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Predicting Technology Use in EFL Instruction: The Roles of Teacher Self-Efficacy and Technology Self-Efficacy

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Abstract

With the widespread use of technology in today's society, the effective integration of technology in education has become a vital area of research, particularly in teacher education. Teacher variables play a crucial role in the successful incorporation of technology in the classroom. Consequently, several empirical studies have explored the factors influencing teachers' intentions to use technology. This study aims to contribute to this research by examining the roles of teacher self-efficacy and technology self-efficacy in predicting technology use among Iranian EFL instructors. A sample of 353 Iranian EFL instructors participated in an online survey, completing three self-report scales measuring the mentioned constructs. Structural Equation Modeling (SEM) was employed to analyze the collected data and test the relationships between the variables. The findings indicated that teacher technology self-efficacy had a more significant impact on intentions to use technology compared to teacher self-efficacy. Both predictor variables, however, showed unique effects on intentions to use technology. The paper concludes with practical implications and recommendations for further research.

***Keywords**:* Technology integration, Self-efficacy, Technology self-efficacy, Intentions, Structural Equation Modeling (SEM), EFL instructors

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INTRODUCTION

In this contemporary technological era, education has experienced a surge in technology-integrated learning environments, generating a growing interest in technology adoption (Chen et al., 2020; Van der Spoel et al., 2020). Integrating technology into education has been perceived as a significant educational reform, captivating the attention of researchers and educators alike (e.g., Al-Sharqi & Abbasi, 2020; Farjon et al., 2019; Fathi, & Nourzadeh, 2019; Mallick et al., 2020; Nelson et al., 2018; Rahimi & Fathi, 2022a; Tondeur et al., 2019; Xu et al., 2019). Technology adoption has become pivotal and unifying in educational settings (Starkey et al., 2021), with researchers affirming the positive impact of technology devices on improving teaching and learning quality (Hao et al., 2021; Heflin et al., 2017; Hoi, 2020; Liu et al., 2022; Persson & Nouri, 2018; Rahimi & Fathi, 2022b). This holds true in the context of English as a Foreign Language (EFL), where digital technologies play a crucial role in high-quality language teaching and learning (Fathi et al., 2022; Kawinkoonlasate, 2019; Liu et al., 2024; Raygan & Moradkhani, 2020).

Amidst this backdrop, teachers' acceptance of technology has emerged as a critical issue in educational contexts, as various factors influence the extent to which teachers embrace and utilize technology in their classrooms (Joo et al., 2018; Ursavaş et al., 2019). It is essential to recognize that the mere existence of digital tools does not guarantee their integration and acceptance among teachers (Herrador-Alcaide et al., 2020). Understanding these factors holds great significance for stakeholders, policymakers, and educators, enabling them to take appropriate initiatives to effectively employ technology devices in educational settings. The affective dimension of instructors is crucial in their adoption of novel technology devices, as it can significantly impact their instructional behavior and choices (Casey et al., 2021; Derakhshesh et al., 2022; Wang et al., 2021). Shin (2013) emphasizes the complexity of matching appropriate technology to teaching methods, requiring careful consideration of various factors. When exploring

variables that contribute to teachers' technology integration, it is essential to consider both cognitive and intrapsychic aspects. Among the affective factors, self-efficacy plays a central role, influencing teachers' performance and effectiveness (Dellinger et al., 2008; Ma et al., 2021; Wu et al., 2019). Bandura (1977) defines self-efficacy as an individual's confidence in their ability to organize and execute actions to achieve specific goals. In the context of teachers, teacher self-efficacy refers to their belief in their teaching abilities, enabling them to attain their instructional objectives more effectively (Friedman & Kass, 2002; Skaalvik & Skaalvik, 2019; Xiaojing, 2021). Educators with higher self-efficacy are more inclined to employ effective instructional methods and tools that cater to their students' educational needs (Dellinger et al., 2008; Henson, 2001; Kwon et al., 2019).

The construct of technology self-efficacy is also argued to play a vital role in technology integration of teachers (Hatlevik, 2017; Tondeur et al., 2008). That is, teachers with lower levels of technology self-efficacy are less willing to use technology devices in the classroom (Hammond et al.,2011). Self-efficacy and technological intricacy contribute to the tendency to use technology (Teo, 2014). In addition, task-specific self-efficacy is claimed to be correlated with ICT achievements (Yang & Cheng, 2009). A body of cogent evidence supports the argument that teachers' perceptions of their abilities to use technology effectively, which is referred to as technology self-efficacy, act as an influential variable explaining the extent of technology use by teachers (Teo, 2011).

Research on technology adoption has highlighted the importance of intentions in influencing technology use (Fathi & Ebadi, 2020; Hwang et al., 2024; Kemp et al., 2019). The Technology Acceptance Model (TAM) (Davis, 1989) and the Theory of Planned Behavior (Ajzen & Madden, 1986) propose that various variables contribute to intentions to use technology and predict future technology adoption. Accordingly, teachers' intentions regarding technology integration play a significant role in predicting their future use of technology in the classroom (Ottenbreit-Leftwich et al., 2018; Salleh & Albion, 2004; Yuen & Ma, 2002). Numerous studies have examined variables

related to technology use intentions and actual technology adoption (e.g., Anderson et al., 2011; Teo, 2011; Wu et al., 2008). However, despite the increasing interest in technology integration within education, there remains a lack of comprehensive empirical research focusing specifically on the adoption and acceptance of technology among EFL instructors. As noted by Papadakis (2018), this area remains underappreciated and poorly understood, necessitating further investigation. The existing literature on pre-service and in-service EFL teachers does not clearly delineate the theoretical and empirical framework surrounding technology acceptance in this specific teaching context. Notably, there is a significant research gap regarding the predictive roles of teachers' self-efficacy and technology self-efficacy in shaping EFL instructors' intentions to use technology, particularly in higher education settings.

This study addresses this critical gap by investigating, for the first time, the predictability of technology acceptance among EFL teachers through the lenses of their self-efficacy and technology self-efficacy beliefs. By doing so, the research aims to contribute novel insights into the theory of technology acceptance and its application within second language (L2) education, taking into account the unique cultural and educational context of Iran. The current research makes a twofold contribution. Firstly, it enriches the understanding of technology acceptance theory and its practical implications for technology implementation in L2 settings. By highlighting the specific context of Iranian educational culture, this study provides a nuanced perspective that has been largely overlooked in previous research. Secondly, the study offers empirical evidence and actionable recommendations for EFL administrators and development researchers. These insights are crucial for designing and enhancing technological professional training programs for EFL instructors, thereby fostering more effective technology adoption and utilization in EFL higher education. By addressing these objectives, this study not only fills a significant gap in the existing literature but also advances our broader understanding of how self-efficacy and technology self-efficacy influence technology adoption in the

EFL context. This, in turn, has the potential to inform policy and practice, ultimately improving the quality of language education through more effective technology integration.

LITERATURE REVIEW

Intentions to Use Technology

The topic of technology acceptance and adoption has been extensively explored in the relevant literature (Parameswaran et al., 2015). Numerous theories and models have been developed and evaluated to explain the factors influencing the acceptance and adoption of various information technologies (e.g., Maillet et al., 2015; Shroff et al., 2011). Among these, the Technology Acceptance Model (TAM), proposed by Gefen et al. (2003), investigates how individuals adopt and use information technologies. According to Davis's (1989) TAM, a person's inclination to adopt technology devices depends on their attitudes towards the perceived ease of use and perceived usefulness, which directly impact their perceptions of technology, ultimately influencing their intentions to use technology. These intentions, in turn, predict the actual usage of technology (Teo, 2009). Additionally, Venkatesh and Davis (1996) suggested that self-efficacy in integrating technology can forecast perceived ease of use of technology. Ultimately, the intention to use technology can be defined as an individual's willingness to utilize technology (Joo et al., 2018). Scholars have noted that the intention to use technology is a form of technology acceptance behavior associated with its usefulness and ease of use (Lee & Lehto, 2013; Teo, 2011).

Likewise, concerning technology integration and acceptance, Technological Pedagogical and Content Knowledge (TPACK) (Koehler & Mishra, 2005) has been introduced as another popular model that provides a new method of evaluating teachers' knowledge and competencies in integrating technology devices into their instruction. According to this framework, the effective integration of technology is a function of a particular kind of teacher competence, which is an interaction of pedagogy, content, and

technology. From this perspective, successful teachers are those who not only have mastery over content and pedagogical knowledge, but they also know how to teach that particular content via using technology (Koehler & Mishra, 2008).

Teachers' successful integration of technology has been attributed to different factors, including adequate infrastructure and resources, technical and environmental supports, teachers' technology skills, their technological pedagogical and content knowledge, teaching experience, self-efficacy, and technology self-efficacy (Anderson & Maninger, 2007; Downey, 2006; Koehler et al., 2007; Goktas et al., 2008; Oguz & Topkaya, 2008; Rohaan et al., 2010).

Teacher Self-Efficacy

Teacher self-efficacy is a fundamental and extensively studied aspect within the realm of education, particularly in the context of technology integration in EFL instruction. It pertains to teachers' personal beliefs and perceptions regarding their own teaching competencies and abilities (Dellinger et al., 2008; Gavora, 2010; Lazarides et al., 2021). Teachers who possess high levels of self-efficacy hold optimistic views about their capabilities in effectively planning and accomplishing their pedagogical objectives. Such educators are more likely to exhibit openness to exploring and adopting novel teaching techniques and innovative methods (Gavora, 2010; Ghasemzadeh et al., 2019).

Within the context of technology use, teacher self-efficacy plays a pivotal role in shaping teachers' attitudes and practices towards technology integration. Educators with heightened perceptions of efficacy are more inclined to embrace innovative concepts and demonstrate a greater dedication to teaching (Tschannen-Moran & Hoy, 2001). They display a willingness to experiment with technology and are motivated to seek out and implement more effective instructional approaches. Tschannen-Moran and Hoy (2001) proposed a comprehensive framework for understanding teacher self-

efficacy, which encompasses three distinct sub-factors. The first sub-factor is Efficacy in Classroom Management, which reflects teachers' confidence in their capacity to maintain discipline and order in the classroom. Teachers who possess high efficacy in classroom management are better equipped to handle disruptive behaviors and establish a positive learning environment, which, in turn, facilitates the successful integration of technology. The second sub-factor is Efficacy in Student Engagement, which pertains to teachers' beliefs in their ability to actively engage students in the learning process. Teachers who hold a strong sense of efficacy in student engagement are skilled at fostering student participation and encouraging active learning. The incorporation of technology tools and interactive platforms can further enhance student engagement in the learning process. Finally, the third sub-factor is Efficacy in Instructional Strategies, which focuses on teachers' perceptions of their capabilities to successfully employ various teaching strategies for achieving effective learning outcomes. Teachers with high efficacy in instructional strategies are more likely to adapt their teaching methods to accommodate technology and leverage it to enhance their instructional practices.

Research has consistently shown that teachers' self-efficacy beliefs significantly influence their willingness to integrate technology into their classrooms (Brouwers & Tomic, 2003). Positive self-efficacy perceptions act as motivating factors for teachers to explore and adopt technology devices and applications in their teaching practices (Jimoyiannis & Komis, 2006). Consequently, the level of technology implementation in the classroom is greatly influenced by teachers' beliefs and confidence in their ability to effectively use technology as a pedagogical tool.

In conclusion, teacher self-efficacy is a multidimensional construct that plays a pivotal role in predicting technology use in EFL instruction. Teachers who perceive themselves as capable and competent in their teaching activities are more likely to embrace technology and seamlessly integrate it into their instructional practices. Understanding the dimensions of teacher self-efficacy and its profound impact on technology integration is essential

for designing effective teacher training programs and professional development initiatives aimed at fostering a positive attitude towards technology and enhancing the successful adoption of technology in EFL classrooms.

Technology Self-Efficacy

According to Compeau and Riggings (1995), technology self-efficacy refers to one's sense of confidence regarding the integration of technology devices. Extending this into education, teachers' technology self-efficacy, as a particular kind of self-efficacy belief, is deemed as teachers' perceived competence and confidence in effective employment of information technologies for educational purposes (Menon et al., 2020). It is worth pointing out that albeit the conceptual similarity between the two constructs, teacher self-efficacy and technology self-efficacy are somewhat different. Teacher self-efficacy, as a more general term, refers to teacher's belief in his abilities to produce desired results by his own actions, however, technology self-efficacy, as a more specific term, entails teacher's belief in utilizing specific technologies for effective instructional technology integration (Yildiz Durak, 2021). Furthermore, self-efficacy is situated within context and can engulf specific curriculum areas such as technology; simply put, self-efficacy can be conceptualized as an umbrella term which covers the construct of technology self-efficacy.

As Lee and Tsai (2010) suggested, there is a positive relationship between teachers' self-efficacy and positive perceptions of technology use. From this perspective, TPACK is the key to the success of teachers in using technology for instructional purposes. TPACK constitutes the type of skill or knowledge which allows teachers to effectively use technology for teaching their own specific content knowledge (Scherer et al., 2017). It is argued that the realization of TPACK may be associated with teachers' self-efficacy beliefs- their perceived capabilities to accomplish particular objectives or to behave in a particular way (Moreira-Fontán et al., 2019). Technology self-

efficacy is claimed to include two underlying components, including technological knowledge, which is the competence for using technological resources and pedagogical knowledge. Both of these two components of technological self-efficacy are normally assessed in a particular field or discipline, which is referred to as content knowledge in the TPACK (Moreira-Fontán et al., 2019). One's self-efficacy can play a pivotal role in his/her use of computers (Eachus & Cassidy, 1999). Ertmer and Ottenbreit-Leftwich (2010) suggested that teachers are less likely to adopt technology in the classroom unless they are confident enough to use it. In addition, teacher self-efficacy and technology self-efficacy have been considered as influential for accounting for instructors' employment of technology (Al-Awidi & Alghazo, 2012; Albion, 2001; Barton & Dexter, 2020; Wang et al., 2004).

Teachers' intentions play a pivotal role in their actual use of technology, prompting several researchers to explore various factors that may influence these intentions. These factors include subjective norms, Technological Pedagogical Content Knowledge (TPACK), teachers' digital competence, as well as their self-efficacy and technology self-efficacy (Abbitt, 2011; Anderson et al., 2011; Celik & Bindak, 2005; Chen, 2008; Ertmer & Ottenbreit-Leftwich, 2010; Hatlevik, 2017; Joo et al., 2018; Paraskeva et al., 2008; Teo, 2009; Yeşilyurt et al., 2016). For example, Yeşilyurt et al. (2016) conducted a study investigating the predictive effects of teacher self-efficacy, academic self-efficacy, and computer self-efficacy on attitudes towards using computer-supported education. They collected data from 323 pre-service teachers, using validated scales to assess the constructs. Exploratory and Confirmatory factor analyses, along with SEM, were employed to explore the relationships in the proposed model. The results indicated that these predictor variables significantly influenced attitudes towards implementing computer-supported education.

In another study, Chaaban and Moloney (2016) examined the factors influencing technology integration among 26 EFL teachers. Their findings suggested that teachers' self-efficacy positively influenced their adoption of technology in the classroom. Similarly, Lailiyah and Cahyono (2017)

investigated the relationship between EFL teachers' technology self-efficacy and their technology usage in Indonesia. Data was collected through surveys and interviews involving 23 EFL teachers, and the results demonstrated that teachers' self-efficacy for technology positively impacted their technology adoption. Furthermore, Joo et al. (2018) delved into the connection between TPACK, teacher self-efficacy, perceived ease of use, perceived usefulness, and teachers' technology integration. They examined these associations in their research. In a study involving 296 teachers, the researchers found a positive association between teachers' Technological Pedagogical Content Knowledge (TPACK) and their self-efficacy, perceived ease of technology use, and perceived usefulness of technology. The structural equation modeling (SEM) results revealed that teacher self-efficacy, perceived ease of use, and perceived usefulness significantly predicted teachers' adoption of technology. However, TPACK did not directly impact teachers' technology use.

In another investigation conducted by Holden and Rada (2011), they explored the influence of teachers' technology self-efficacy on their technology acceptance. Surveying 99 teachers, the authors reported that teachers' technology self-efficacy had a predictive role in their technology acceptance. Additionally, Celik and Yesilyurt (2013) discovered a positive relationship between teachers' technology self-efficacy and their perceptions of technology. More recently, Ursavaş et al. (2019) studied the influential role of subjective norms on teachers' intentions to integrate technology in Turkey. Analyzing data from 324 preservice and 517 in-service teachers, their findings indicated that teachers' attitudes significantly affected their intention to incorporate technology. Moreover, subjective norms had a strong effect on preservice teachers' intention to use technology. Furthermore, Jokisch et al. (2020) highlighted that internet self-efficacy showed a substantial association with technology avoidance.

Although extensive research exists on the subject, to the best of our knowledge, no study has yet explored the simultaneous relationships among EFL teachers' self-efficacy, technology self-efficacy, and technology use in

the higher education context. To address this gap in the literature, the present study aims to investigate the effects of teacher self-efficacy and technology self-efficacy on technology use among EFL instructors. By examining these factors together, this research seeks to enhance our understanding of technology integration in the higher education setting and contribute to the existing body of knowledge in this area.

PURPOSE OF THE STUDY

According to the theoretical structure of the constructs and the empirical background reviewed above, a model of intention to use technology based on technology self-efficacy and teacher self-efficacy is hypothesized for Iranian EFL teachers. The rationale for the hypotheses is grounded in both theoretical frameworks and empirical findings.

Hypothesis 1 (H1): *Technology self-efficacy impacts instructors' intentions to use technology*

The concept of technology self-efficacy, derived from Bandura's self-efficacy theory, posits that individuals' beliefs in their capabilities to use technology effectively influence their actual use of technology (Bandura, 1977). Empirical studies support this notion, indicating that higher levels of technology self-efficacy are associated with greater intentions to integrate technology into teaching practices. For instance, Holden and Rada (2011) found that teachers with higher technology self-efficacy are more likely to adopt and use technological tools in their instruction. Additionally, Venkatesh and Davis (1996) suggested that self-efficacy in integrating technology can forecast perceived ease of use, further reinforcing the impact of technology self-efficacy on technology adoption intentions. Therefore, we hypothesize that technology self-efficacy significantly influences Iranian EFL teachers' intentions to use technology.

Hypothesis 2 (H2): ***Teacher self-efficacy affects instructors' intentions to use technology***

Teacher self-efficacy, defined as teachers' beliefs in their abilities to effectively manage and execute teaching tasks, has been shown to influence various instructional behaviors, including the adoption of new teaching methods and tools. According to Tschannen-Moran and Hoy (2001), teachers with high self-efficacy are more open to experimenting with innovative teaching strategies, which likely includes the integration of technology. Empirical evidence supports this relationship; for example, Abbitt (2011) and Paraskeva et al. (2008) demonstrated that higher teacher self-efficacy correlates with increased technology use in the classroom. These findings suggest that EFL teachers' self-efficacy is a critical factor in their intention to use technology, leading to the hypothesis that teacher self-efficacy affects their technology adoption intentions.

Hypothesis 3 (H3): ***Teacher self-efficacy and technology self-efficacy are interconnected***

The interconnection between teacher self-efficacy and technology self-efficacy is supported by theoretical and empirical literature. Self-efficacious teachers are generally confident in their ability to implement effective teaching strategies, including the use of technology (Yeşilyurt et al., 2016). This relationship is reinforced by studies showing that teachers' general self-efficacy beliefs often translate into specific domains such as technology use (Albion, 1999; Mannila et al., 2018). Moreover, Yeşilyurt et al. (2016) found that teachers' overall self-efficacy and their technology self-efficacy are positively correlated, suggesting that a strong belief in one's general teaching abilities supports confidence in using technology. Therefore, we hypothesize that there is a significant interconnection between teacher self-efficacy and technology self-efficacy.

The hypothesized model, including its paths, is illustrated in Figure 1.

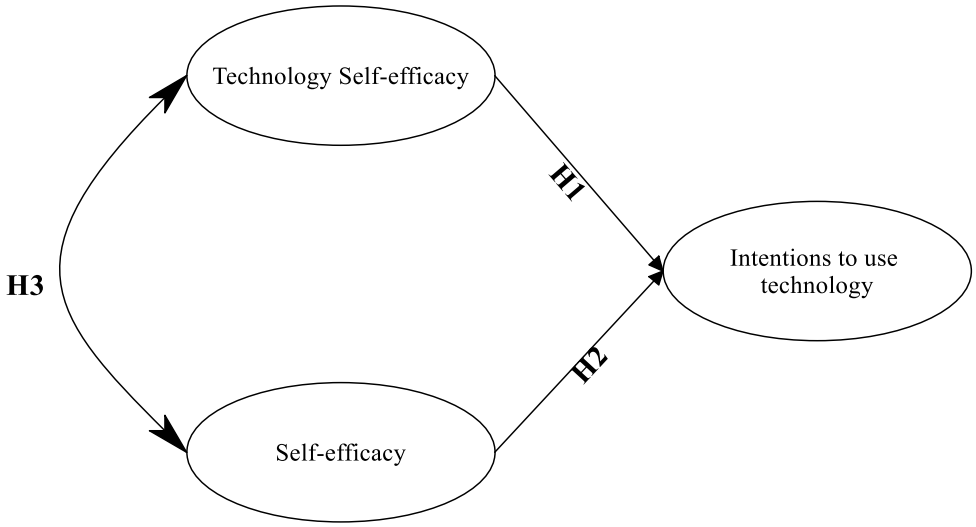

Figure 1. *The Hypothesized Model*

METHOD

Participants

The study included a total of 353 Iranian EFL instructors as participants. The instructors were selected using a convenience sampling method, ensuring ease of access and practicality in gathering the data. Among the participants, 141 were male instructors (39.9%), while 212 were female instructors (60.1%), reflecting a gender distribution that aligns with the broader population of EFL instructors in Iran. The participants' ages ranged from 21 to 51 years, with a mean age of 35.4 years (SD = 8.2), indicating a wide age distribution that contributed to the diversity of the sample. Teaching experience among the participants varied significantly, ranging from 2 years to 26 years, with an average of 14.3 years (SD = 7.5). This variation in professional experience highlights the inclusion of both novice and veteran teachers, providing a comprehensive perspective on technology integration across different career stages.

Regarding educational backgrounds, the majority of participants held degrees in English Language Teaching (ELT), English Literature, or Applied Linguistics, equipping them with specialized knowledge in the language and pedagogy. Specifically, 67% of the instructors had obtained a bachelor's degree, 28% held a master's degree, and 5% possessed a Ph.D. This educational diversity underscores the varying levels of academic preparation and theoretical knowledge among the instructors. Furthermore, these EFL instructors were actively teaching English at various educational settings, including primary and secondary schools (40%), language institutes (35%), and universities (25%). This distribution ensures that the sample is representative of different educational contexts, from formal school environments to more flexible language institute settings and higher education institutions. The geographical distribution of the participants spanned multiple provinces and cities across Iran, capturing a broad spectrum of regional educational practices and access to technological resources. This geographical diversity is crucial for understanding the contextual factors influencing technology adoption in different parts of the country.

Instruments

Teachers' self-efficacy was evaluated using the Teachers' Sense of Efficacy Scale (TSES), a reliable and valid self-report instrument developed by Tschannen-Moran and Hoy (2001). The TSES comprises 24 items that assess teachers' beliefs in their teaching competence, focusing on instructional strategies, student engagement, and classroom management. Respondents rated each item on a five-point Likert scale, ranging from 1 (not at all confident) to 5 (completely confident).

To measure teachers' technology self-efficacy, we employed a Likert-point scale developed and validated by Wang et al. (2004). This self-report scale consists of 21 items that assess participants' confidence in integrating technology in the classroom. Respondents indicated their level of agreement with each item on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Teachers' intentions to use technology were assessed using the scale designed and validated by Ursavaş et al. (2019). This self-report scale comprises 22 items, covering five underlying components: Behavioral intention (BI) with 5 items, Perceived usefulness (PU) with 5 items, Perceived ease of use (PEU) with 4 items, Attitudes toward computer use (ATCU) with 4 items, and Subjective norms (SN) with 4 items. Each item was rated on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Ursavaş et al. (2019) reported good internal consistency for this scale, with alpha values ranging from 0.75 to 0.90. It is worth noting that all the instruments were administered in English, as the majority of the participants were proficient in the language due to their professional background in English language teaching.

Data Collection Procedure

This non-experimental, correlational study aimed to explore the relationships between three key constructs: teachers' self-efficacy, technology self-efficacy, and intentions to use technology among actively teaching EFL instructors in Iran. The target population consisted of English instructors who were actively teaching at various educational settings, including schools, language institutes, and universities, in different provinces and cities across the country.

Data collection commenced in the summer of 2022 and was conducted over a period of approximately four weeks. For participants' convenience, electronic versions of the scales were developed using the Google Docs application. The survey link, containing items from the three questionnaires, was subsequently disseminated through popular online platforms like Telegram and WhatsApp groups, which boasted a diverse membership of Iranian EFL instructors from different regions. In instances where participants faced challenges accessing Telegram or WhatsApp, alternative means were provided, allowing them to access the survey through email. Clear and comprehensive instructions were furnished to participants before completing the survey, facilitating accurate and reliable responses. Additionally, to

promote candid feedback, explicit assurances were given regarding the confidentiality and protection of their personal information.

Ethical procedures were meticulously followed throughout the data collection process. Prior to participation, all potential respondents were provided with an informed consent form that detailed the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time without any consequences. Participants were also informed about the anonymity of their responses and the measures taken to ensure data confidentiality. Informed consent was obtained electronically, as participants were required to agree to the consent form before proceeding to the survey. This process ensured that all participants were fully aware of the study's aims and their rights as participants. The study was conducted in accordance with ethical guidelines and was approved by the Institutional Review Board (IRB) of the University of Kurdistan, ensuring that the research met all necessary ethical standards. Participants' data were stored securely, accessible only to the research team, and were used solely for the purposes of this study.

Data Analysis

The collected data were analyzed using the SPSS AMOS 24. First, the missing data and outliers were detected and eliminated. Missing values (less than 5%) were randomly distributed and imputed through the expectation–maximization (EM) algorithm. As for the particular purpose of this study, Structural Equation Modelling (SEM) was used to investigate the effects of teacher self-efficacy and technology self-efficacy in predicting teachers' intentions to use technology. A set of fit indices were taken into account to evaluate the adequacy of the structural relations.

The model fit was assessed using several indices, including $\chi 2/df$ (chi-square divided by degrees of freedom), Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). An acceptable model is indicated by values such as $\chi 2/df < 3$, GFI > .95, TLI > .95, CFI > .95, and RMSEA < .06 (Hu & Bentler, 1999).

RESULTS

The purpose of this research was to investigate the relationships among the three constructs of teacher self-efficacy, technology self-efficacy, and intentions to use technology. Before testing the measurement model, including the constructs and indicators, the reliability and validity of the instruments used to measure the constructs were investigated. In so doing, a Confirmatory Factor Analysis (CFA) was conducted to guarantee the construct validity of the scales by checking their fit indices. These fit indices allow the investigation of the adequacy the psychometric properties of the scales. The results of goodness-of-fit indices indicated a good fit: $X^2/df = 1.81$, $p = 0.00$, GFI = 0.973, TLI = 0.982, CFI = 0.983, RMSEA = 0.03. Cronbach's alpha coefficients were calculated to check the internal consistency of the scales. As seen in Table 1, the reliability indices of all the three questionnaires were greater than 0.70, hence the acceptable reliability indices of the questionnaires. In addition, the composite reliability values varied from .79 (technology self-efficacy) to .89 (self-efficacy). In addition, the factor loadings for all the statements of the scales were significant ($p < 0.001$).

Table 1
Descriptive Statistics and Correlations

	M (SD)	1	2	3	4	5	6	Cronbach A
1. TSE	56.21 (13.28)	1.00						.79
2. SE	40.67 (10.16)	.28*	1.00					.83
3. IP	38.10 (10.55)	.23*	.32**	1.00				.81
4. CM	46.64 (12.95)	.33**	.24*	.27*	1.00			.82
5. Total SE	125.61(32.07)	.33**	.26*	.28*	.32**	1.00		.89
6.IUT	62.82 (15.74)	.54**	.32**	.28*	.25*	.39**	1.00	.84

Note. TSE= Technology self-efficacy; SE= Student engagement; IP= Instructional practices; CM=classroom management; Total SE= Total teacher self-efficacy; IUT= Intentions to use technology
* $p < .05$.
** $p < .01$.

Table 1 contains the descriptive statistics together with the correlations among the constructs and their underlying components. As indicated in Table 1, the correlation between teacher technology self-efficacy and intentions to use technology ($r = .54$, $p < .01$) is greater than the correlation between teacher self-efficacy and intentions to use technology ($r = .39$, $p < .01$).

In the next step of data analysis, SEM was used to analyze the hypothesized model for the structural relations. In fact, the structural equation modeling technique was used to measure the effects of the two constructs of self-efficacy and technology self-efficacy on intentions to use technology as the criterion variable of the study.

SEM is categorized as a multivariate statistical approach which can be conceptualized as a more sophisticated combination of regression, factor analysis, and path analysis, which allows researchers to analyze the correlations among constructs using a factor analytic approach as well as test hypothesized associations among variables through a kind of a path analytic approach (Weston & Gore, 2006). Some key features make SEM become distinct from other multivariate procedures. First, it adopts a confirmatory approach rather than an exploratory one to analyze the data. Second, unlike traditional multivariate techniques that failed to estimate measurement error, SEM allows the direct estimation of error variance. Third, SEM provides the opportunity to combine both latent and observed constructs (Byrne, 2010).

In order to assess the structural relations among the constructs through structural equation modeling technique, two models, as seen in Figure 2, were hypothesized. The structures of the two models are the same in the sense that teacher self-efficacy and technology self-efficacy served as the predictors of intentions to use technology. Therefore, they are expected to be statistically the same. However, in order to investigate the correlations between the predictors and the criterion variable, both models were examined. Additionally, to probe the unique effects of the self-efficacy and technology self-efficacy on intentions to use technology, a set of fit indices were taken into account to assess the adequacy of the hypothesized relations. The relations demonstrated a good fit of measurement model, as seen in Table 2.

In model A, the three constructs were found to be significantly correlated. More specifically, teacher technology self-efficacy and self-efficacy had 5% of shared variance (R^2= .234). Teacher technology self-efficacy and intentions to use technology showed 21.8% common variance (R^2= .467). In the same vein, self-efficacy and intentions to use technology shared 12 % of variance (R^2= .347). Given these results, it can be concluded that teacher technology self-efficacy could predict intentions to use technology more than self-efficacy.

Additionally, to investigate the distinct impacts of teacher technology self-efficacy and self-efficacy beyond each other, we examined the incremental changes in the R^2 values between models A and B. In model B, the combined influence of teacher technology self-efficacy and self-efficacy accounted for 28% of the variance in intentions to use technology. This revealed that teacher self-efficacy contributed an additional 7% of variance in intentions to use technology, beyond the influence of technology self-efficacy as the sole predictor (ΔR^2=.28−.21=.07). Furthermore, the unique effect of technology self-efficacy on intentions to use technology, surpassing the contribution of self-efficacy, was found to be 16% (ΔR^2=.28−.12=.16). Based on these findings, it can be inferred that teacher technology self-efficacy had a more substantial impact on predicting intentions to use technology compared to self-efficacy.

Table 2
Goodness of Fit Indices

	χ2	χ2/df	GFI	TLI	CFI	RMSEA	Δχ2
Models A and B	9.21	1.81	.97	.98	.98	.03	
Model A1 (β SE = 0)	14.65	2.31	.98	.97	.97	.05	5.44*
Model A2 (β TSE = 0)	16.78	2.43	.97	.96	.97	.04	7.57*

Note. SE= self-efficacy; TSE= technology self-efficacy.
* p <.05.

Subsequently, the beta weights corresponding to each construct were set to zero, and the resulting changes in χ2 were examined in model B to determine the individual impact of self-efficacy and technology self-efficacy

on predicting intentions to use technology. If constraining the beta weights to zero leads to a significant reduction in $\chi 2$, it implies that the distinct influence of each construct (i.e., self-efficacy or technology self-efficacy) on intentions to use technology is noteworthy. The fit indices for the models can be found in Table 2. When the beta weights were constrained to zero in both model A1 (β self-efficacy = 0) and model A2 (β technology self-efficacy = 0), there were significant differences in chi-square values (model A1 (β self-efficacy = 0): $\Delta\chi 2$ (1, N = 353) = 5.44, $p < .05$; model A2 (β technology self-efficacy = 0): $\Delta\chi 2$ (1, N = 353) = 7.57, $p < .05$). These results indicate that self-efficacy and technology self-efficacy have notable and distinct effects as predictors of intentions to use technology.

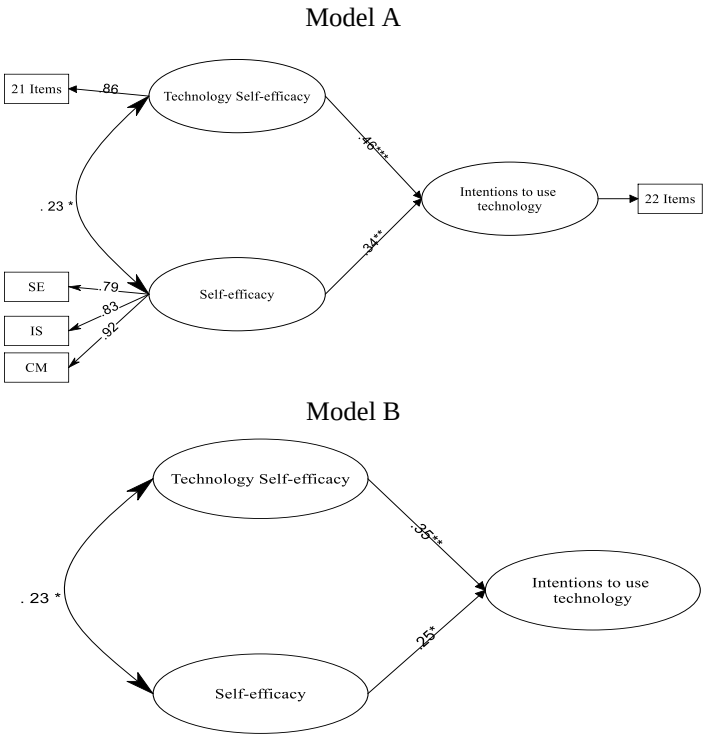

Figure 2. Self-efficacy and technology self-efficacy as predictors of intentions to use technology; **p <.05. ** p <.01. ***.p <.001*

DISCUSSION

The primary aim of this study was to examine the interrelationships among teachers' self-efficacy, technology self-efficacy, and intentions to use technology. Specifically, we investigated the predictive roles of teacher technology self-efficacy and teacher self-efficacy in relation to intentions to use technology among Iranian EFL teachers. The results obtained through structural equation modeling demonstrated that both predictor variables significantly influenced intentions to use technology. However, it was evident that teacher technology self-efficacy had a stronger association with intentions to use technology. This finding aligns with previous research (Celik & Bindak, 2005; Chen, 2008; Cui, 2021; Downey, 2006; Holden & Rada, 2011; Jiang et al., 2021; Menabò et al., 2021), which indicated a positive and significant relationship between teachers' technology self-efficacy, attitudes towards technology-assisted education, and their intentions to use technology. In line with these findings, Şahin et al. (2021) identified self-efficacy as a contributing factor to instructors' intentions to use information technologies, and Jiang et al. (2021) also emphasized the importance of technology self-efficacy as a determinant of teachers' intentions to use technology-supported flipped instruction.

The findings of this study are consistent with prior research conducted by Rohaan et al. (2010), who demonstrated the significant impact of instructors' technology self-efficacy on their attitudes and inclination towards technology integration in their classrooms. Similarly, Celik and Yesilyurt (2013) confirmed the significant relationship between perceived technology self-efficacy and teachers' attitudes towards technology. Holden and Rada (2011) also reported the influential role of teachers' perceived technology self-efficacy in shaping their attitudes towards technology use. Other studies have further supported the positive association between technology self-efficacy and intentions to use technology (e.g., Oguz & Topkaya, 2008). As suggested by Abbit (2011), teachers' perceptions of the effectiveness of specific technology devices can significantly influence their adoption of

technology in their teaching practices. Additionally, Anderson et al. (2011) found that technology self-efficacy predicted pre-service teachers' intentions to adopt technology, and teachers' technological competence was positively linked to their willingness to frequently use technology in the future. These collective findings underscore the significance of technology self-efficacy in shaping teachers' attitudes, intentions, and adoption of technology in educational settings.

Aligned with Bandura's (2006) perspective, self-efficacy can be understood as an individual's belief in their competence to perform a specific learning task. In the context of technology, technology self-efficacy refers to an individual's confidence and competence in utilizing particular technologies (Compeau & Riggings, 1995). Thus, teachers' attitudes and confidence in integrating technology for instructional purposes play a crucial role in shaping their intentions to use technology in their teaching practices. As Venkatesh and Davis (1996) point out, self-efficacy in using technology predicts one's perceived ease of use when engaging in hands-on activities with technology. Therefore, successful technology integration in education is not solely dependent on teachers' prior training but also on their beliefs about their own abilities to effectively employ technology in the classroom (Vannatta & Fordham, 2004).

As discussed earlier, efficacy perceptions are related to an individual's confidence in carrying out specific tasks or activities (Bandura, 2006). In the context of technology, technology self-efficacy pertains to an individual's sense of confidence in using technology devices (Compeau & Riggings, 1995). This technology self-efficacy has been shown to influence one's perceived ease of use when using technology (Downey, 2006). In summary, teachers' technology self-efficacy, along with their attitudes towards technology integration, plays a significant role in determining their intentions to use technology effectively in their educational settings.

The significance of technology self-efficacy extends beyond its impact on intentions; it also plays a crucial role in the actual implementation of technology in the classroom. This finding aligns with numerous studies

(e.g., Al-awidi & Alghazo, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Wang et al., 2004), which have demonstrated the influential role of teachers' technology self-efficacy in driving their actual integration of technology in teaching. Instructors who possess a strong belief in their abilities to effectively use technology in instruction are more inclined to actively incorporate technology devices for educational purposes (Teo, 2009). When teachers genuinely perceive that technology positively impacts both their teaching and students' learning, they become more motivated to integrate technology into their classrooms (Albion & Ertmer, 2002; Niederhauser & Perkmen, 2008). As a result, these teachers invest more effort in adopting technology to achieve their intended educational outcomes, as they are confident in their abilities to teach effectively with technology. Supporting this notion, Eachus and Cassidy (1999) emphasized that self-efficacy consistently emerges as a significant factor in understanding the frequency and effectiveness of individuals' computer use. Consequently, the technology self-efficacy of teachers plays a critical role in shaping their actual use of technology, as it influences their confidence, motivation, and efforts to integrate technology effectively in educational settings.

Moreover, teacher self-efficacy emerged as a significant predictor of intentions to use technology, aligning with findings from several prior studies (e.g., Abbitt, 2011; Albion, 1999; Ateş & Garzón, 2022; Hanham et al., 2021; Paraskeva et al., 2008; Yeşilyurt et al., 2016). These results are consistent with Joo et al.'s (2018) discovery, where teacher self-efficacy had a significant impact on teachers' intention to use technology. Similarly, Gomez et al. (2022) confirmed the importance of teachers' self-efficacy in relation to their willingness to integrate technology, and Šabić et al. (2022) underscored its significance in utilizing information and communication technology. Partially in line with our findings, Aldhahi et al. (2022) also reported the key role of self-efficacy in influencing online learning satisfaction.

One possible explanation for this finding lies in the fact that teachers with higher self-efficacy possess the confidence and belief in their ability to overcome setbacks and challenges during teaching (Betoret, 2006; Horvitz et

al., 2015). In the context of technology integration, which is replete with complexities and obstacles, teachers need to be adequately prepared to handle such difficulties (Ramorola, 2013), especially in the EFL setting (Khatoony & Nezhadmehr, 2020). Hence, teachers with elevated self-efficacy are better equipped to address challenges related to technology implementation, which consequently facilitates their intentions to use technology effectively in their classrooms.

Additionally, it can be argued that teachers who possess a sense of competence in using appropriate teaching strategies, managing classrooms effectively, and engaging students are more likely to incline towards technology use in their instructional practices. This finding is supported by Lee and Tsai's (2010) study, where teachers' perceived self-efficacy and positive perceptions of the educational use of the World Wide Web were significantly correlated. The combination of self-efficacy beliefs and positive perceptions of technology's educational utility may contribute to teachers' openness to incorporating technology in their teaching approaches.

CONCLUSION AND IMPLICATIONS

This study explored the structural model of technology self-efficacy, teacher self-efficacy, and intentions to use technology among Iranian EFL teachers using SEM. Our findings revealed that both teacher self-efficacy and technology self-efficacy significantly influenced teachers' intentions to use technology in their EFL classrooms. In summary, our results indicate that higher levels of self-efficacy and technology self-efficacy are associated with more positive attitudes towards technology integration among teachers. This finding is particularly relevant as online EFL courses become more prevalent, emphasizing the need to understand factors influencing teachers' attitudes towards technology adoption. Our study highlights the vital roles of teachers' efficacy perceptions and technology self-efficacy in fostering positive attitudes and successful technology integration in EFL teaching.

The findings also have important theoretical implications, highlighting the distinct predictive powers of general teacher self-efficacy and technology self-efficacy in influencing intentions to use technology. This supports existing literature emphasizing the domain-specific nature of self-efficacy (Klassen & Chiu, 2010). Understanding these separate constructs is crucial when examining their effects on technology integration. Moreover, our research contributes to the theoretical background supporting the positive association between efficacy perceptions and attitudes (Bandura, 1997; Li, 2012; Tarkin & Uzuntiryaki, 2012; Torkzadeh et al., 1999). Teacher self-efficacy and technology self-efficacy play significant roles in shaping instructors' attitudes and intentions towards technology integration. High levels of efficacy in both general teaching competencies and technology usage encourage positive attitudes and motivate instructors to explore and use technology in their teaching practices. Our findings reaffirm the multi-faceted and situation-sensitive nature of self-efficacy as a construct that empowers learners and enhances their skills and competencies (Bandura, 1977; Pajares, 2002).

The empirical evidence from our survey study highlights the critical role of teacher self-efficacy and technology self-efficacy in influencing the technology use of Iranian EFL teachers. These findings offer several valuable implications for teacher educators and policymakers aiming to promote effective technology integration in the classroom. Given that technology self-efficacy significantly predicts instructors' intentions to use technology, it is imperative for teacher education programs to prioritize building teachers' confidence in using technological tools. This can be achieved by incorporating comprehensive technology training modules that focus not only on the technical skills required to operate digital tools but also on the pedagogical strategies for integrating these tools into the curriculum (Fathi et al., 2024). For instance, hands-on workshops and continuous professional development courses can help teachers become more comfortable and proficient with technology, thereby increasing their willingness to adopt it in their teaching practices.

In addition to enhancing technology self-efficacy, the study found that general teacher self-efficacy plays a crucial role in shaping teachers' intentions to adopt technology. Therefore, teacher education programs should also focus on enhancing overall teaching competencies. This includes developing effective classroom management techniques, fostering student engagement, and employing diverse instructional strategies. By improving these general teaching skills, educators can build a strong foundation of self-efficacy that will support the integration of new technologies in their teaching. The interconnectedness of teacher self-efficacy and technology self-efficacy suggests that teacher training should adopt an integrated approach. Programs should not treat technology skills in isolation but rather embed them within broader pedagogical training. For example, lesson planning sessions can incorporate the use of digital tools, and teachers can be encouraged to develop technology-enhanced learning activities. Such integrated training helps teachers see the relevance of technology in achieving their instructional goals and builds their confidence in using these tools effectively.

Furthermore, the study's findings reinforce the need for teacher education programs to address not only technical competence but also teachers' attitudes and perceptions towards technology. Programs should include components that highlight the benefits of technology in enhancing teaching and learning outcomes. This can be done through showcasing successful case studies, providing opportunities for teachers to share their positive experiences with technology, and offering support networks where teachers can seek advice and encouragement from their peers. Moreover, integrating technology-related field experiences into teacher education programs is essential. Prospective teachers should have opportunities to observe and practice technology integration in real classroom settings. These experiences allow them to apply what they have learned in training, experiment with different tools, and receive feedback on their practices. Such practical exposure is crucial for building both technology self-efficacy and general teaching self-efficacy. Finally, ongoing support and professional development are vital for sustaining technology integration. Teacher

education programs should establish mechanisms for continuous learning, such as regular workshops, online courses, and mentorship programs. By providing teachers with resources and support beyond their initial training, educators can ensure that teachers remain confident and motivated to use technology throughout their careers.

Another limitation is the sole reliance on quantitative self-report data. To strengthen the credibility of the findings, future investigations may consider supplementing the quantitative data with structured or semi-structured interviews, or other qualitative data collection methods. Qualitative insights could offer a deeper understanding of the complex interplay between self-efficacy, technology self-efficacy, and intentions to use technology, providing richer interpretations. Lastly, the cross-sectional design used in this study captures data at a single point in time, limiting insights into temporal relationships. To comprehensively understand the dynamic interconnections among these variables, longitudinal studies tracking participants' attitudes and behaviors over time are recommended. Longitudinal research can unveil the temporal relationships between self-efficacy, technology adoption, and instructional practices, providing a more comprehensive understanding of how these factors evolve over time.

Disclosure statement

No potential conflict of interest was reported by the authors.

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