Iranian English Language Teachers' Perspectives on Their Pedagogical-Technological Knowledge and Its Integration into Wartime Virtual Distance Learning

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Abstract

The rapid expansion of wartime virtual distance learning has transformed traditional face-to-face instruction into accessible and reliable online education, requiring educators to rethink and adapt technology-based teaching practices. This study examines whether English as a Foreign Language (EFL) teachers possess the pedagogical and technological knowledge needed to use digital tools effectively in remote instruction during wartime and beyond. Using a mixed-methods design, the study explored teachers' practices and perceptions of emergency remote teaching. Data were collected from 129 EFL teachers through an online survey and analyzed using SPSS. Quantitative data were examined with ranking and non-parametric statistical tests, while responses to an open-ended question were analyzed through thematic analysis. The findings revealed that teachers increasingly relied on self-directed learning, colleagues, staff training sessions, and school-based online support to develop their digital teaching skills. A significant relationship emerged between teachers' technological knowledge and their effective use of digital tools. Those whose knowledge matched or exceeded their level of technology use were better able to integrate digital tools into instruction, manage online classes effectively, and promote greater student engagement and motivation. In contrast, teachers whose technological knowledge lagged behind their use of digital tools experienced technical difficulties that negatively affected their teaching. The results highlight the importance of strengthening teacher education programs by enhancing pedagogical-technological knowledge, expanding opportunities to develop digital competence, and supporting teachers in adapting to emerging technologies within their disciplinary contexts. These findings provide valuable implications for improving both pre-service and in-service teacher education.

Keywords: Wartime virtual distance learning, teachers' professional knowledge, teachers' perspectives, teachers' education, lifelong learning

1. Introduction

Since the onset of Wartime Virtual Distance Learning, educators have had to cope with a vastly changed reality. Online teaching is often the only platform through which educators can remain connected with millions of students. Synchronous and asynchronous lessons have been in use for the past two decades, but the exceptional circumstances associated with lockdowns and school closures have created a need to reinvent familiar technological tools in educational processes and models.

Nevertheless, even without war, these changes have long been percolating in the system and are now clearly poised to become prominent elements of education, even post-war. A key question therefore arises: Do teachers believe they have the knowledge and skills to deal with complex situations as they orchestrate distance learning?

A new term has emerged during this unprecedented crisis: Emergency Remote Teaching (ERT) (Hodges et al., 2020). Our study investigates teacher practices and perceptions of teaching online during remote teaching in the course of Wartime Virtual Distance Learning when online teaching was the only platform through which teachers could connect with their students. and as they look to the future. Exploring EFL teachers' beliefs regarding their online instruction is especially valuable due to the uniquely global character of EFL (Faez & Karas, 2017). English is a mandatory subject for study in most countries and the most prevalent language online globally. Moreover, the plethora of web resources and online digital tools that exist in English is invaluable for teacher education (Kitao & Kitao, 2000). In English instruction, both the content and the language constitute the core of the lesson (Chiang, 2008). In distance learning, any online text can be relevant, and it is increasingly difficult to separate the English text from its digital environment. This study explores EFL teachers' metacognitive beliefs regarding their distance teaching during Wartime Virtual Distance Learning and examines whether, how, and to what extent EFL educators are aware of and deploy various aspects of their knowledge.

2. Literature review

The past two decades have seen a shift from traditional modes of instruction to online teaching (Martin et al., 2019), and the Wartime crisis, when widespread school closures made it the only mode of learning, has intensified this process (Pu, 2020). Online teaching materials facilitate collaborative, interactive, project-based, and real-life activities (Deacon et al., 2000). Researchers have investigated how free internet resources can aid English language learning (Kitao & Kitao, 2000; Meloni, 2000; Warschauer, 2000) and whether online EFL instruction has improved learners' language proficiency (Marta, 2018; Meloni, 2000). A recent study (Krishnan et al., 2020) conducted during wartime examined the distinguishing features of free online learning compared to conventional learning and compared their relative effectiveness. Findings showed positive student attitudes toward free online resources and indicated that online materials and exercises contributed to their learning.

2.1. Teachers' professional knowledge

It is broadly accepted that teacher knowledge significantly influences the effectiveness of teaching, learning, and successful mastering of tasks (Berliner, 2001, 2004; Darling-Hammond & Bransford, 2007; Gitomer & Zisk, 2015; Grossman & McDonald, 2008). Educational research often refers to teachers' knowledge of metacognition (Corebima, 2009; Jacobse & Harskamp, 2012; Sperling et al., 2002; Sugiharto et al., 2018). Metacognition plays a critical role in successful learning. It refers to higher-order thinking that involves active control over the cognitive processes engaged in learning. Metacognition consists of both metacognitive knowledge and metacognitive experiences. Metacognitive knowledge is divided into knowledge of person variables, task variables, and strategy variables. According to Flavell, the most effective approaches to metacognitive instruction are those that provide the learner with both knowledge of cognitive processes and strategies and experience or practice in using both metacognitive and cognitive strategies. Knowledge of cognition refers to cognition in general (Schraw, 1998), and to the possibility of implementing differing strategies congruously (Garrison, 2003; Javid et al., 2013). Knowledge of cognition consists of three aspects of cognitive awareness: declarative knowledge, procedural knowledge, and conditional knowledge

(Schraw, 1998). Gibson's (2008) theoretical framework for how the nature of knowledge influences technology integration is predicated on the dichotomy between declarative (knowing about) and procedural (knowing how to do) knowledge. He concludes that the ultimate educational goal for technology and design must be to empower people to acquire, create, and use knowledge needed for familiar and unfamiliar tasks.

The Technological Pedagogical and Content Knowledge Model (TPACK) developed by Koehler and Mishra (2008) is also relevant here and is the most frequently cited model on teachers' professional knowledge in teacher educational technology (EdTech) research. The model extends Shulman's idea of Pedagogical Content Knowledge (1986, 1987), which defines knowledge that is unique to teachers. The TPACK model identifies the knowledge teachers require to integrate technology into the classroom while also addressing the complex nature of teacher knowledge. It distinguishes three types of knowledge that educators need for successful EdTech integration: Content Knowledge (CK), Pedagogy Knowledge (PK), and Technology Knowledge (TK). Schulman's model also emphasizes what lies at the intersections of these primary knowledge forms. As Koehler and Mishra (2008) explain: "The interaction of these bodies of knowledge, both theoretically and in practice, produces the types of flexible knowledge needed to successfully integrate technology use into teaching" (p.60).

In this study, we specifically examine the intersection of EFL teachers' PK and TK. PK encompasses teachers' knowledge of general pedagogical activities, including strategies for motivating students, presenting information, student assessment, and classroom management. TK is knowledge of how to use emerging technologies. Our study focuses on teachers' perceptions regarding four questions:

What were the English foreign language teachers' sources of knowledge of digital tools before and during the Wartime Virtual Distance Learning?

Is there a difference between English foreign language teachers' level of knowledge of digital tools and actual usage during the Wartime Virtual Distance Learning?

How does the gap between knowledge and usage of digital tools relate to the challenges that English foreign language teachers experienced during the Wartime Virtual Distance Learning?

What are English foreign language teachers' perceptions about the challenges and opportunities of distance emergency remote teaching?

3. Methodology

This study used a questionnaire with open- and closed-ended survey questions. The survey described below was distributed electronically, using social media, primarily through sites that are frequented by English teachers in Iran. This may explain the high percentage of participants from Iran. In addition, participation was encouraged using a snowball effect where one participant suggests and encourages other participants. In the introduction of the survey, participants were asked to read a detailed explanation of the survey's purpose, and it was made clear to participants that participation in the study was anonymous and voluntary. Before filling out the survey, participants were asked to click on a button expressing their consent to take part in the study. Data on EFL teacher knowledge and practice were drawn from the closed questions. The complementary open-ended question allowed for greater elaboration and provided deeper insights into teachers' perceptions of their distance teaching during Wartime, including challenges and new opportunities.

3.1. Participants

A total of 129 participants were recruited from various cities of Iran. The survey was disseminated electronically, using social media, primarily through sites that are frequented by English teachers in Iran. This may explain the high percentage of participants from Iran. In addition, participation was encouraged using a snowball effect where one participant suggests and encourages other participants. The mean age of the participants was 43.66 (SD 11.47). Ninety percent of the teachers reported that they are certified as EFL teachers, and the mean number of years of teaching reported was 12.39 (SD 10.46). School grades taught ranged from elementary (grades 1–6), junior high (grades 7–9), high school (grades 10–12), and other (e.g., college and university level). Since some teachers reported teaching in more than one grade range, the total for this item exceeded 129. To ensure participants' privacy, the questions that appeared in the survey did not require any disclosure of personal or other identifying details.

3.2. Instruments

The survey was distributed using Google Forms and consisted of 24 closed and one open question. The closed questions examined professional background, gender, age, country, native language, teaching certification, academic qualification, teaching grade level, and teaching tenure. Two questions on distance EFL teaching before the Wartime Virtual Distance Learning crisis utilized a 5-point Likert scale ranging from very high to not at all, and related to knowledge of digital tools and sources of digital tools, respectively.

Fourteen questions on distance EFL teaching during the Wartime crisis were divided into clusters regarding: sources of knowledge of digital tools; support from school; beliefs about personal levels of technological-pedagogical knowledge; perceptions regarding actual practice of digital tools; opinions about the change in professional knowledge and practice; challenges in distance teaching; and teachers' estimation of distance versus face-to-face learning. All questions were measured on a 5-point Likert scale, apart from the 3-point Likert scale in question 22 that looked at teachers' preferences regarding different aspects of teaching and learning and looked at three distinct modes of teaching. The questionnaire also included one open-ended question soliciting teachers' observations on distance EFL teaching during the Wartime Virtual Distance Learning crisis.

3.4. Procedure

The online survey was developed for this study. Nine interviews were conducted with five EFL teachers and four EFL regional technology counselors. The teachers included one elementary school teacher, two junior high school teachers, and two high school teachers who have all participated in an in-service course on teaching EFL with new digital technologies. The four EFL regional technology counselors are ICT experts in the field who function at the regional level and conduct in-service training on EFL digital instruction. Based on their insights and current literature in the field, questions and statements were devised. Thereafter, the aforementioned four EFL regional technology counselors examined and validated the survey questions and reached consensus about them with the researchers. Data were collected between March and May of 2026, at the very beginning of the war in Iran. The questionnaire was posted on the English Teachers Network. A snowball procedure was adopted for collecting the data: a small pool of teachers was requested to complete the questionnaire and share it with friends and colleagues from different countries where English is taught as a foreign language. We made it clear to participants that the data were for research purposes only and would be anonymized.

3.5. Data analysis

Since the data were based on ranking, non-parametric tests were used. Measures of interest were calibrated by deriving medians and means together with standard deviations (SD) and interquartile ranges (IQR). A Wilcoxon signed-rank test evaluated differences between paired comparisons; a Kruskal-Wallis test examined differences among groups; and a Mann-Whitney U test provided for post hoc comparisons. A Spearman's rank-order correlation test assessed the association between measures of interest. Results were considered significant for p-values < 0.05. All analyses were carried out using SPSS version 25.

Qualitative data from the open-ended question were analyzed using data-driven thematic analysis. Repeated patterns within the data obtained from teachers' responses to the questionnaire were identified, coded, and analyzed (Braun & Clarke, 2006). The qualitative coding of data-driven themes was used to characterize the experience of EFL teachers in distance instruction. Data analysis was divided into three stages. During the first stage, respondents' answers were divided into 220 meaning units, meaning units of one or two sentences expressing one idea. In the second stage of analysis, repeated patterns of meaning units were identified and categorized. In the third stage, the categories were re-examined to better define their semantic field. The categories were divided into two main themes: challenges and advantages. The challenges category included 154 meaning units and the advantages 66.

4. Results

Question 1 examined the sources of knowledge of digital tools before and during the Wartime crisis. The categories "self-taught" and "school colleagues" received the highest scores before and during the Wartime crisis. Wilcoxon signed-ranks tests were used to examine whether there were any changes in the sources of knowledge before and during the crisis. Results indicated that there was a significant increase in the use of four sources of knowledge during the pandemic: self-taught (z ¼ -3.64, p < 0.001), school colleagues (z ¼ -3.61, p < 0.001), staff tutorials in school (z ¼ -2.71, p < 0.01), and online school support (z ¼ -3.74, p < 0.001). There was no significant increase in the reliance on teacher training courses and experiences along with in-service courses. Figure 1 presents the differences between sources of knowledge before and during the Wartime crisis.

Question 2 examined the possible differences between levels of knowledge and usage of digital tools. The participants were requested to indicate how well they knew each tool and the degree to which they used each. The mean scores indicate that four tools received a mean score of four or above for knowledge: WhatsApp, emails, video conferencing, and presentations. Two tools received a mean score of 4 or above for usage: WhatsApp and video conferencing. To determine whether the differences between knowledge and usage scores were significant, additional analysis was performed using Wilcoxon signed-ranks tests. Findings indicated significantly higher scores for knowledge than for usage on 11 out of the 12 tools (WhatsApp (z ¼ -3.03, p < 0.001); Emails (z ¼ -5.85, p < 0.001); Recordings (z ¼ -6.45, p < 0.001); Presentations (z ¼ -3.19, p <0.001); Discussions (z ¼ -6.19, p < 0.001); E-posters (z ¼ -7.60, p <0.001); Real world environments (z ¼ -7.69, p < 0.001); E-books (z ¼ -7.90, p < 0.001); Virtual museums (z ¼ -8.37, p < 0.001). The only tool for which the gap between knowledge and usage was not significant was video conferencing, although even this showed a trend for a higher level of knowledge than usage. Figure 2 presents the differences between reported levels of knowledge and usage for each tool.

Question 3 explored the nature of the gaps between knowledge and usage scores for the digital tools in the study and elicited teacher challenges. To calculate the gap between knowledge and usage, the response for use was subtracted from the response for knowledge for each participant and tool.

The gap between the two measures for each tool led to three categories: a) a positive category representing greater knowledge than use (K > U); b) a negative category representing greater use than knowledge (K < U); c) a zero category representing an equal measure of use and knowledge (K¼U).

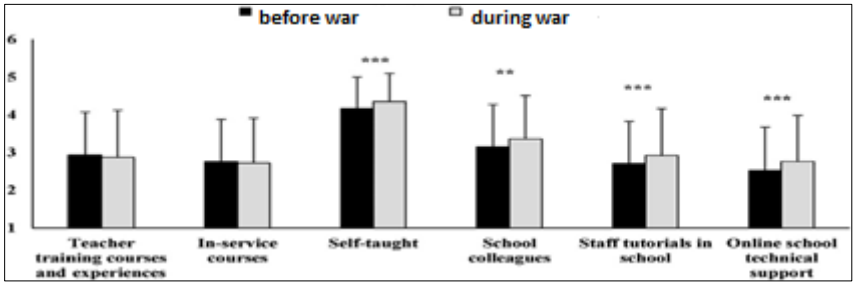


Figure 1. *The differences between sources of knowledge before and during the Wartime Virtual Distance Learning crisis. p 0.01; p 0.001.*

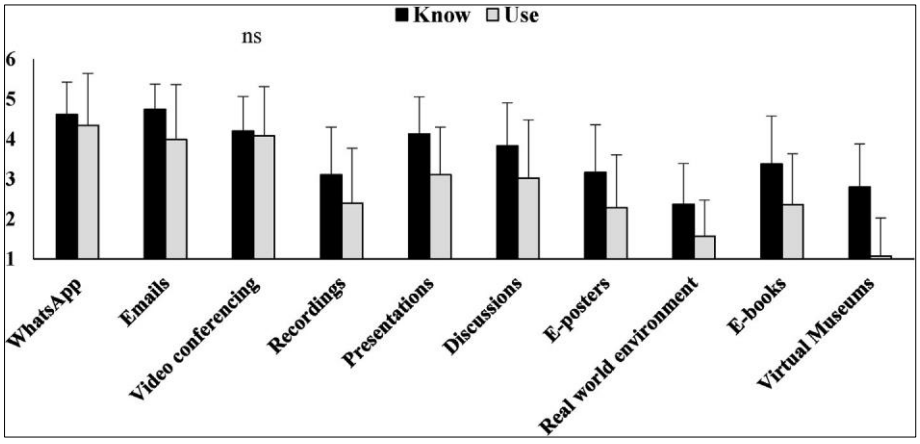


Figure 2. *The differences between reported levels of knowledge and usage for each tool.*

Calculations of the three categories measured each tool and each participant individually by creating two profiles: one for tools and one for participants. For example, a participant reporting higher knowledge than use (K > U) across all 12 tools received a score of 12 for this category and a score of 0 for the category of K < U and K¼U. For this question, participant profiles were examined in relation to the technical and pedagogical challenges that EFL teachers experienced using digital tools during the war crisis (see question 21 in the survey for the full list). Negative correlations were found between the variable of high knowledge/low usage (K > U) and the following two challenges: enhancing existing knowledge of digital tools for teaching and learning (rs ¼ -0.25, p ¼ 0.005), and choosing suitable materials for specific learning outcomes (rs ¼ -0.19, p ¼ 0.03). These findings indicate that participants with higher knowledge than usage scores for digital tools reported fewer difficulties in enhancing existing knowledge of digital tools and choosing suitable materials for specific learning outcomes. Moreover, the analysis indicates positive correlations between the high usage/low knowledge variable (K < U) and two of the challenges: overcoming technical problems (rs ¼ 0.21, p ¼ 0.02) and maintaining pupil engagement and motivation (rs ¼ 0.19, p ¼ 0.03). Participants with

higher usage and lower knowledge of digital tools reported greater difficulties in overcoming technical problems and maintaining pupil engagement and motivation.

Question 4 provided a deeper understanding of teachers' experience in distance learning during the war crisis, with respondents asked to reflect on distance learning during the pandemic. Data were derived from the open question. Answers were long and detailed, testifying to willingness and need to reflect on intense experiences. Table 1 presents the challenge categories.

Table 1 indicates stressful teaching experiences derived from overwhelming workloads and new professional requirements imposed without adequate support. In addition, teachers have been deprived of a primary professional incentive: satisfying interpersonal, face-to-face relationships with pupils. Table 2 presents the advantages categories.

Table 2 shows that the positive aspect of distance learning was the participants' experience of professional progress apparent in their students' significant learning outcomes.

Table 1.

Categories of challenges in distance EFL teaching reported by teachers during war crisis (N ¼ 154).

Category	Examples	% of all answers
Lack of pedagogical technological knowledge	I constantly ponder whether I am using the appropriate digital tool for a certain teaching strategy or language skill. At the application stage, I feel I don't indicate whether what I'm doing is good. Although I graduated from college three years ago, I still feel challenged to integrate digital tools in a meaningful way in my teaching.	25.3
Lack of professional guidance	What I miss is a template of an effective online lesson. Right now, in our online teaching, we are working through trial and error, without any pedagogical guidance. None of the teachers in my school were prepared for this. Since the crisis started, we have received no actual advice on how to deal with the situation, or any practical pedagogical advice concerning tools available online. In my in-service professional courses, we were simply taught digital tools. We did not discuss when best to use them.	18.9
Time-consuming lesson preparation	It's challenging, exhausting, and energy-draining. It takes a lot of time and effort to plan every online lesson. It has to be very accurate and efficient, very different from face-to-face teaching… takes time to get used to, and it changes and develops constantly.	14.46
Lack of face-to-face interaction with students.	What I miss most is the personal contact with my pupils. I would much rather be in a classroom of 30–40 students. The personal interaction is missing: the ability to challenge them, help them, learn their individual strengths and weaknesses, and adapt accordingly. The opportunity to get to know them as people is missing, to see their reactions, to ease their doubts and fears, to challenge them when necessary. All these are almost impossible at a distance.	11.34

Table 2.

Categories of advantages in distance EFL teaching reported by teachers during war crisis (N ¼ 66).

Category	Examples	% of all answers

Opportunity for professional development	I'm thankful for the opportunities during this time to broaden my teaching tools and style. I feel I can take my teaching to a new level. I've learned new skills and see the students in a different light.	10.63
Facilitates meaningful, personalized, and independent learning	It has created a more meaningful learning experience for the pupils since it allows more independent work and more personal feedback. More independent work time (during which I'm available) has been built into the schedule.	10.45
Satisfying experience	It is still incredibly fun and satisfying once you see how well the students cooperate and react to whatever new things you implement.	8.92

5. Discussion

The present study explored EFL teacher beliefs regarding their own pedagogical technological knowledge and its usage in online ERT during the war school lockdowns and the impact of the inevitable future incorporation of these methods into instruction. The first question explored teachers' sources of knowledge regarding digital tools before and during the war crisis. Our findings show that during the initial phase of the outbreak, teachers reported a significant increase in the use of four sources of knowledge: self-teaching, school colleagues, staff tutorials in school, and online school support. This indicates that teachers felt a need to expand their pedagogical technological knowledge; teachers who relied on themselves demonstrated an ability to reflect on their own teaching practice and make the necessary changes to teach in times of crisis, as is consistent with other research (Hodges et al., 2020; Iglesias-Prades et al., 2021).

We did not find any significant increase in the reliance on pre-service teacher education and experiences, nor did teachers report that the in-service courses they received were useful. In pre-service education, the phrase "21st century skills" is commonly used. Based on the findings of this study, however, when these skills were urgently needed, many teachers lacked sufficient professional technological preparation. This gap has been widely recognized: "Even though TPACK has been widely adopted in teacher education programs, its knowledge base is far less extensive and established as compared to PCK that forms the basis of methods courses" (Koh, 2019, p. 580). Clearly, in our age of rapid changes, teacher training at colleges cannot remain static, and in-service training needs to be constantly updated.

Since the advent of the war crisis was sudden and surprising, it is arguable that there was no time to prepare suitable in-service courses to address the new reality, and that this explains teachers' dissatisfaction. However, this training should have been available earlier. Quantitative findings have shown that teachers should not rely on in-service training for distance teaching during school lockdowns. Teachers expressed that they would have preferred to have been better prepared in terms of technological and digital know-how and that in-service courses lacked the required digital tools training for teaching, especially for developing their capabilities to meet future challenges.

The importance of integrating meaningful teaching with technology is echoed in the literature. Koehler, Mishra, and Cain (2013) define TPACK as "an understanding that emerges from interactions amongst content, pedagogy, and technology knowledge […] knowledge underlying truly meaningful and deeply skilled teaching with technology" (p. 66). Educational research on initial teacher education programs supports the acquisition of teachers' professional knowledge and its relation to teacher education. Thomas (2016) found that teachers' technological knowledge is critical for their professional development, and the significance of pedagogical and technological knowledge is widely acknowledged. Valtonen et al. (2019) suggest that the strongest gains in teachers'

development and confidence were in TPACK areas related to pedagogy, as these are areas where pedagogical and technological knowledge interact. The fact that teacher training courses are primary sources of teacher knowledge sends a powerful message to program designers and instructors about the importance of including new digital tools in instruction programs. Most importantly, in our digital era, pre-service teacher training alone cannot offer long-term solutions to the challenges teachers face. Teachers must become independent and flexible learners, able to independently establish meaningful interactions in pedagogy and technology, as well as solve problems.

The second research question examined whether there was a difference between the level of teacher knowledge of digital tools and their actual usage of them during the war crisis. Findings indicated that video conferencing was the only digital tool exhibiting no significant difference between knowledge and usage, with teachers reporting significant knowledge gaps regarding all of the other tools examined. We surmise that, in this unprecedented time of ERT, teachers used video conferencing primarily as a substitute for face-to-face lessons, enabling a planned lesson to move forward and be provided in a digital format. Other widely used tools, such as email and WhatsApp, also facilitate communication and distance learning. Thus, digital tools were not used for pedagogical objectives and teachers did not fully take advantage of all the benefits of distance learning.

The third question addressed how the gap between knowledge and usage of digital tools relates to the challenges facing EFL teachers in the first period of the transition to distance learning. Findings indicate that teachers who reported knowing more or roughly the same about the tools compared to their usage of them took control over the management of their instruction. They were able to expand their digital knowledge and select appropriate materials. These teachers knew about cognition with its three aspects of cognitive awareness (Javid et al., 2013; Schraw, 1998) and could apply their knowledge congruously in their practical teaching. However, those teachers whose knowledge of digital tools was lower than their usage of them encountered technological difficulties that impaired their teaching. They lacked the professional metacognitive knowledge essential for successful teaching, illustrating the important point that reaching the stage of applying knowledge while acquiring such knowledge is conditional on understanding when, how, and where to use something we already know (Yore & Treagust, 2006). This facilitates proficiency in the use of digital tools, which involves independence, flexibility, and the ability to achieve goals by choosing appropriate teaching materials.

The last question addressed EFL teachers' perception of distance ERT, including its challenges and opportunities. Findings showed that most EFL teachers' difficulties stemmed from a lack of pedagogical technological knowledge. These findings were supported by the quantitative findings (see Tables 1 and 2). Teachers need to be shown how to integrate technology meaningfully into particular pedagogical contexts to attain desired learning outcomes. Teaching the use of digital tools separately does not achieve the desired outcome. For effective teaching to take place, teachers must know in advance what their learning objectives are and determine the most appropriate digital tool for each context. Teachers who opted to describe the advantages of distance teaching during the war crisis indicated that it was an opportunity to improve their teaching tools and broaden their range. This finding is consistent with other studies conducted during the pandemic that showed that online learning provided a chance for teachers to undergo digital transformation and find new ways for teaching and learning (Iglesias-Prades et al., 2021; Oliveira et al., 2021). Although our study was conducted in an unprecedented and sudden situation for ERT, when learners did not have time to acquire the requisite knowledge, some teachers seized the opportunity to expand their professional knowledge.

6. Conclusion

The war crisis advanced online education in Iran and made clear that online teaching has become a permanent feature of education in one form or another. Our study, conducted in the midst of this crisis, focused on the significance of professional-technological knowledge as a crucial component of effective teaching and posits a strong link between professional-technological knowledge and teacher efficacy in online teaching. Digital teaching depends on teachers' perceived and experienced use of technology in their teaching strategies. Teachers' attitudes toward digital instruction should be forged in teacher education programs, both pre- and in-service. Our findings strongly suggest a pressing need to raise teachers' confidence in technology, to broaden their cognitive skills in relation to technology pedagogy, and to promote a culture of using technology meaningfully. As the present crisis has shown, failure to do so harms everybody.

Our findings also show the urgent need for education enabling teachers to become lifelong independent digital learners. Digital instruction in teacher education programs should include more meaningful and relevant instruction driven by teachers' own initiative and interest. Teachers should be encouraged to adapt to new digital tools within their particular disciplines. Once they become familiar with applying digital tools to an identified desirable pedagogical outcome, they will undoubtedly become better able to deploy new technology more effectively. This outcome is crucial if digital tools promise to become a classroom reality. Alarmingly, our findings show that currently, digital tools are not being used optimally in the classroom. Although this research was conducted in relation to EFL classrooms, our findings are likely applicable to various school subjects taught online during the first school lockdown.

7. Limitations and future research

The fact that our survey research relied on self-reported data, a common practice, may mean that the responses may not accurately reflect the perceptions and practices of all EFL teachers. Participants may also have unknowingly tried to "please" researchers by giving responses that conformed to what they felt were the researchers' assumptions. Moreover, as the present study is heuristic in nature, further study is necessary to establish innovative approaches to enhancing pedagogical technological processes and methods within the constraints and opportunities of constantly changing technology, and to define TSE in relation to online education. While, of course, Wartime Virtual Distance Learning has had debilitating consequences for many aspects of life, understanding the policy decisions that should flow from the increased role of digital technology in teaching will make hitherto unimagined demands on educational resources and policymaking. The present war has served as a wake-up call to help educators prepare for the immediate and long-term future.

Declarations:

Author contribution statement

Hossein Rezaee: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

The authors do not have permission to share data.

Declaration of interest's statement

The authors declare no conflict of interest.

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