Teaching English Language Journal
ISSN: 2538-5488 – E-ISSN: 2538-547X – http://tel.journal.org

Please cite this paper as follows:
Taherkhani, M., Kiany, G. R., & Allami, H. (2026). Technology integration in the language class: Impacts of the COVID-19 pandemic and in-service EFL teachers' contextual knowledge, TPACK, and attitudes in public schools. *Teaching English Language, 20*(1), 239-278. https://doi.org/10.22132/tel.2025.503520.1784

Research Paper

Technology Integration in the Language Class: Impacts of the COVID-19 Pandemic and In-service EFL Teachers' Contextual Knowledge, TPACK, and Attitudes in Public Schools

Mahdi Taherkhani
Ph.D. Candidate, Department of English Language and Literature, Faculty of Foreign Languages, Tarbiat Modares University
Gholam Reza Kiany[1]
Professor, Department of English Language and Literature, Faculty of Foreign Languages, University of Mazandaran
Hamid Allami
Associate Professor, Department of English Language and Literature, Faculty of Foreign Languages, Tarbiat Modares University

Abstract
Research on effective technology integration by language teachers has grown exponentially. Previous research has shed light on significant factors contributing to effective technology integration by language teachers, such as teachers' competence and skills. This research study adds to the literature by investigating the impacts of four variables—the COVID-19 pandemic, contextual knowledge, TPACK, and attitudes—on technology integration of in-service Iranian EFL teachers in public schools. For this purpose, three surveys for assessing TPACK, attitude, and technology integration were employed from prior research, and two instruments for the COVID-19 pandemic and contextual knowledge were developed to address the impacts of

[1] Corresponding author: rezakiany@umz.ac.ir

these two factors on technology integration in an EFL setting. These two instruments were constructed following rigorous stages of survey development. All five surveys were employed to gather data from a cohort of 449 tenured in-service EFL teachers. Structural equation modeling was utilized to analyze the direct and indirect effects among the variables. The results indicated that the independent variables (i.e., contextual knowledge, TPACK, and attitudes) were significant predictors of technology integration except for the COVID-19 pandemic. Furthermore, significant direct relationships were found between contextual knowledge and TPACK, as well as the COVID-19 pandemic and attitudes. Analysis of the indirect path coefficients revealed contextual knowledge influences technology integration through the mediating role of TPACK. The findings have several implications for language teachers, teacher educators, and policymakers.

***Keywords**:* Attitudes toward technology, Contextual knowledge, In-service EFL teachers, Technology integration, The COVID-19 pandemic, TPACK

Received: January 31, 2025
Accepted: September 12, 2025

1. Introduction

Educational technology is regarded as a tool to bring about positive changes in learning. Language education also benefits from the application of technology through enriching language learning experiences (Ebadi & Vakili, 2023; Mirzaei et al., 2025; Sarani & Ghollasi Moud, 2022; Sun et al., 2024; Wang, 2024). Despite the benefits of educational technology, in many EFL settings, teachers are unable to integrate technology into their language pedagogies because of unfavorable conditions for the successful process of technology integration (Li et al., 2019). Thus, the topic of technology integration in language education has become a subject of study in recent decades (Bui, 2022).

Technology integration is a process that requires a 'systematic approach' (Gunuç & Babacan, 2017). The systematicity of technology integration reflects its complex and demanding nature. It is a complex undertaking in language

teaching as it is modulated by several factors, such as teachers' pedagogical beliefs, their competence and confidence in technology, and their professional development as internal factors, as well as the sociocultural context and availability of technology as external factors (Ertmer et al., 2012; Bui, 2022).

2. Research on Technology Integration in the Iranian Context

In Iran, language education is delivered in three different contexts: universities, language institutes, and public schools. However, most studies have explored the outcomes of technology-enhanced language learning in the milieu of universities (e.g., Ghorbani & Ebadi, 2020; Hassanzadeh et al., 2021), and few studies examined the impacts of technology integration on language learners in language institutes or public schools (e.g., Hedjazi Moghari & Marandi, 2017; Sarani & Ghollasi Moud, 2022). Similarly, all studies that have analyzed language teachers' perceptions toward technology integration and the corresponding factors affecting their technology integration have been conducted in universities or private language institutes (e.g., Ashrafzadeh & Sayadian, 2015; Taghizadeh & Hasani Yourdshahi, 2019; Raygan & Moradkhani, 2020), and no study has explored the factors that affect the technology integration exclusively among EFL teachers in Iranian public schools.

One reason for conducting more technology integration studies in universities and language institutes is the teacher's role, which is less autonomous in Iranian public schools. Unlike language teachers in universities and language institutes, public language teachers who work under a strict top-down educational system must cover a mandated syllabus in a limited amount of time to prepare students for national state-run tests (Nazari & Molana, 2023). Another reason might be rooted in the availability of technology. Universities and most private language institutes are often technologically

richer compared with public schools (Raygan & Moradkhani, 2024). Aside from technological infrastructure, the process of language teachers' training, recruitment, maintenance, and evaluation is somewhat different in public schools (Zohrabi & Paydar, 2025). Although some governmental national documents (e.g., the Education Transformation Document, enacted in 2011) emphasize and support the application of technology in public schools and recommend technology-oriented teaching, teachers are not obliged to integrate technology into their educational practice. Therefore, any technology integration practice by language teachers at public schools is done on a voluntary basis. However, this educational trend was challenged by the outbreak of the COVID-19 pandemic, which compelled teachers to utilize educational technology temporarily in 2020. This even gave rise to the foundation of a special native social networking application (i.e., SHAD which stands for 'online students' network' in Persian language) for teachers and students in public schools. SHAD is still widely used by teachers for pedagogical purposes (Namaziandost et al., 2025).

3. Theoretical Grounding and Hypotheses

Many studies (Lai et al., 2022; Mohammad-Salehi et al., 2021; Raygan & Moradkhani, 2020; Teo et al., 2018; Teo, et al. 2017) have attempted to explicate the factors that impact on English language teachers' technology integration using different knowledge-based frameworks like technological pedagogical content knowledge (TPACK) model (Mishra & Koehler, 2006) and/or psychological models such as unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003), and technology acceptance model (TAM) (Davis, 1989). These studies have been mainly carried out to investigate three sets of significant factors for language teachers' technology integration: (a) internal factors associated with teachers' knowledge (i.e.,

TPACK), teachers' attitude and its main underlying constructs (i.e., perceived ease of use (PEU) and perceived usefulness (PU)), and teachers' pedagogical beliefs, (b) external factors that are imposed by the learning environment on teaching contexts including facilitating conditions and facilitating support, and (c) moderating factors including language teachers' age, gender, experience, and voluntariness of technology use.

In the current study, the expanded TPACK framework (i.e., ConteXtual Knowledge + TPACK) (Mishra, 2019) and the reduced TAM framework (Davis, 1989) were used. PU and PEU were removed from TAM model since their relationships with technology integration were previously well explored (e.g., Mei et al., 2017; Teo et al., 2018; Teo, et al. 2017). Instead, the COVID-19 pandemic was added to TAM model as a moderating factor. Thus, the primary purpose of this research study is to investigate the impacts of four variables, namely, contextual knowledge, TPACK, the COVID-19 pandemic, and attitudes on technology integration of in-service EFL teachers in Iranian public schools.

3.1. XTPACK and Technology Integration

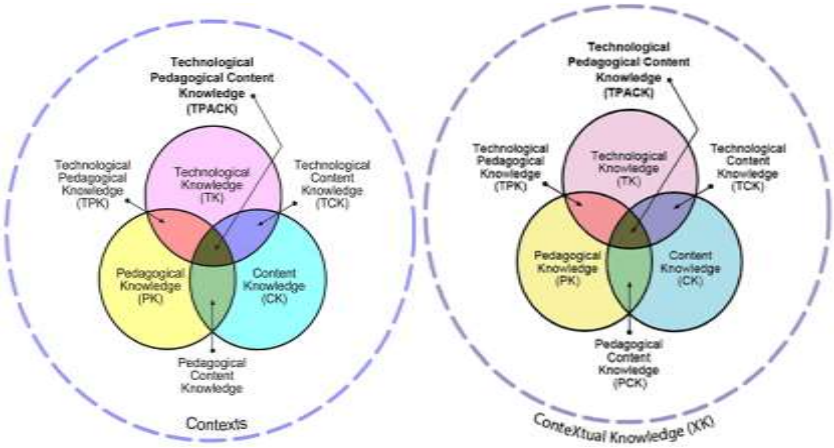
TPACK is a necessary domain of knowledge for language teachers' successful technology integration (Bustamante, 2019). TPACK framework, as put forward by Mishra and Koehler (2006), looks at individual areas of teacher knowledge including, content, pedagogy, and technological knowledge as working both in isolation and in an interplay with each other. Recently, an additional domain of knowledge, i.e., contextual knowledge (XK), has also been added to the domains of the model by Mishra (2019).

As illustrated in Figure 1, this area was previously labelled contexts (Koehler & Mishra, 2009; Koehler et al., 2013). Mishra (2019) defines XK as

not only teachers' familiarity with existing technological resources but also their understanding of the contextual policies they operate in, ranging from local context (i.e. school) to broader national context (i.e. administration). Brianza et al. (2022) carried out a comprehensive review on contextual knowledge studies that used TPACK as their theoretical framework and concluded that inclusion of XK in TPACK framework yields a new conceptualization for the TPACK model and termed it as 'XTPACK'.

Figure 1

TPACK models from Koehler and Mishra (2009) and Mishra (2019)



Despite the realization of contexts or contextual knowledge as an important area of knowledge in the TPACK framework, prior research indicates that it is absent in most TPACK studies (Rosenberg & Koehler, 2015). Moreover, there is a paucity of research studies on how contextual knowledge influences EFL teachers' technology integration (Bui, 2022). Foulger et al. (2021) undertook a survey study to examine how contextual knowledge predicts pre-service teachers' inclination to apply technology for teaching. Their study revealed that contextual knowledge elements predict teachers' technology integration.

However, subject-specific research is still required to provide insight into the role of context and contextual knowledge in the technology integration of EFL teachers. Moreover, the interplay of contextual knowledge with other domains of the TPACK model is an area of enquiry that needs more investigation. In this study, the contextual knowledge possessed by in-service Iranian EFL teachers about two levels of context, i.e., the meso-level and micro-level (Porras-Hernández & Salinas-Amescua, 2013), was assessed to determine how contextual knowledge predicts Iranian EFL teachers' TPACK and technology integration.

3.2. Attitude and Technology Integration

Ertmer et al. (2012) referred to a misalignment between what teachers believe and practice in the integration of technology within classroom settings. This disparity was initially found to be caused by external barriers such as the lack of technology (O'Mahony, 2003; Pelgrum, 2001). However, access to technology has begun to increase worldwide in recent decades. This has led to the reduction or elimination of external barriers in many educational settings. Given this, researchers might have expected to observe a surge in technology integration in classrooms; however, this expectation was not realized (Hermans et al., 2008). It became evident that increased availability of technology does not culminate in effective technology integration if teachers' pedagogical attitudes do not change accordingly. The same problem still persists in developing countries where access to technology increases, but teachers rarely integrate technology into their pedagogy. Thus, understanding EFL teachers' perceptions and attitudes toward technology integration is viewed as a primary antecedent to successful technology integration (Albirini, 2006).

3.3. The COVID-19 Pandemic and Technology Integration

The influential internal factors in technology integration are related mainly to teachers' cognitive (technology, pedagogy, and content knowledge) and affective (attitudes and perceptions towards technology) dimensions, whereas external factors are associated with technological support from the school and the availability of technology. In the present study, we propose that one pivotal point in the history of education has influenced the technology integration of language teachers in developing countries (e.g., Iran). In Iran, almost all tenured EFL teachers in public school had not experienced the online classes in the pre-COVID-19 era (Tafazoli & Meihami, 2023). This turning point has apparently acted as a catalyst for English language teachers' perceptions and attitudes toward technology and consequently has influenced how they integrate technology in their teaching (Stockwell & Wang, 2023; Khanahmadi, 2025). No prior research has used a survey to measure Iranian EFL teachers' technological dispositions in L2 pedagogy as a result of the pandemic. Therefore, in this study, a new survey was developed, and the impact of the COVID-19 pandemic as a natural phenomenon on Iranian EFL teachers' attitudes and technology integration was investigated.

3.4 The proposed conceptual model

In light of the identified gaps in the current literature, this research is designed to explore the structural relationships among the four key predictors and their direct influences on EFL teachers' technology integration. Also, the indirect impacts of contextual knowledge and the COVID-19 pandemic on technology integration were examined through the mediating roles of TPACK and attitudes. Therefore, the following research hypotheses were formulated:

Hypothesis 1. TPACK predicts the technology integration of Iranian EFL teachers.

Hypothesis 2. Attitudes toward technology predict the technology integration of Iranian EFL teachers.

Hypothesis 3. Contextual knowledge predicts the technology integration of Iranian EFL teachers.

Hypothesis 4. The COVID-19 pandemic predicts the technology integration of Iranian EFL teachers.

Hypothesis 5. The COVID-19 pandemic predicts attitudes of Iranian EFL teachers.

Hypothesis 6. Contextual knowledge predicts TPACK possessed by Iranian EFL teachers.

Hypothesis 7. The COVID-19 pandemic predicts the technology integration of Iranian EFL teachers through the mediating role of attitudes.

Hypothesis 8. Contextual knowledge predicts the technology integration of Iranian EFL teachers through the mediating role of TPACK (See Figure 2).

4. Method

A quantitative approach was utilized to gather research data through the administration of several scales that were either adopted from the literature or developed to examine the influential factors for technology integration.

4.1 Participants

596 individuals responded voluntarily in this study; however, only 449 responses were deemed eligible for analysis. This reduction resulted from two criteria. First, because the COVID-19 outbreak occurred in 2020 and data

collection was conducted in 2023, participants with fewer than 5 years of experience in teaching English were excluded. Second, only English language teachers working in public schools were included. The eligible participants differed in gender, age, area of expertise, and years of teaching experience, and were located in various cities across Iran. Table 1 presents the participants' demographic information in greater detail.

Figure 2

The hypothesized model of the relationships among contextual knowledge (XK), TPACK, the COVID-19 Pandemic (CV), attitudes (AT), and technology integration (TI).

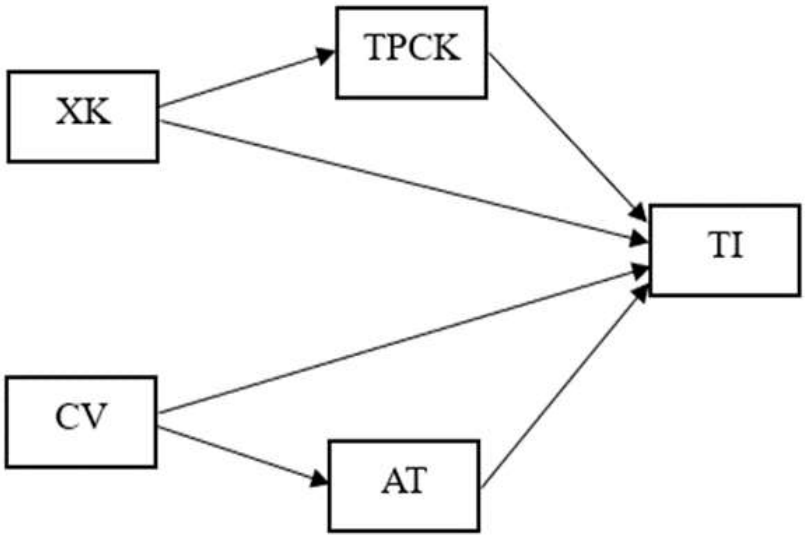


Table 1

Participants' demographic information

Variables	Categories	Frequency	Percentage
Gender	Male	119	26.5
	Female	330	73.5
Age	20-30	221	49.2
	31-40	142	31.6
	40-50	62	13.8
	51 or above	24	5.3
Level of education	BA	233	49.6
	MA	168	37.4
	PhD	48	10.6
Teaching Experience	5-10	290	64.5
	11-15	93	20.7
	16-20	30	6.6
	21-25	36	8
Total	-	449	-

4.2 Instruments

4.2.1 Instrument Adoption for TPACK, Attitudes, and Technology Integration

To assess teachers' TPACK, attitudes toward technology, and the extent of technology integration, several instruments previously validated by researchers were utilized. Bostancıoğlu and Handley's (2018) TPACK questionnaire designed specifically for EFL context with 36 items on various knowledge domains including CK, TK, PCK, TCK, TPK, and TPCK, was adopted to serve the purpose of this study. Since the current study aims to measure teachers' combined content, pedagogy, and technology knowledge for technology integration, only the 6-item TPCK subscale was used. The reliability index for the TPCK subscale was reported as 0.89 (Bostancıoğlu & Handley, 2018), indicating high reliability.

To gauge attitudes toward technology, Aydin's (2013) questionnaire, adapted from the original work of Papanastasiou and Angeli (2008), was employed. The technology attitudes sub-scale included 15 items designed to measure teachers' attitudes to the application of technology in education. The reliability index for the instrument was found to be 0.83, suggesting a satisfactory level of reliability. The attitudes and TPACK surveys use a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

To assess technology integration, an adapted sub-scale of Vannatta and Banister's (2009) composite questionnaire called the Teacher Technology Integration Survey was used. The sub-scale focusing on teacher technology use, which includes 13 items, examines teachers' technological pedagogical practices across administration, communication, and instruction. Hedayati and Marandi (2014) reported that the sub-scale was highly reliable (r=0.86). This scale uses a 5-point Likert scale, with response options ranging from *never* to *several times a week*.

4.2.2 Development of the Scales for the COVID-19 Pandemic and Contextual Knowledge

This study aimed to measure the lasting influence of the COVID-19 pandemic on Iranian EFL teachers' dispositions toward technology integration and their contextual knowledge within the XTPACK framework. Given the lack of existing instruments in these areas, two separate questionnaires were developed and validated.

According to Dörnyei and Taguchi (2009), for designing a new questionnaire, a series of focus group interviews can be conducted to facilitate the generation of a pool of items. Therefore, for the COVID-19 pandemic scale, an online focus group of 10 Iranian EFL public school teachers was convened to generate potential items. The focus group was moderated by the first researcher. The moderator used the XTPACK framework to provoke discussions on how the COVID-19 pandemic shaped their pedagogical and technological knowledge and practices. Content analysis of the discussion sessions produced 25 potential items, which were reviewed by three experts. Following their feedback, 16 items unrelated to technology were removed, leaving nine items focused on key technological knowledge areas.

For the contextual knowledge scale, item generation was guided by the framework of Porras-Hernández & Salinas-Amescua (2013), which conceptualizes contextual knowledge as teachers' awareness of micro (classroom), meso (school), and macro (government) factors influencing technology integration. A literature review (Mishra, 2019; Brianza et al., 2022; Rosenberg & Koehler, 2015) yielded 67 items. After a content validity review by three experts, the number of items was reduced to 12, which were evenly

distributed between the micro and meso levels. No macro-level items were included because this level is somehow unreachable for teachers.

Both devised scales were piloted among 204 Iranian EFL teachers via online administration. A 5-point Likert scale was used to gather responses. With regard to the reliability of the scales, the results revealed that the Cronbach's alphas were 0.85 and 0.88 for the COVID-19 pandemic and contextual knowledge scales, respectively. These alpha values were observed to be above the satisfactory threshold value of 0.70 (Pallant, 2020). Also, the requirements for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were checked (Pallant, 2020; Brown, 2006) by running both EFA and CFA to ensure the acceptable structure and construct validity of the scales. The results of these analyses proved the constructed surveys enjoy acceptable structure and construct validity. The developed surveys with their EFA and CFA indices can be found in appendices A and B.

5. Data Collection

The data were obtained via the administration of a survey to a large group of in-service Iranian EFL teachers in an online format via email addresses, personal contacts, and social media groups on various platforms, including SHAD and Telegram. The survey begins with five items requesting demographic information of respondents, including age, gender, language teaching experience, education level, and place of work. The rest of the survey consists of five sub-scales of (a) TPACK (6 items); (b) XK (12 items); (c) the COVID-19 pandemic (9 items); (d) attitudes (15 items); (e) technology integration (13 items).

During the data gathering period, which lasted four months from September to December in 2023, 596 responses were successfully delivered

and could be retrieved and analyzed through the Google Forms platform. As it was mentioned, 82 questionnaires were excluded because their respondents did not choose public schools as their place of work. Among them, 63 respondents were either university lecturers or freelance teachers, or they found themselves equally affiliated with both public and private language institutes (19 respondents). Additionally, 65 respondents announced that they did not experience the COVID-19 crisis as language teachers and as a result they could not be eligible to participate and were removed from the sample. The remaining 449 participants were considered as suitable candidates for data analysis since they identified themselves as affiliated with a public school and were EFL teachers before, amid, and following the COVID-19 pandemic.

6. Data Analysis

The obtained data were uploaded into SPSS (version 27), after which Cronbach's alpha was run to verify the internal consistency of the items across the different sections. Additionally, the items were evaluated in terms of their distribution normality to confirm the psychometric validity of the questionnaires. Subsequently, Pearson correlation analyses were performed to explore the associations between the five variables.

SEM was applied to test the proposed conceptual framework (Figure 2), enabling the assessment of intricate predictive associations among the five variables. Multivariate normality was assessed via AMOS software (version 24), with maximum likelihood estimation utilized to achieve optimal model fit. In alignment with the guidelines of Kline (2023), an adequate sample size for maximum likelihood estimation in SEM is approximately 200 participants, a criterion well satisfied with outnumbered 449 participants in this research. Other alternative models were also evaluated by examining their chi-square (χ^2) values and degrees of freedom (df) to determine whether they presented

an improved fit over the initial model. Various model fit indices, including the minimum sample discrepancy (CMIN), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root-mean-square error of approximation (RMSEA), were utilized to assess the overall fit of the model in the current investigation.

7. Results

7.1 Descriptive Statistics

As shown in Table 2, descriptive statistics including the mean, standard deviation, Cronbach's alpha, skewness, and kurtosis were calculated for each variable of the research model. The alpha coefficients varied between 0.75 and 0.89, representing a reasonably strong internal consistency in the participants' responses across the various scales. According to Kunnan (1998), if skewness or kurtosis values exceed ±2.0, it suggests that the distribution deviates significantly from normality. The results from the skewness and kurtosis calculations represented values varying from -0.47 to 0.08, and from -0.66 to 0.52, respectively, suggesting that the data displayed an adequate normal distribution.

7.2 Testing the Measurement Model

The measurement model was analyzed through CFA (Brown, 2015). Both the convergent and divergent validity, as well as the overall model fit, were analyzed. Fornell and Larcker's (1981) criterion was employed to evaluate divergent validity. This method involves assessing whether the square root of the average variance extracted (AVE) for each construct exceeds its correlations with other constructs. Divergent validity was confirmed when the square root of a construct's AVE exceeded its highest correlation with any other construct. Table 3 illustrates the diagonal elements (in bold) as the square

roots of the AVE values, and the off-diagonal elements are the correlations between constructs. The results proved that the Fornell-Larcker criterion was satisfied with each construct, and the model enjoyed acceptable divergent validity. Pearson correlation coefficients between the variables are also displayed in Table 3. The results signified medium to nearly strong and significant relationships between the variables.

Table 2

Descriptive statistics of participants' responses to the XK, TPACK, COVID-19, attitude, and technology integration surveys

	Mean	**SD**	**Alpha**	**Skewness**	**Kurtosis**
XK	3.56	.85	.88	0.08	-0.58
TPCK	2.84	.93	.83	-0.47	-0.54
CV	3.47	.74	.85	-0.08	0.52
AT	2.74	.46	.75	-0.02	-0.66
TI	2.67	.82	.89	-0.10	-0.58

Table 3

Results of correlation coefficients, divergent validity, and convergent validity of the research model

Variables	XK	TPACK	CV	AT	TI	CR	AVE
XK	**0.85**					0.97	0.73
TPACK	.52**	**0.74**				0.92	0.56
CV	.54**	.47**	**0.86**			0.96	0.74
AT	.46**	.56**	.55**	**0.75**		0.92	0.57
TI	.56**	.61**	.45**	.564**	**0.76**	0.95	0.59

**p < 0.01

Convergent validity was analyzed by examining the composite reliability (CR) and AVE. The suggested threshold of 0.50 (Hair et al., 2010) should be achieved to ascertain the convergent validity of the proposed model. Table 3 also displays that the CR and AVE for each construct were higher than the suggested threshold level. Moreover, the factor loadings for each construct were reviewed to evaluate item reliability. Based on the work of Hair et al. (2010), an item is considered to accurately reflect its latent construct if its standardized loading estimate exceeds 0.50. All factors had acceptable loadings above the threshold of 0.5.

Finally, fit indices were calculated for the research model including CMIN ($\chi 2 = 1590.44$), CMIN/df ($\chi 2/df = 2.70$), GFI = 0.94, AGFI = 0.92, CFI = 0.96, and RMSEA = 0.07. All measures showed a satisfactory fit for the model.

7.3 SEM Analysis and Hypothesis Testing

After establishing the research model validity, we can analyze the research hypotheses by examining the path magnitude and significance by SEM analysis. The results showed that six hypotheses were accepted, one hypothesis was rejected, and another one was inconclusive.

As shown in Table 4 and Figure 3, we can understand that three independent variables including TPACK, contextual knowledge, and attitudes had relatively weak but significant direct impacts on technology integration. As a result, the first three hypotheses were confirmed. Nonetheless, the COVID-19 pandemic made a direct but insignificant impact on technology integration ($\beta = 0.1$, $p = 0.86$); accordingly, hypothesis 4 was rejected. Surprisingly, the effects of contextual knowledge on TPACK ($\beta = 0.53$, $p < 0.001$) and the COVID-19 pandemic on the attitudes ($\beta = 0.56$, $p < 0.001$) were direct and relatively strong and significant. As a result, hypotheses 5 and 6 were accepted. These findings also signified the importance of two novel variables of the COVID-19 pandemic and contextual knowledge in the research model.

Considering hypothesis 7, i.e., the mediating role of attitudes between the COVID-19 pandemic and technology integration, we could not further analyze the significance of the mediating role of attitudes because the association between the COVID-19 pandemic and technology integration was not significant. Consequently, hypothesis 7 is inconclusive. However, the mediating role of TPACK between contextual knowledge and technology integration was testable considering the four necessary conditions suggested by Judd and Kenny (2010) as a significant association between (1) the mediating variable and the independent variable, (2) the mediating variable and the dependent variable, (3) the dependent variable and the independent

variable, and (4) a significant indirect effect. In the research model, contextual knowledge significantly predicts TPACK. In our analysis, the regression weight for the relationship between XK and TPACK was 0.53 ($p < 0.001$), representing a significant relationship. The regression weight for the relationship between TPACK and TI was 0.36 ($p < 0.001$), which was significant. The regression weight for the relationship between XK and TI was 0.29 ($p < 0.001$), demonstrating a significant direct effect. Additionally, the independent variable must significantly predict the dependent variable through the mediator. According to our bootstrapping results, the mediating role of TPACK between XK and TI was significant, with a lower bound of 0.081 and an upper bound of 0.158, and a p-value of 0.001. As a result, we can confirm that contextual knowledge significantly influenced TI through the mediating role of TPACK (See Table 5).

Figure 3

Research model path analysis

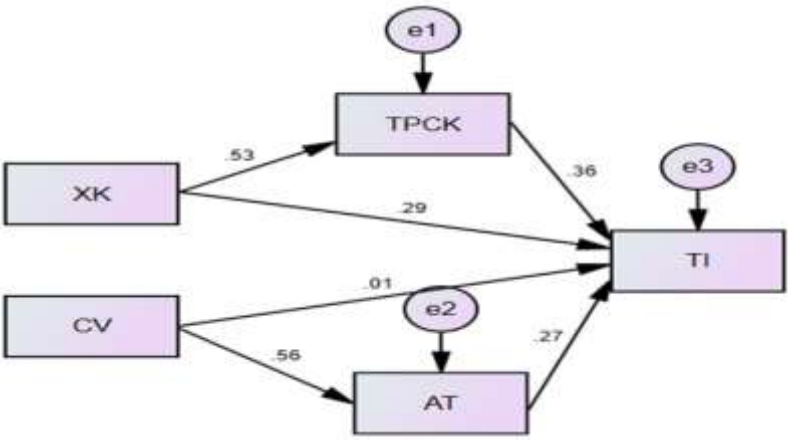


Table 4

Results from testing the direct effects (Hypotheses 1 to 6)

Hypotheses	Path	Path Coefficients	P-value	Results
H1	TPCK⟶TI	0.36**	.000	accepted
H2	AT ⟶ TI	0.27**	.000	accepted
H3	XK ⟶ TI	0.29**	.000	accepted
H4	CV ⟶ TI	0.10	.86	rejected
H5	CV ⟶AT	0.56**	.000	accepted
H6	XK⟶ TPCK	0.53**	.000	accepted

**$p < 0.05$

To assess the percentage of variance described by the independent variables for the endogenous constructs, the square multiple correlations (R^2) were calculated. The results revealed that 32% of the variance in attitudes was explained by the COVID-19 pandemic, 36% of the variance in TPACK was accounted for by contextual knowledge, and 52% of the variance in technology integration was explained by attitudes, the COVID-19 pandemic, TPACK, and contextual knowledge. These findings demonstrated that the research model effectively explains a considerable amount of the variance in the constructs, highlighting the importance of the independent variables in influencing EFL teachers' technology integration.

Table 5

Results from testing the hypotheses by bootstrapping (mediating effects)

Hypotheses	Path	P-value	Results
H7	CV ⟶ AT ⟶ TI	_	inconclusive
H8	XK ⟶ TPCK ⟶ TI	.001	Accepted

8. Discussion

The significant path leading from TPACK to technology integration is in harmony with existing theoretical and empirical research. This finding approves Mishra and Koehler's (2013) argument that successful technology integration necessitates teachers to enhance their technology, pedagogy, and content knowledge. Similarly, empirical research indicates that when EFL teachers show strong TPACK competence, they tend to apply technology in their pedagogy (Lai et al., 2022; Mei et al., 2017; Raygan & Moradkhani, 2020; Teo et al., 2018). However, the result contradicts some other empirical research studies (Mohammad-Salehi, 2021; Joo et al, 2018). One reason for such a contradiction might be rooted in the nature of the technology under study. For example, Mohammad-Salehi et al. (2021) explored EFL teachers' technology integration in relation to a specific type of technology (i.e., Web 2.0) in language institutes in an Iranian urban context. They did not include generic concept of technology integration in their data collection instrument. Furthermore, Iran, as a developing country, does not provide a technologically rich environment for many in-service teachers. Even if teachers have access to sophisticated technologies in some locations such as special language schools

in few cosmopolitan areas, they often use rudimentary digital technologies for content delivery like power point slides for presentations, sharing and playing audio and video files more frequently than advanced transformative web.2 tools in classroom practices.

The role of attitudes in technology integration research has a well-established research background compared with the role of TPACK in technology integration (Davis, 1989). Analyzing the path from attitudes to technology integration affirms a significant direct association between the variables. Moreover, the finding is in congruence with the related educational literature (Albirini, 2006; Hsu, 2020; Joo et al., 2018; Raygan & Moradkhani, 2020). The significance of this relationship shows that EFL teachers who maintain positive attitudes toward technology are inclined to employ technology in their practice. However, we ought to reaffirm that, unlike some previously conducted studies (e.g., Mei et al., 2017; Teo et al., 2018), the present study did not examine the fundamental constructs of attitudes (i.e., PU and PEU) defined in psychological models for technology use. Only attitudes toward technology in general were considered and found to be strong predictors of technology integration by EFL teachers.

By comparing the strengths of the relationships among TPACK, attitudes, and technology integration, we find that TPACK is more significant than attitudes in predicting EFL teachers' technology integration. This finding aligns with prior research among EFL teachers in Iranian language institutes (Raygan & Moradkhani, 2020). While the disparity is modest, the comparison indicates that, as with private-sector EFL teachers—whose TPACK outweighs attitudes in influencing their technological pedagogy—the technological literacy of public-school EFL teachers is a stronger predictor of technology integration than their attitudes.

With respect to the significant paths from contextual knowledge to TPACK and technology integration, previous research highlights the relevance of all knowledge areas within the TPACK model for technology integration (Mishra, 2019). However, no empirical study in an EFL context has explored the relationship between the overarching contextual knowledge domain and TPACK with technology integration simultaneously. The encompassing XK domain is deemed a predictor of all the knowledge areas within TPACK, considering the interconnectedness of all knowledge domains (CK, TK, PK, XK) within the TPACK framework (Brianza et al., 2022; Mishra, 2019). In this study, contextual knowledge is identified as a strong predictor of TPACK and a somewhat weaker predictor of technology integration. Moreover, contextual knowledge is a stronger predictor of technology integration than attitudes toward technology, yet a weaker predictor than TPACK. Thus, EFL teachers' micro-level contextual knowledge _ i.e., knowledge about their immediate teaching milieu like classroom facilities, available time, students' social identities, abilities, and motivations _ influences their TPACK knowledge and subsequently their technological pedagogy. This is logical considering that most current Z-generation students in Iran are passionate about new digital technologies so that digital devices (mobiles, tablets, laptops, etc.) have become integral to their lives (Hamidi, 2025). Similarly, EFL teachers' contextual knowledge at the meso level _ i.e., the school milieu including school expectations, standards, and policies _ plays a predictive role in their TPACK and technology integration, which confirms the significant impact of social influence. Venkatesh et al. (2003) conceptualized social influence as the extent to which an individual feels the influential others expect them to adopt the new technology.

Previously, no direct path analysis was conducted between Iranian EFL teachers' technological dispositions caused by the COVID-19 pandemic and their attitudes and their technology integration. The findings indicate that while the COVID-19 pandemic significantly influences EFL teachers' attitudes toward technology, it does not exert a comparable impact on their technology integration practices during the endemic era. The disruption of in-person school education and the imposition of emergency remote teaching (ERT) were pivotal points in education that encouraged many Iranian EFL teachers to develop positive attitudes to technology-enhanced language teaching and consequently led to the adoption of various technologies in their online teaching practices to resume their careers throughout the global COVID-19 crisis. However, it is significant to observe that entering the post-pandemic era lifted the imposed online teaching obligations from EFL teachers' shoulders, and naturally, they bounced back to their casual face-to-face pedagogy with traditional teaching practices. Moreover, public schools stopped providing necessary support (e.g., free Internet and online teaching platforms) for teachers and learners following the pandemic. Also, despite the reported benefits of technological teaching in the course of the pandemic (Khatoony & Nezhadmehr, 2020), there were occasional complaints about the quality of online teaching, such as technological fatigue, lack of learning, poor testing, and teacher identity tensions from different educational stakeholders (Alavi et al., 2022; Nazari & Seyri, 2021). These reported challenges, together with the research findings, suggest that EFL teachers' current instructional practices are not substantially shaped by the technology-related dispositions developed during the pandemic, even though their attitudes toward educational technology have become more positive through the experience of supported ERT throughout the COVID-19 period.

Considering attitudes, as a mediator between the COVID-19 pandemic and technology integration, we could not examine the mediating role of attitudes further because the association between the COVID-19 pandemic and technology integration was direct but not significant. However, the bootstrapping results revealed that contextual knowledge that EFL teachers possess with respect to students and schools could significantly influence their technology integration, considering the mediating role of TPACK. It was likely that mediating role of TPACK should be significant since EFL teachers know that the students, parents, and school systems expect them to apply technological teaching and in light of this understanding, they develop and apply their TPACK knowledge as a facilitator to utilize technology in L2 pedagogy.

9. Limitations

One limitation of the current study is the online procedure of data collection. Considering the vast geographical distribution of EFL teachers in public schools in Iran, we had to administer the surveys online. Therefore, we could not verify the exact identities of the EFL teachers who were recruited for this study. Moreover, the self-report data gathered from voluntary online survey administration might have been influenced by social desirability bias, especially in sensitive areas like teaching practices. Consequently, generalizations should be carried out with great care.

Another limitation of the study, which is probably manifested in the weak relationship between the COVID-19-related technological pedagogical dispositions and technology integration, might be associated with the nature of the instruments used in this study. Most items in technology integration scale reflect a general approach to technology including both online and offline technologies but most items in the COVID-19 pandemic survey were

constructed based on online teaching or ERT experience EFL teachers had in the course of the pandemic.

10. Implications and Conclusion

This study attempted to cast light on the factors that influence the technology integration of in-service EFL teachers in state-run schools in Iran which has been a somewhat neglected research area. This was accomplished by establishing an innovative SEM model for the obtained data comprising of variables from previous research (i.e., technology integration, TPACK, and attitudes) and two new variables (contextual knowledge and the COVID-19 pandemic). Unlike dispositions triggered by the COVID-19 pandemic toward educational technology, other independent factors including contextual knowledge, TPACK, and attitudes were significant predictors of technology integration among in-service Iranian EFL teachers. This highlights the fact that the utilization of imposed emergency online pedagogy throughout the COVID-19 pandemic era did not have lasting impacts on the technology integration of Iranian EFL teachers in the endemic era. Nevertheless, it could bring out positive changes in EFL teachers' attitudes toward technology integration. In other words, the pandemic led to positive perceptions but not positive long-lasting pedagogical technological practices. Perhaps, in the case of similar disasters, EFL teachers in similar contexts might have difficulty working with modern advanced online technologies. This might be alarming for language teachers, teacher educators, administrators, and policymakers in similar less developed contexts. Educational systems in these countries are recommended to include more sophisticated online technologies and the necessary technological knowledge in language teacher education programs.

Contextual knowledge as a domain of EFL teachers' knowledge was found to exert an influential impact on technology integration and TPACK. In

addition, TPACK played a significant mediating role between contextual knowledge and technology integration. EFL teachers' awareness of their immediate and proximal environments encouraged them to possess the necessary TPACK and implement technological teaching. This confirms the importance of contextual knowledge as a legitimate area of knowledge within TPACK, which is worth developing (Mishra, 2019). This also highlights the significance of what EFL teachers know about their students, classrooms, schools, and administrators. We can conclude that educational systems in developing contexts should reform in harmony with social changes. Teachers may feel frustrated by the contradiction between the technological teaching they feel obliged to perform based on their contextual knowledge and the lack of support from macro-level contexts, such as administrators, in developing their TPACK. Therefore, as language teachers increase their understanding of their surrounding context, educational systems should support their increased awareness with the provision of necessary professional development and technological support.

In the end, we suggest several future research directions to shed a better light on factors that impact on technology integration practices of EFL teachers. First, future research is recommended to triangulate quantitative data through qualitative data obtained from observations, interviews, and reflections. Second, longitudinal studies may be carried out to track the lasting effects of the pandemic-related changes among both EFL teachers and learners. Third, the study was performed with participants from public schools. We suggest replicating this research with participants from other contexts and conducting comparative studies between public school and private school sectors. Fourth, the other potential moderating factors including, gender, age, education level, and teaching experience might be examined in future studies.

Lastly, the study was limited to two levels of contextual knowledge within TPACK framework, future research is required to address multilayered and multifaceted contextual knowledge of EFL teachers more profoundly in respect with other domains of TPACK model and technology integration practices.

References

Alavi, S. M., Dashtestani, R., & Mellati, M. (2021). Crisis and changes in learning behaviours: Technology-enhanced assessment in language learning contexts. *Journal of Further and Higher Education*, *46*(4), 461–474. https://doi.org/10.1080/0309877X.2021.1985977

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education, 47*(4), 373–398. https://doi.org/10.1016/j.compedu.2004.10.013

Ashrafzadeh, A., & Sayadian, S. (2015). University instructors' concerns and perceptions of technology integration. *Computers in Human Behavior*, *49*, 62–73. https://doi.org/10.1016/j.chb.2015.01.071

Aydin, S. (2013). Teachers' perceptions about the use of computers in EFL teaching and learning: The case of Turkey. *Computer Assisted Language Learning*, *26*(3), 214–233. https://doi.org/10.1080/09588221.2012.654495

Bostancıoğlu, A., & Handley, Z. (2018). Developing and validating a questionnaire for evaluating the EFL 'Total PACKage': Technological Pedagogical Content Knowledge (TPACK) for English as a Foreign Language (EFL). *Computer Assisted Language Learning*, *31*(5–6), 572–598. https://doi.org/10.1080/09588221.2017.1422524

Brianza, E., Schmid, M., Tondeur, J., & Petko, D. (2022). Situating TPACK: A systematic literature review of context as a domain of knowledge. *Contemporary Issues in Technology and Teacher Education*, *22*(4), 707–753. https://citejournal.org/wp-content/uploads/2022/10/v22i4General1.pdf

Brown, T. A. (2015). *Confirmatory factor analysis for applied research (2nd ed.)*. Guilford Press.

Bui, T. H. (2022). English teachers' integration of digital technologies in the classroom. *International Journal of Educational Research Open*, *3*, 100204. https://doi.org/10.1016/j.ijedro.2022.100204

Bustamante, C. (2019). TPACK-based professional development on web 2.0 for Spanish teachers: A case study. *Computer Assisted Language Learning*, *33*(4), 327–352. https://doi.org/10.1080/09588221.2018.1564333

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Dörnyei, Z., & Taguchi, T. (2009). *Questionnaires in second language research: Construction, administration, and processing*. Routledge.

Ebadi, S., & Vakili, Sh. (2023). Exploring online misconceptions in EFL learners' productive intelligibility strategies. *Teaching English Language, 17*(1), 201–225. https://doi.org/10.22132/TEL.1999.153099

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, *59*(2), 423–435. https://doi.org/10.1016/j.compedu.2012.02.001

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Foulger, T. S., Buss, R. R., & Su, M. (2021). The IT2 Survey: Contextual knowledge (XK) influences on teacher candidates' intention to integrate technology. *Educational Technology Research and Development*, *69*(5), 2729–2760. https://doi.org/10.1007/s11423-021-10033-4

Ghorbani, N., Ebadi, S., & Popescu, M. (2020). Exploring learners' grammatical development in mobile assisted language learning. *Cogent Education*, *7*(1). https://doi.org/10.1080/2331186X.2019.1704599

Gunuç, S., & Babacan, N. (2017). Technology integration in English language teaching and learning. *Journal of Teaching English for Specific and Academic Purposes*, *5*(2), 349–358. https://doi.org/10.22190/jtesap1702349g

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis: A global perspective* (7th ed.). Pearson Prentice Hall.

Hamidi, M. M. (2025). Z generation in Iran. *International Journal of Social Science and Human Research,* *8*(1), 21–24. https://doi.org/10.47191/ijsshr/v8-i1-03

Hassanzadeh, M., Saffari, E., & Rezaei, S. (2021). The impact of computer-aided concept mapping on EFL learners' lexical diversity: A process writing experiment. *ReCALL*, *33*(3), 214–228. https://doi.org/10.1017/S095834402100001X

Hedayati, H. (Fatemeh), & Marandi, S. S. (2014). Iranian EFL teachers' perceptions of the difficulties of implementing CALL. *ReCALL*, *26*(3), 298–314. https://doi.org/10.1017/S0958344014000172

Hedjazi Moghari, M., & Marandi, S. S. (2017). Triumph through texting: Restoring learners' interest in grammar. *ReCALL*, *29*(3), 357–372. https://doi.org/10.1017/S0958344017000167

Hermans, R., Tondeur, J., Van Braak, J., & Valcke, M. (2008). The impact of primary school teachers' educational beliefs on the classroom use of computers. *Computers & Education*, *51*(4), 1499–1509. https://doi.org/10.1016/j.compedu.2008.02.001

Hox, J. J., & Bechger, T. M. (1998). An introduction to structural equation modeling. *Family Science Review*, *11*, 354–373.

Hsu, C. Y., Liang, J. C., Chuang, T. Y., Chai, C. S., & Tsai, C. C. (2020). Probing in-service elementary school teachers' perceptions of TPACK for games, attitudes towards games, and actual teaching usage: A study of their structural models and teaching experiences. *Educational Studies*, *47*(6), 734–750. https://doi.org/10.1080/03055698.2020.1729099

Joo, Y. J., Park, S., & Lim, E. (2018). Factors influencing preservice teachers' intention to use technology: TPACK, teacher self-efficacy, and technology acceptance model. *Journal of Educational Technology & Society, 21*(3), 48–59. https://www.jstor.org/stable/26458506

Judd, C. M., & Kenny, D. A. (2010). Data analysis in social psychology: Recent and recurring issues. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., pp. 115–139). John Wiley & Sons. https://doi.org/10.1002/9780470561119.socpsy001004

Khanahmadi, A. (2025). Teachers' perspectives of and experience with TPACK in ESP classrooms. *TechTrends*, 1–14. https://doi.org/10.1007/s11528-025-01087-9

Khatoony, S., & Nezhadmehr, M. (2020). EFL teachers' challenges in integration of technology for online classrooms during Coronavirus (COVID-19) pandemic in Iran. *AJELP: Asian Journal of English Language and Pedagogy*, *8*(2), 89–104. https://doi.org/10.37134/ajelp.vol8.2.7.2020

Kline, R. B. (2023). *Principles and practice of structural equation modeling (5th ed.)*. Guilford Press.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)?. *Contemporary Issues in Technology and Teacher Education,* *9*(1), 60–70. https://www.learntechlib.org/primary/p/29544/

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. *Journal of Education*, *193*(3), 13–19. https://doi.org/10.1177/002205741319300303

Kunnan, A. J. (1998). An introduction to structural equation modelling for language assessment research. *Language Testing*, *15*(3), 295–332. https://doi.org/10.1177/026553229801500302

Lai, C., Wang, Q., & Huang, X. (2022). The differential interplay of TPACK, teacher beliefs, school culture and professional development with the nature of in-service EFL teachers' technology adoption. *British Journal of Educational Technology*, 53, 1389–1411. https://doi.org/10.1111/bjet.13200

Li, G., Sun, Z., & Jee, Y. (2019). The more technology the better? A comparison of teacher-student interaction in high and low technology

use elementary EFL classrooms in China. *System*, *84*, 24–40. https://doi.org/10.1016/j.system.2019.05.003

Mei, B., Brown, G. T. L., & Teo, T. (2017). Toward an understanding of preservice English as a foreign language teachers' acceptance of computer-assisted language learning 2.0 in the People's Republic of China. *Journal of Educational Computing Research*, *56*(1), 74–104. https://doi.org/10.1177/0735633117700144

Mirzaei, A., Beigi, Z., R. Eslami, Z., Roohani, A., & Burke, M. D. (2025). Effects of L2 multimodality on vocabulary resonance: full/partial captioning and working memory. *Computer Assisted Language Learning*, 1–36. https://doi.org/10.1080/09588221.2025.2515174

Mishra, P. (2019). Considering contextual knowledge: The TPACK diagram gets an upgrade. *Journal of Digital Learning in Teacher Education*, *35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Mohammad-Salehi, B., Vaez-Dalili, M., & Heidari Tabrizi, H. (2021). Investigating factors that influence EFL teachers' adoption of Web 2.0 technologies: Evidence from applying the UTAUT and TPACK. *TESL-EJ*, *25*(1). https://www.tesl-ej.org/pdf/ej97/a21.pdf

Namaziandost, E., Heydarnejasd, T., Rezai, A., & Kargar Behbahani, H. (2025). To boldly go in distance language learning: A picture of nexus between academic resilience, academic buoyancy, learner self-efficacy, learner enjoyment, and academic well-being. *Teaching English Language, 19*(1), 473–514. https://doi.org/10.22132/tel.2024.431472.1547

Nazari, M., & Molana, K. (2023). “Predators of emotions”: The role of school assessment policies in English language teachers' emotion labor. *TESOL Quarterly*, *57*(4), 1226–1255. https://doi.org/10.1002/tesq.3245

Nazari, M., & Seyri, H. (2021). Covidentity: Examining transitions in teacher identity construction from personal to online classes. *European Journal of Teacher Education*, *46*(3), 397–416. https://doi.org/10.1080/02619768.2021.1920921

O’Mahony, C. (2003). Getting the information and communications technology formula right: Access + ability = confident use. *Technology, Pedagogy and Education*, *12*(2), 295–311. https://doi.org/10.1080/14759390300200159

Pallant, J. (2020). *SPSS survival manual: A step-by-step guide to data analysis using IBM SPSS (7th ed.)*. Routledge. https://doi.org/10.4324/9781003117452

Papanastasiou, E. C., & Angeli, C. (2008). Evaluating the use of ICT in education: Psychometric properties of the Survey of Factors Affecting Teachers Teaching with Technology (SFA-T3). *Educational Technology & Society*, *11*(1), 69–86.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education*, *37*(2), 163–178. https://doi.org/10.1016/S0360-1315(01)00045-8

Porras-Hernández, L. H., & Salinas-Amescua, B. (2013). Strengthening TPACK: A broader notion of context and the use of teacher's narratives to reveal knowledge construction. *Journal of Educational Computing Research*, *48*(2), 223–244. https://doi.org/10.2190/EC.48.2.f

Prasojo, L., Habibi, A., Mukminin, A., Sofyan, S., Indrayana, B., & Anwar, K. (2020). Factors influencing intention to use Web 2.0 in Indonesian vocational high schools. *International Journal of Emerging Technologies in Learning*, *15*(5), 100–118. https://doi.org/10.3991/ijet.v15i05.12021

Raygan, A., & Moradkhani, S. (2020). Factors influencing technology integration in an EFL context: Investigating EFL teachers' attitudes, TPACK level, and educational climate. *Computer Assisted Language Learning*, *35*(8), 1789–1810. https://doi.org/10.1080/09588221.2020.1839106

Raygan, A., & Moradkhani, S. (2024). Iranian EFL teachers' perceptions toward technology integration, TPACK, attitudes toward technology, and school climate: The case of public schools versus private institutes. *Technology Assisted Language Education*, *2*(4), 22–44. https://doi.org/10.22126/tale.2024.11069.1056

Rosenberg, J. M., & Koehler, M. J. (2015). Context and technological pedagogical content knowledge (TPACK): A systematic review. *Journal of Research on Technology in Education*, *47*(3), 186–210. https://doi.org/10.1080/15391523.2015.1052663

Sarani, A., & Ghollasi Moud, S. (2022). The effect of teaching vocabulary through PowerPoint designed vocabulary organizers on different learning styles of pre-intermediate Iranian EFL learners. *Teaching English Language,* *16*(1), 311–329. https://doi.org/10.22132/TEL.2022.153486

Stockwell, G., & Wang, Y. (2023). Exploring the challenges of technology in language teaching in the aftermath of the pandemic. *RELC Journal*, *54*(2), 474–482. https://doi.org/10.1177/00336882231168438

Sun, X., Mollaee, F., & Izadpanah, S. (2024). Impact of flipped learning on reflective thinking and goal orientation among English foreign language learners. *Computer Assisted Language Learning*, 1–22. https://doi.org/10.1080/09588221.2024.2430718

Tabatabaei, O., & Goojani, A. H. (2012). The impact of text-messaging on vocabulary learning of Iranian EFL learners/Impact de la text-messaging sur l'apprentissage du vocabulaire des apprenants d'anglais en langue étrangère irannienne. *Cross-Cultural Communication*, *8*(2), 47–62.

Tafazoli, D., & Meihami, H. (2023). Narrative inquiry for CALL teacher preparation programs amidst the COVID-19 pandemic: Language teachers' technological needs and suggestions. *Journal of Computers in Education*, *10*(1), 163–187. https://doi.org/10.1007/s40692-022-00227-x

Taghizadeh, M., & Hasani Yourdshahi, Z. (2019). Integrating technology into young learners' classes: Language teachers' perceptions. *Computer Assisted Language Learning*, *33*(8), 982–1006. https://doi.org/10.1080/09588221.2019.1618876

Teo, T., Huang, F., & Hoi, C. K. W. (2017). Explicating the influences that explain intention to use technology among English teachers in China. *Interactive Learning Environments*, *26*(4), 460–475. https://doi.org/10.1080/10494820.2017.1341940

Teo, T., Sang, G., Mei, B., & Hoi, C. K. W. (2018). Investigating pre-service teachers' acceptance of Web 2.0 technologies in their future teaching: a Chinese perspective. *Interactive Learning Environments*, *27*(4), 530–546. https://doi.org/10.1080/10494820.2018.1489290

Vannatta, R., & Banister, S. (2009). Validating a measure of teacher technology integration. In C. D. Maddux (Ed.), *Research highlights*

in technology and teacher education (pp. 329–338). Society for Information Technology & Teacher Education.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. https://doi.org/10.2307/30036540

Wang, C. (2024). Six-minute flipped classroom: The effect of using podcasts and collaborative learning on Taiwanese freshmen's English communicative competence. *Teaching English Language, 18*(1), 1–23. https://doi.org/10.22132/tel.2024.444021.1571

Zohrabi, M., & Paydar, Z. (2025). Iranian EFL practitioners' issues at private institutes and state schools. *Teaching English Language, 19*(1), 81–118. https://doi.org/10.22132/tel.2025.433009.1552

Appendices

Appendix A: The COVID-19 Pandemic Survey (CVPS) with EFA and CFA Results

Item	Factor Loading
Eigenvalue: 4.32; Variance explained: 54%	
1.The CVP made me aware of teaching and learning capabilities of technology.	0.56
2.My attitude towards educational technology changed positively due to the CVP.	0.61
3.In cases of the same or similar disasters, I would be prepared to keep up the quality of my teaching through available technologies.	0.52
4.After the CVP, I started to appreciate the value of online teaching.	0.63
5.After the CVP, I found out that teaching English through technology is more efficient than traditional teaching.	0.55

6.I am willing to continue online teaching of English language because I believe it is more efficient even after the CVP.	0.51
7.I started to use social media (SHAD, Telegram, etc.) during the CVP and I am still using technology to interact with my learners even after the CVP.	0.67
8.Due to my professional development opportunities in the CVP, I believe I will never quit using technology to improve my pedagogical and content knowledge.	0.52
9. The CVP led me to notice the lack of necessary educational infrastructure like the internet, online platforms, software, etc.	0.58

*EFA Requirements: Kaiser-Meyer-Olkin (KMO) measure: 0.81; Bartlett's test: $\chi^2 = 846.590$, $p < 0.001$(significant sphericity)

**EFA results suggest a one-factor structure

Appendix B: Contextual Knowledge Survey (XKS) with EFA and CFA Results

Microlevel item	Factor Loading
Eigenvalue:4.71; Variance Explained:39.30%	
1. I am knowledgeable about the technological infrastructure of the class.	0.59
2. I am knowledgeable about the needed time and the available time in the class.	0.60
3. I am knowledgeable about the students' experiences and prior knowledge.	0.77
4. I am knowledgeable about students' social characteristics and social roles.	0.81
5. I am knowledgeable about the students' beliefs, attitudes, and values.	0.71
6. I am knowledgeable about the students' goals, expectations, and motivations.	0.65
Mesolevel item	

Eigenvalue: 2.17; Variance explained: 18.10%	
7. I am knowledgeable about social network or community of teachers at school.	0.70
8. I am knowledgeable about the available budget of the school for technology.	0.68
9. I am knowledgeable about the concerns, expectations, and values of the school.	0.76
10. I am knowledgeable about the pedagogical demands of the school.	0.68
11. I am knowledgeable about the assessment standards of the school.	0.71
12. I am knowledgeable about the relevance of the school subjects to everyday life.	0.67

*EFA Requirements: Kaiser-Meyer-Olkin (KMO) measure: 0.79; Bartlett's test: $\chi^2 = 759.191$, $p < 0.001$ (significant sphericity)

**EFA results suggest a two-factor structure