrait–monotrait ratio (HTMT). As shown in Table 3, all HTMT values were below the recommended threshold of 0.85, indicating satisfactory discriminant validity.

Table 3: HTMT Matrix

Construct	TI	PU	TSE	ELTC
TI	—			
PU	.79	—		
TSE	.68	.74	—	
ELTC	.63	.66	.81	—

Source: SmartPLS 4 Output

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Collinearity was evaluated using the variance inflation factor (VIF). All inner VIF values ranged from 1.38 to 2.71, well below the recommended threshold of 3.30, indicating that multicollinearity was not a concern. In addition, the standardized root mean square residual (SRMR) was 0.046, suggesting an acceptable overall model fit.

Overall, the measurement model demonstrated satisfactory reliability, convergent validity, discriminant validity, and collinearity diagnostics, supporting its suitability for structural model assessment.

Table 4: Variance Inflation Factor

Construct	Inner VIF	Threshold	Interpretation
TI	1.38	< 3.30	Not a concern
PU	1.96	< 3.30	Not a concern
TSE	2.71	< 3.30	Not a concern
ELTC	1.78	< 3.30	Not a concern

Source: SmartPLS 4 Output

Structural Model Assessment

The structural model was assessed using the bootstrapping procedure with 5,000 resamples. Explanatory power and predicting capability of the model have been analyzed before the hypothesis testing.

The coefficient of determination (R^2) indicated that Technology Integration explained 50.4% of the variance in Perceived Usefulness. Together, Technology Integration and Perceived Usefulness explained 44.7% of the variance in Teacher Self-Efficacy, while the complete model explained 61.8% of the variance in English Language Teaching Competency.

Stone-Geisser's predictive relevance (Q^2) values were all greater than zero (PU = 0.328, TSE = 0.291, ELTC = 0.402), indicating satisfactory predictive relevance. Effect size analysis (f^2) further suggested that Technology Integration had a large effect on Perceived Usefulness, whereas Teacher Self-Efficacy exerted a moderate effect on English Language Teaching Competency.

Table 5 : Structural Model Assessment

Construct (Endogenous)	R^2	Q^2	Structural Path	f^2	Effect Size
PU	0.504	0.328	TI→PU	1.254	Large
TSE	0.447	0.291	-	-	-
ELTC	0.618	0.402	TSE→ELTC	0.236	Moderate

Source: SmartPLS 4 Output

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Hypothesis Testing

Table 6 : Structural Model Results

Hypothesis	Path	*β*	*t*	*p*	Decision
H1	TI → ELTC	.24	3.18	.001	Supported
H2	TI → PU	.71	10.82	<.001	Supported
H3	PU → TSE	.62	8.74	<.001	Supported
H4	TSE → ELTC	.55	7.96	<.001	Supported

Source: SmartPLS 4 Output

The results of the structural model are presented in Table 6. Technology Integration exerted a significant positive effect on English Language Teaching Competency (β = .24, p = .001), supporting H1. It also demonstrated a strong positive influence on Perceived Usefulness (β = .71, p < .001), supporting H2. Perceived Usefulness significantly predicted Teacher Self-Efficacy (β = .62, p < .001), providing support for H3. Furthermore, Teacher Self-Efficacy showed a significant positive effect on English Language Teaching Competency (β = .55, p < .001), confirming H4.

Among the direct relationships, the path from Technology Integration to Perceived Usefulness exhibited the largest standardized coefficient, suggesting that teachers' technology integration practices substantially enhanced their perceptions of the instructional value of educational technologies.

Mediation Analysis

Table 7 : Mediation Results

Hypothesis	Indirect Path	*β*	Boot SE	95% CI	Decision
H5	TI → PU → ELTC	.18	.05	[.10, .29]	Supported
H6	TI → TSE → ELTC	.21	.06	[.12, .34]	Supported
H7	TI → PU → TSE → ELTC	.24	.05	[.15, .36]	Supported

Source: SmartPLS 4 Output

All three indirect effects were statistically significant because the 95% confidence intervals excluded zero. Moreover, the sequential mediation effect through Perceived Usefulness and Teacher Self-Efficacy was also significant, indicating that teachers' positive evaluations of educational technologies contributed to stronger self-efficacy, which subsequently enhanced English Language Teaching Competency.

After including the mediators, the direct effect of Technology Integration on English Language Teaching Competency remained significant (β = .24, p = .001), indicating partial mediation rather than full mediation. These findings suggest that technology integration is related to teachers' instructional competency both directly and indirectly through cognitive (Perceived Usefulness) and motivational (Teacher Self-Efficacy) mechanisms, providing empirical support for the integrated conceptual framework proposed in this study.

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Beyond the independent mediating effects, the sequential mediation path (H7: TI → PU → TSE → ELTC) was also statistically significant (β = .24, 95% CI [.15, .36]), as the confidence interval excluded zero. This indicates that technology integration first is associated with teachers' perceived usefulness of digital tools, which in turn strengthens their self-efficacy, and ultimately contributes to improved English language teaching competency. The significant sequential mediation effect provides empirical support for the integrated TAM–SCT framework, demonstrating that cognitive appraisal (PU) and motivational belief (TSE) operate in a staged rather than parallel manner in the competency development process.

Discussion

This work has three contributions. First, it is one of the first works to empirically test a sequential mediation model where perceived usefulness and teacher self-efficacy co-transmit the impact of technology integration on teaching competency. Previous work has investigated either PU or TSE as single mediators (Teo, 2011; Barton & Dexter, 2020), but never the sequenced cognitive – motivational pathway. Second, by integrating TAM and SCT, this study presents a unified theoretical framework that can explain both the evaluative (PU) and motivational (TSE) mechanisms of competency development beyond single-theory explanations. Third, the study contributes context-specific evidence from the population of Chinese higher education EFL teachers, who have been largely underrepresented in the technology integration literature despite the rapid adoption of smart classroom and AI-assisted language teaching in China. The context is important because Chinese EFL teachers are facing unique challenges concerning class sizes, exam-oriented curricula and uneven technological infrastructure.

Technology Integration and English Language Teaching Competency (H1)

A significant positive association emerged between TI and ELTC among Chinese higher education EFL teachers. The more frequently the teachers use digital tools and AI-assisted teaching materials, the greater pedagogical flexibility, instructional design ability and classroom management skills they possess in technology-enhanced environments.

This finding is consistent with Richards, who emphasizes that contemporary language teaching practice needs to incorporate digital pedagogy as a professional skill mandatory an optional skill. Chai et al. also report that technology-rich instructional environments are redefining teaching by making instruction learner-centered, interactive, and multimodal, which in turn is associated with teaching effectiveness as a whole.

In the context of Chinese higher education, where smart classrooms and blended learning systems have been spreading rapidly, TI is a key factor for teaching practice to change. The active technology users are more likely to design communicative tasks, to teach in a differentiated way and to enhance students' involvement. Thus, TI is also an equally technological practice, but more importantly a significant antecedent for ELT professional competency development.

Technology Integration and Perceived Usefulness (H2)

In terms of technology integration, its results are significantly positive in predicting teachers' perceived usefulness (PU) towards educational technologies. When teachers authentically use

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digital tools in their instruction, they will gradually discover their power to enhance their teaching efficiency and classroom achievements.

This finding conforms to Davis's Technology Acceptance Model (TAM), which assumes that perceived usefulness is one of the key determinants of technology adoption, and according to Davis, once a system is used, the cognitive judgment of usefulness is strengthened by the direct experience of actually using it.

Teo further confirms that frequent exposure to educational technologies is related to teachers' awareness of their pedagogical value, including time efficiency, instructional flexibility, and associated with student interaction. Similarly, Ran et al. demonstrate that teachers develop stronger positive beliefs toward technology when they observe its practical benefits in teaching environments.

In this study, TI serves as a behavioral mechanism that strengthens cognitive appraisal. In Chinese EFL higher education settings, where digital teaching tools are widely promoted, hands-on experience is essential in shaping teachers' recognition of technology's instructional value.

Perceived Usefulness and Teacher Self-Efficacy (H3)

The findings indicate that perceived usefulness positively and significantly predicts teacher self-efficacy, which means that cognitive evaluation of technology does predict teachers' belief in their instructional capability. This could also be explained in Bandura's Social Cognitive Theory, where self-efficacy is determined by cognitive judgements, mastery experience and environmental feedback. If teachers find technology useful, they would be more confident that can achieve the instructional goals through these technologies, which would help them enhance their efficacy beliefs.

Tschannen-Moran and Hoy highlight that self-efficacy is highly related to the way teachers make sense of instructional materials and contextual support. In this regard, PU is a cognitive reinforcement that makes teachers feel confident about their teaching abilities. Peng goes further and shows that teachers who view digital tools as beneficial are more confident in their ability to plan lessons, manage classrooms, and keep students motivated in technology-enhanced learning settings. Therefore, PU plays an important psychological connecting role between the technology experience and the motivational belief formation.

Teacher Self-Efficacy and ELT Competency (H4)

Teacher self-efficacy was strongly and positively associated with EFL teaching competency. It means that teachers who are more confident of their teaching ability are more inclined to exhibit their great teaching performances in a complicated classroom environment.

The main explanation for this relationship is found in Bandura's theory, where it has been emphasized that teachers who have high self-efficacy are more resistant, goal-directed, and persistent encountering difficult tasks. In the teaching context, this is equivalent to better instructional planning, adaptive pedagogy and classroom management.

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Richards highlights that competent language teachers are not only knowledgeable, but also confident in using a variety of pedagogical approaches. Farrell goes a step further, suggesting that reflective and self-efficacious teachers are able to adapt their instruction according to learners' needs and other contextual factors.

In the technology enhanced ELT settings, self-efficacy becomes even more important as teachers need to continuously learn and integrate new digital tools and teaching modes. Thus, self-efficacy is a primary psychological factor in the development of ELT competency.

Mediating Effects of Perceived Usefulness and Teacher Self-Efficacy

The present study examined the mediating role (independent and sequential) of PU and TSE in the relationship between TI and ELTC. The results are insightful evidence to suggest that the impact of TI on ELTC is through several psychological pathways and not a single direct one.

Perceived Usefulness as a Mediator (H5)

The result confirms that perceived usefulness is a significant mediating role between TI and ELTC. It shows that when teachers actively use the educational technology, their direct experience is associated with what they think it is useful to teach and that contributes to improving their teaching competency.

This result supports the Technology Acceptance Model which suggests perceived usefulness as a cognitive determinant for results of behavior and performance. In this study, PU functions as an interpretation process where teachers can make sense of the instructional value of technology. When teachers find technology useful to increase their teaching efficiency, instructional design, and students' engagement, they are more likely to mediate that perception into higher teaching performance.

From a PLS-SEM perspective, this result shows that PU is a meaningful intervening variable in the TI – ELTC relationship, suggesting that the cognitive appraisal is a crucial phase in the adoption-performance pathway.

Teacher Self-Efficacy as a Mediator (H6)

The findings also show that teacher self-efficacy is a significant mediator of the impact of TI on ELTC. In turn, this indicates that teachers' direct experience in handling technology is related to their beliefs about their teaching ability, which is related to their teaching performances.

Based on Social Cognitive theory of Bandura, self-efficacy is the most significant motivational construct determining how people regulate their behavior and persist at challenging tasks. In technology-enhanced teaching contexts, the successful experience of interacting with technology provides teachers with mastery experiences. Tschannen-Moran and Hoy also note that teacher self-efficacy is strongly related to instructional performance, especially when teaching in dynamic and resource-demanding classroom contexts. Therefore, TSE functions as a psychological mechanism that converts technology experience into teaching professional competence.

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Sequential Mediation of PU and TSE

Beyond these individual mediating effects, the study also confirms the presence of an important sequential mediation effect, in which perceived usefulness to teacher self-efficacy mediates sequentially in the transmission of the effect of technology integration on English language teaching competency.

This pathway sequence suggests the following phased psychological change process. In the first step, teachers assess helpfulness of technology based on their instructional experience with it. This first-hand cognitive assessment provides the basis of acceptance and subsequent active engagement with digital tools. In the second stage, when technology is found to be useful, teachers gain higher confidence on using them more effectively, which predicts self-efficacy. And finally higher self-efficacy has been linked to better instructional performance and instructional competence.

This finding integrates the Technology Acceptance Model and Social cognitive theory into a unified explanatory model. The former explains the cognitive assessment process, while the latter explains the motivational and behavioral transformation. The sequential mediation thus yields a more comprehensive understanding of how technological involvement gets converted into professional competence.

Importantly, the sequential mediation does not substitute the separate mediating effects of PU and TSE but complements each other. They reveal that the effect of technology integration on teaching competency is transmitted through both independent and chained psychological mechanisms.

Summary of Mediation Findings

In general, the results highlight three different but interrelated mediation mechanisms, namely direct mediation through perceived usefulness (H5), direct mediation through teacher self-efficacy (H6) and sequential mediation through PU to TSE (H7).

All results support that the English language teaching competency in technology-mediated contexts is indeed not conditioned by a single path, but by a multi-layered cognitive-motivational process. This increases the explanatory power of the proposed and is related to the theoretical soundness of the model in the area of digital pedagogy research.

Implications

Theoretical Implications

This study contributes to the literature in three major ways. First, it integrates TAM and Social Cognitive Theory, presenting a more comprehensive theoretical view of technology-enhanced teaching development. TAM describes the cognitive beliefs about technology, while SCT describes and explains motivational and behavioral outcomes, and their integration presents a richer explanatory framework. Second, it supports a sequential mediation model which defines the phased nature of the psychological change in the cases of technology integration. This extends previous research which primarily examines isolated or single mediation effects. Third, the study makes a contribution to English language teaching competency literature by

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formulating teacher competency in a digitally mediated instructional ecosystem, when technology is increasingly playing a role in higher education teaching.

Practical Implications

In practical terms, universities are advised to complement technological infrastructure with professional development initiatives targeting both perceived usefulness and self-efficacy.

Teacher Training Programs

Training should follow a two-stage design. In the first stage, hands-on workshops should show participants the concrete usefulness of digital tools that builds PU. In the second stage, micro-teaching and peer observation should be employed to build TSE via mastery experiences.

Professional Development

Continuous professional development should feature communities of practice where EFL teachers can share successful cases of technology integration. Such social persuasion and vicarious experience is one of the main sources of self-efficacy (Bandura, 1997).

Institutional Technology Support

Just-in-time technical support and pedagogical consulting, not just infrastructure, should be offered by institutions. Each department could have an educational technology mentor, who can support teachers as they transition from casual users to confident integrators.

Limitations and Future Research

While providing an important theoretical and practical implication, this study is also subject to several limitations, which point directions for potential future research. First, as a cross-sectional study design, this study is unable to draw conclusions about the temporal order or causality between any of the latent variables. Future work should consider using longitudinal designs to see how technology integration and its psychological determinants interact over a longer period of time. Furthermore, as the data was collected solely from EFL teachers in Chinese higher education institutions, the findings should be cautiously treated when extended to other cultural or educational contexts. It would be highly interesting to replicate the conceptual model in other regional contexts which would strengthen its external validity. Last but not least, the self-reported measures could be prone to the social desirability and subjective opinion biases. Mixed-method designs – quantitative surveys paired with qualitative interviews and direct classroom observations – should be considered in future studies for a robust triangulation and richer qualitative insights on instructional competency development.

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