# Teacher self-efficacy in the COVID-19 pandemic: an exploration of EFL teachers’ pedagogical-technological knowledge and approach to distance learning

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Abstract

The educational world has been forced to revolutionize itself due to COVID-19, with traditional face-to-face teaching methods urgently transformed into accessible, reliable online distance education. This has meant revisiting and reinventing existing technology-based educational processes and models. This study analyzes whether teachers of English as a Foreign Language (EFL) are confident that they have the requisite knowledge for such remote teaching. A mixed methods approach was employed, with 129 participants interviewed. Teachers reported significantly increased reliance on self-teaching, colleagues’ knowledge, staff tutorials, and online school support. Teachers with higher levels of usage than knowledge of digital tools experienced greater technological difficulties and problems sustaining pupil engagement and motivation, and experienced the lowest teacher self-efficacy. Teachers with similar levels of knowledge and usage reported the highest levels of teacher self-efficacy. The findings point to digital teacher self-efficacy being vital for adapting to online teaching during COVID-19 school closures. Teacher education programs need to improve teacher awareness of new pedagogical-technological learning methods, provide opportunities to acquire digital competence, and encourage teachers to adapt personally to new digital technologies within specific disciplinary contexts. Our findings have both theoretical and practical implications for pre- and in-service teacher training.

Keywords: self-efficacy, online distance learning, teachers’ professional knowledge, teachers’ perceptions, EFL, teachers’ education, lifelong learning.

1. Introduction

Since the onset of COVID-19, educators worldwide 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. 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 explores English as a Foreign Language (EFL) teachers’ confidence in their own pedagogical technological knowledge and classroom application, and their self-efficacy (SE) during school lockdowns. 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.

1. Literature Review

2.1 Introduction

The past two decades have seen a shift from traditional modes of instruction to online teaching (Martin, et al. 2019) and the COVID-19 crisis, when widespread school closure made it the only mode of learning, has intensified this process (Pu, 2020).

Online teaching materials facilitate collaborative, interactive, project-based, and authentic 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 through them (Marta, 2018; Meloni, 2000). A recent study (Krishnan et al., 2020) conducted during the COVID-19 pandemic 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.

2.2 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).

This study explores EFL teachers’ metacognitive beliefs regarding their distance teaching during the COVID-19 pandemic and examines whether, how, and to what extent EFL educators are aware of and deploy various aspects of their knowledge.

Educational research often refers to teachers’ knowledge as the knowledge of metacognition (Corebima, 2009; Jacobse & Harskamp, 2012; Sperling et al., 2002; Sugiharto et al., 2018). 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 & 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 and situated 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 & 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 paper, 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.

2.3 Teacher Self-Efficacy

Self-efficacy (SE) is a key concept in Bandura’s Social Cognitive Theory (1977, 1986). Teacher Self-Efficacy (TSE) is teachers’ belief in their ability to influence student learning (Aston, 1984). It is “the teacher’s beliefs in her or his capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (Tschannen-Moran et al., 1998, p.3). This crucial construct in teachers’ belief systems has a direct impact on teaching practices, student outcomes, and the ability of teachers to fulfil their essential duties during the teaching process (Gan, Liu &Yang, 2020; Goddard, Hoang, 2018; Hoy & Hoy, 2000; Klassen & Tze, 2014; Morris et al, 2016; Pajares, 2006; Tschannen-Moran & Hoy, 2001; Usher & Chen, 2016; Zimmerman, 2000).

Bandura suggests four primary sources of information that influence SE: primary experience (success or failure in performing a task); vicarious experience (observation of others’ performances); verbal persuasion (compliments and encouragement); and psychological states (emotional states when performing tasks). Primary experience is often the most influential in the formation of SE (Usher & Pajares, 2008) and is the most widely assessed source of TSE in educational research (Morris et al., 2016). Our study evaluates teachers’ SE by asking them about their success or failure with specific digital tools and online teaching skills.

In addition to Klassen et al. (2011) noting the role of teacher knowledge in the development of TSE, and studies show that teachers’ knowledge has an effect on TSE which, in turn, influences teachers’ practice (see, for example, Wyatt, 2014). In the specific context of instruction using technology, studies have empirically demonstrated a connection between TSE and the tendency to use technology (Anderson et al., 2011; Banas & York, 2014; Jeung, 2014; Valtonen et al., 2015). Research has also shown a significant correlation between teachers’ professional-technological knowledge and TSE (Abbitt, 2011; Depaepe and König, 2018; Semiz & Ince, 2012;).

TSE is regarded as a specific domain rather than a general construct about self-confidence (Bandura, 1977). Tschannen-Moran et al. (1998) describe TSE as “the teacher’s beliefs in her or his capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (p.3). This implies that teachers’ context-specific judgements about their particular teaching behaviors should be investigated in domain-specific research (Klassen et.al., 2011). Research on TSE is more meaningful when explored in field-specific ways (Kaygisiz, Ulgun & Ulcar, 2020). Bandura (2006), Dellinger, Bobbett, Olivier, & Ellett (2008), and Tschannen-Moran & Woolfolk Hoy (2001) all contend that TSE research in a specific disciplinary field should include investigation of efficacy beliefs for specific pedagogical capabilities and exclude content knowledge**.** Exploring TSE in EFL teaching and examining teachers’ pedagogical and technological capabilities, including their beliefs about their digital teaching knowledge and capabilities, is part of assessing their efficacy.

Research has examined links between TSE and technology in the classroom (Joo et al., 2018; Mishra & Kohler, 2006; Niederhauser & Stoddart, 2001), yet the study of TSE in online teaching remains relatively underdeveloped. To date, mMost ways of measuring TSE in online education are based on scales that are internally validated for face-to-face teaching, such as general or content-specific pedagogy, and do not consider technological knowledge (Newby et al., 2011). Scholars recognize that a way of measuring TSE in online pedagogy has yet to be empirically established (Corry & Stella, 2018). This study sheds light on TSE in online teaching during this unprecedented ERT period prompted by the COVID-19 crisis.

The distinct subject of TSE in Teaching English as a Foreign Language (TEFL) (Faez & Karas, 2017) has not been widely researched. The few studies that exist examine teacher perceptions of their personal efficacy in teaching English and their self-reported English proficiency levels and instructional strategies (Choi & Lee, 2016; Underwood, 2012; Yilmaz, 2011 ). Thompson and Woodward (2018) examine dimensions of Japanese EFL teachers’ SE that include their use of English, communicative teaching strategies, teamwork capabilities, student achievement, and regulatory practices. Other studies investigate TSE beliefs for implementing self-regulated learning (Gan, Z., Liu, F & Yang, C.C.R, 2020; Vatoy K. 2020); collective TSE beliefs in relation to job-related stress or satisfaction (Göker, 2012); sources of TSE for Vietnamese EFL teachers (Phan & Locke, 2015); and TSE development in professional EFL communities (Zonoubi et al., 2017). All studies have focused on self-efficacy beliefs for EFL in relation to traditional instruction. Reviews of TSE research in EFL contexts have concluded that this area is underrepresented in the literature and have encouraged more research (Klassen & Tze, 2014; König et al., 2016). This relative lack of research is especially evident on the subject of TSE in EFL online instruction. Our study focuses on teachers’ perceptions regarding five questions:

1. What were their sources of knowledge of digital tools before and during the COVID-19 crisis?

2. Is there a difference between their level of knowledge of digital tools and actual usage during the COVID-19 crisis?

3. How does the gap between knowledge and usage of digital tools relate to the challenges that EFL teachers have experienced during the COVID-19 crisis?

4. How does the gap between knowledge and usage of digital tools relate to measurements of TSE during the COVID-19 crisis?

5. What are EFL teachers’ perceptions about the challenges and opportunities of distance ERT?

3. Methodology

3.1 Introduction

Our study employs a mixed method design for the research questions, in a complementary and expansive manner (Johnson et al., 2007). Quantitative data on EFL teacher knowledge, practice, and TSE was elicited from closed questions in an online questionnaire. Qualitative data was collected from the open-ended questions, which allowed for greater elaboration on the quantitative results, providing insights into teachers’ perceptions of their distance teaching during COVID-19, including challenges and new opportunities. Sequential explanatory design ensured that qualitative data would lead to a better understanding than quantitative data alone (Creswell, 2009; Creswell et al., 2003).

3.2 Participants

A total of 129 participants were recruited from various countries where English is taught as a foreign language. Most of the 129 teach in Israel (79.8%), with the other participants from North America, Europe, and Asia (19.4%). Their mean age was 43.66 (SD 11.47) and the mean number of years of teaching reported was 12.39 (SD 10.46). School grades taught were ranged by elementary (grades 1–6), junior high (grades 7–9), high school (grades 10–12), and other. Table 1 presents demographic information regarding participants.

Table 1. Participant Demographic Information (N=129).

|  |  |  |  |
| --- | --- | --- | --- |
|  |   | *N* | Score in % |
| **Gender** | Female | 112 | 86.8% |
| Male | 17 | 13.2% |
| **Country taught** | Israel | 103 | 79.8% |
| Other | 25 | 19.4% |
| **Certification** | Yes | 116 | 89.9% |
| No | 13 | 10.1% |
|  | BA | 33 | 25.6% |
| **Academic Qualification** | BEd | 27 | 20.9% |
| MA | 58 | 45.0% |
| PhD/EdD | 8 | 6.2% |
| Other | 2 | 1.6% |
| **Grades Taught** | Elementary (1–6) | 144 |  |
| Jr High (7–9) | 186 |  |
| High (10–12) | 216 |  |

Since some teachers reported teaching in more than one grade range, the total for this item exceeds 129.

3.3 Tools

## The online survey devised using Google Forms consisted of 24 closed and one open question (see https://forms.gle/mQkGDE8iK8SRnfPAA). 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 prior to the COVID-19 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 COVID-19 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; personal self-efficacy in distance teaching; 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 last, which used a 3-point Likert scale. The questionnaire also included one open-ended question soliciting teachers’ observations on distance EFL teaching during the COVID-19 crisis.

3.4 Procedure

Data was collected between March and May of 2020, at the very beginning of the COVID-19 lockdown in Israel. The questionnaire was posted on a site frequently visited by English teachers in Israel and on the English teachers’ Facebook site. 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 was for research purposes only and would be anonymized.

3.5 Data Analysis

Since the data was based on ranking, non-parametric tests were used. Measures of interest were calibrated by deriving medians and means together with standard deviations (SD) and inter-quartile 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-value ≤0.05. All anals 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. Thematic analysis is considered more sensitive and more topic flexible (Braun & Clarke, 2006); data-driven thematic analysis facilitated accepting a variety of answers without *a priori* assumptions.

1. Results

Question 1 examined the sources of knowledge of digital tools before and during the COVID-19 crisis. The categories “self-taught” and “school colleagues” received the highest scores before and during the COVID-19 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, school colleagues, staff tutorials in school, and online school support. There was no significant increase in the reliance on teacher training courses and experiences along with in-service courses. Table 2 presents the differences between sources of knowledge before and during the COVID-19 crisis.

Table 2. Wilcoxon signed-ranks tests for differences between sources of knowledge before and during the COVID 19 crisis by means and median scores (N=129).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of knowledge |  | Mean score (SD) | Median (IQR) | Z score |
| Teacher training courses and experiences |  Before | 2.93 (1.14) | 3 (2-4) | -0.91  |
|  During | 2.87 (1.25) | 3 (2-4) |
| In-service courses |  Before | 2.76 (1.12) | 2 (2-3)  | -0.68  |
|  During | 2.72 (1.19) | 2 (2-3.5) |
| Self-taught |  Before | 4.16 (0.84) | 4 (4-4.5)  | -3.64\*\*\*  |
|  During | 4.35 (0.75) | 4 (4-5) |
| School colleagues |  Before | 3.15 (1.12) | 2 (2-4) | -3.61\*\*\*  |
|  During | 3.36 (1.15) | 3 (3-4)  |
| Staff tutorials in school |  Before | 2.71 (1.11) | 2 (2-3.5)  | -2.71\*\*  |
|  During | 2.92 (1.24) | 2 (2-4)  |
| Online school technical support |  Before | 2.52 (1.15) | 2 (2-3) | -3.74\*\*\*  |
|  During | 2.76 (1.22) | 2 (2-4) |

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: emails, WhatsApp, 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. The only tool for which the gap between knowledge and usage was not significant was video conferencing, although even this showed a trend for higher level of knowledge than usage. Table 3 presents the differences between reported levels of knowledge and usage for each tool.

Table 3. Wilcoxon signed-ranks tests for differences between reported levels of knowledge and usage for each tool (N=129).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tool |  | Mean score (SD) | Median (IQR) | Z score |
| WhatsApp | Know | 4.62 (0.81) | 5 (5-5) | -3.03\*\*\*  |
| Use | 4.34 (1.30) | 4 (4-5)  |
| Emails | Know | 4.74 (0.64) | 5 (5-5) | -5.85\*\*\*  |
| Use | 3.99 (1.37) | 3 (3-5) |
| Video conferencing | Know | 4.20 (0.87) | 4 (4-5) | -1.11  |
| Use | 4.08 (1.23) | 3 (3-5) |
| Recordings | Know | 3.11 (1.19) | 3 (2-4) | -6.45\*\*\*  |
| Use | 2.40 (1.37) | 1 (1-3) |
| Presentations | Know | 4.13 (0.93) | 4 (4-5) | -3.19\*\*\*  |
| Use | 3.86 (1.22) | 3 (3-5) |
| Discussions | Know | 3.83 (1.08) | 3 (3-5) | -6.19\*\*\*  |
| Use | 3.02 (1.46) | 3 (3-5) |
| E-posters | Know | 3.17 (1.19) | 2 (2-4) | -7.60\*\*\*  |
| Use | 2.29 (1.32) | 1 (1-3) |
| Real world environment | Know | 2.37 (1.02) | 2 (2-3) | -7.69\*\*\*  |
| Use | 1.57 (0.91) | 1 (1-3) |
| E-books | Know | 3.38 (1.20) | 3 (3-4) | -7.90\*\*\*  |
| Use | 2.36 (1.27) | 1 (1-3) |
| Virtual Museums | Know | 2.80 (1.08) | 2 (2-4) | -8.37\*\*\* |
| Use | 1.08 (0.95) | 1 (1-2) |

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) zero category representing an equal measure of use and knowledge (K=U). 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 K=U. For this question, participant profiles were examined in relation to the technical and pedagogical challenges that EFL teachers experienced using digital tools during the COVID-19 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 =-0.25, p=0.005), and choosing suitable materials for specific learning outcomes (rs=-0.19, p=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=0.21, p=0.02) and maintaining pupil engagement and motivation (rs=0.19, p=0.03). Participants with higher levels of usage and lower levels of knowledge with regard to digital tools reported greater difficulties in overcoming technical problems and in maintaining pupil engagement and motivation.

Question 4 considered measures of self-efficacy: implementation of technology, teaching skills, and a general measure of TSE, and calculated the differences in self-efficacy scores in relation to each of the three profiles: K>U, K<U, K=U. Using the Kruskal-Wallis test, the four digital tools with the highest mean scores for knowledge and usage were assessed: emails, WhatsApp, video conferencing and presentations. In what follows, the findings for these four tools will be presented in relation to the three measures of SE in figures 1-3. In each figure, the x-axis assigns one box for each category, in this case each profile (know<use; know=use; know>use). The y-axis presents the minimum, first quartile, median, third quartile, and maximum value in a set of numbers, along with outliers.

Figures 1a–1d present the findings for these four digital tools in relation to the measure of self-efficacy in implementation of teaching skills. *Post hoc* comparisons (see Appendix) indicated that, for all four tools, the scores for the profile know=use were significantly higher than the scores for know<use. Moreover, the score for know=use was significantly higher than the score for know> use for the tools of WhatsApp and ppts. The score for know>use was significantly higher than the score for know<use for emails. (Figures 1a–1d here)

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Error bars represent ±SD.

Figures 2a–2d present the findings for the relationship between the three knowledge/usage profiles and the self-efficacy score for implementation of digital tools for the same four tools. The missing whiskers in some figures are due to similar values of the 25th and 75th percentiles and the 5th and 95th percentiles, respectively. Post hoc comparisons indicated that for emails, WhatsApp, and video conferencing, the scores for the profile know= use were significantly higher than the scores for know<use. Moreover, the score for know>use was significantly higher than the score for know<use for the email and video conferencing tools.(Figures 2a–2d here)

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The findings for the relationship between the three knowledge/usage profiles and the general SE score are presented in figures 3a–3d. The missing whiskers in some figures are due to similar values of the 25th and 75th percentiles and the 5th and 95th percentiles, respectively. Comparisons made *post hoc* indicated that for the tool of video conferencing, scores for know=use were significantly higher than scores for the two other profiles, know<use and know>use. Moreover, the scores for know>use were significantly higher than those for know<use for emails.(Figures 3a–3d here)

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One open-ended question provided a deeper understanding of teachers’ experience in distance learning during the COVID-19 crisis, with respondents asked to reflect on distance learning during the pandemic. Answers were long and detailed, testifying to a willingness and need to reflect on intense experiences. 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 being a sentence or two 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. Table 4 presents the challenges categories.

Table 4. Categories of challenges in distance EFL teaching reported by teachers during Corona crisis (N=154).

|  |  |  |
| --- | --- | --- |
| Category | Examples | Percentage 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 have an indication of what I’m doing is good.Although I graduated 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, their fears, to challenge them when necessary. All these are almost impossible in long distance. | 11.34 |

Table 4 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 5 presents the advantages categories.

Table 5. Categories of advantages in distance EFL teaching reported by teachers during Corona crisis (N=66).

|  |  |  |
| --- | --- | --- |
| Category | Examples | Percentage 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 |

Table 5 shows that the positive aspect of distance learning was the participants’ experience of professional progress apparent in their students’ significant learning outcomes.

1. Discussion

This study has explored EFL teacher beliefs regarding their own pedagogical technological knowledge, its usage in classrooms and their feelings of SE in online ERT during the COVID-19 school lockdown. The first question explored teachers’ sources of knowledge regarding digital tools before and during the COVID-19 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. We therefore infer that teachers had to expand their pedagogical technological knowledge; teachers who relied on themselves demonstrated an ability to make the necessary changes to teach in time of crisis, as is consistent with other research (Hodges et al., 2020).

We did not find any significant increase in the reliance on pre-service teacher education and experiences, nor did teachers report that their in-service courses 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 had to be put into practice urgently, many teachers lacked sufficient professional technological preparation. This gap has already 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 th e COVID-19 crisis was sudden and surprising, it is arguable that there was no time to prepare suitable in-service courses to deal with 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 previous in-service training. 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.

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. 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 for TPACK areas related to pedagogy, since these are areas of endeavor where pedagogical and technological knowledge interact. Teacher training courses are primary sources of teacher knowledge. This sends a powerful message to program designers and instructors to include new digital tools in instruction programs. Most importantly, in our digital era, pre-service teacher training cannot offer long-term solutions to the challenges teachers face. Teachers need to 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 COVID-19 crisis. Findings indicated that the only digital tool exhibiting no significant difference was video conferencing. Teachers reported significant knowledge gaps regarding all of the other tools examined. We surmise that, in this unprecedented time of ERT, teachers have mostly used video conferencing to substitute face-to-face lessons and to enable the provision of a planned lesson in a digital format to move forward almost seamlessly. Other widely used tools, such as email and WhatsApp, also facilitate communication and distance learning. Thus, the use of digital tools was not for pedagogical objectives and teachers did not fully take full advantage of them for 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 could expand their digital knowledge and select appropriate materials. These teachers had the knowledge of cognition with its three aspects of cognitive awareness (Javid et al., 2013; Schraw, 1998) and could apply their knowledge ongruously 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 when acquiring such knowledge is conditioned 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 fourth question addressed the nature of the gaps between teachers’ knowledge and usage and their reported TSE. These gaps were apparent and our findings revealed that when teachers’ usage of used digital tools was greater than their knowledge about them, all three SE scores – implementation of teaching skills, digital tools and general SE – were low. Thus, not having the knowledge to apply tools affected their teacher and professional identities. Teachers with similar or greater knowledge about digital tools than practical use of them experienced high SE in their teaching and could adapt each tool to the pedagogical content. During the first phase of the COVID-19 distance learning crisis, two distinct types of teacher emerged: one that experienced a dramatic decrease in their SE and lost their flexibility and sense of control over their teaching; and a second that was more flexible and saw COVID-19 as an opportunity to expand their teaching repertoire. This finding is supported by the qualitative data in this study.

Our findings on the application of digital tools in order to experience higher TSE are congruent with previous studies which emphasize success or failure in primary experience as a key source in TSE research (Morris et al., 2016; Usher & Pajares, 2008). SE in digital tools *per se* plays a prominent role in digital learning processes and is a crucial construct in teachers’ belief systems that influences success or failure in many aspects of education (Hoang, 2018; Joo et al., 2000; Klassen, Tze, Betts, & Gordon, 2011;). This is especially true in our ever-changing reality. Undoubtedly, TSE in digital learning deserves further attention in both research and practice.

The last question addressed EFL teachers’ perception of distance ERT, including the 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. Teachers need to be shown how to integrate technology meaningfully into particular pedagogical contexts to reach 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 find the most appropriate digital tool for each context. Teachers who opted to describe the advantages of distance teaching during the COVID-19 crisis indicated that it was an opportunity to improve their teaching tools and broaden their range. Although our study was conducted in an unprecedented and sudden situation of ERT, when learners did not have time to acquire the requisite knowledge, there were teachers who seized the opportunity to expand their professional knowledge.

The COVID-19 crisis drove education online all around the world. Our study, conducted in the midst of this crisis, has focused on the significance of professional-technological knowledge as a crucial component of effective teaching and posits a strong link between it and teacher efficacy in online teaching. Digital learning depends on TSE with relevant technology. This, in turn, encompasses teachers’ beliefs about technology and their perceived and lived use of technology in their teaching strategies. Teachers’ beliefs about 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 show the urgent need for education to enable 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 own disciplines. Once they become familiar with applying digital tools to an identified desirable pedagogical outcome, they will certainly become better able to deploy new technology more effectively. This is crucial if the promise of digital tools is to become a classroom reality. Alarmingly, our findings show that this is not currently the case. 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.

The present study is heuristic in nature and 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, COVID-19 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 COVID-19 has served as a clarion wakeup call.

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Appendix



References

## Abbitt, J. T. (2011). An Investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers, *Journal of Digital Learning in Teacher Education*, *27*(4), 134–143. https://doi.org/10.1080/21532974.2011.10784670

Anderson, S. E., Groulx, J. G., & Maninger, R. M. (2011). Relationships among preservice teachers’ technology-related abilities, beliefs, and intentions to use technology in their future classrooms, *Journal of Educational Computing Research*, *45*(3), 321–338. https://doi.org/10.2190/EC.45.3.d

Aston, P.T. (1984). Teacher efficacy: A motivational paradigm for effective teacher education, *Journal of Teacher Education*, *35*(5), 28-32. https://doi.org/10.1177/002248718403500507

Banas, J. R., & York, C. S. (2014). Authentic learning exercises as a means to influence preservice teachers’ technology integration self-efficacy and intentions to integrate technology, *Australasian Journal of Educational Technology*, *30*(6), 728– 746. https://doi.org/10.14742/ajet.362

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Prentice-Hall.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy Beliefs of Adolescents* (Vol. 5, pp. 307–337). Information Age Publishing.

Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. Freeman.

Berliner, D. C. (2001). Learning about and learning from expert teachers, *International Journal of Educational Research*, *35*(5), 463–482. https://doi.org/10.1016/S0883-0355(02)00004-6

Berliner, D. C. (2004). Describing the behavior and documenting the accomplishments of expert teachers, *Bulletin of Science, Technology & Society*, *24*, 200–212. https://doi.org/10.1177/0270467604265535

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology, *Qualitative Research in Psychology,* *3*(2), 77–101, DOI: 10.1191/1478088706qp063oa

Chiang, M.-H. (2008). Effects of fieldwork experience on empowering prospective foreign language teachers, *Teaching and Teacher Education*, *24*(5), 1270–1287. doi:10.1016/j.tate.2007.05.004

Choi, E., & Lee, J. (2016). Investigating the relationship of target language proficiency and self-efficacy among nonnative EFL teachers. System, 58, 49–63. https://doi.org/10.1016/j.system.2016.02.010

Corebima, A. D. (2009). Metacognitive skill measurement integrated in achievement test. State University of Malang. http://recsam.edu.my/cosmed/cosmed09/AbstractsFullPapers2009/Abstract/Science Parallel PDF/Full Paper/01.pdf

Corry, M. & Stella, J. (2018). Teacher self-efficacy in online education: A review of the literature, *Research in Learning Technology*, *26*, 1–11. https://doi.org/10.25304/rlt.v26.2047

Creswell, J.W. (2009). Mapping the field of mixed methods research, *Journal of Mixed Methods Research,* *3*(2), 95–108. https://doi.org/10.1177/1558689808330883

Creswell, J.W., Plano Clark, V.L., Gutmann, M.L & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds), *Handbook of Mixed Methods in Social and Behavioral Research*. pp. 209–240. Sage.

Darling-Hammond, L., & Bransford, J. (2007). *Preparing Teachers for a Changing World: What Teachers Should Learn and Be Able to Do*. Jossey-Bass.

Deacon, A., Paxton, M. & Carr, T. (2000). Creating a project-based learning environment. Proceedings, Conference on Information Technology in Tertiary Education (CITTE), University of Port Elizabeth, South Africa, March. http://www.upe.ac.za/citte2000/ [viewed 5 Dec 2001, verified 26 Jan 2003 at http://www.upe.ac.za/citte2000/docs/adeacon.doc.

# Dellinger, A.B., Bobbett, J.J., Olivier, D.F. & Ellett, C.D. (2008.) Measuring teachers’ self-efficacy beliefs: Development and use of the TEBS-Self, *Teaching and Teacher Education*. *24*(3), 751–766. <https://doi.org/10.1016/j.tate.2007.02.010>

Depaepe, F. & König, J. (2018). General pedagogical knowledge, self-efficacy and instructional practice: Disentangling their relationship in pre-service teacher education, *Teaching and Teacher Education*. *69*, 177–190.

Doering, A., Koseoglu, S., Scharber,C., C., Henrikson, J., & Lanegran, D. (2014). Technology integration in K-12 geography education using TPACK as a conceptual model. *Journal of Geography*, *113*(6), 223–237. http://doi.org/10.1080/00221341.2014.896393

Faez, F. & Karas, M. (2017).Connecting language proficiency to (self-reported) Teaching Ability: a review and Analysis of research. *RELC Journal,* *48*(1), 135–151. https://doi.org/10.1177/0033688217694755

Gan, Z., Liu, F., Yang, CCR. (2020). Student-teachers’ self-efficacy for instructing self-regulated learning in the classroom. *Journal of Education for Teaching,* *46* (1), 120–123. https://doi.org/10.1080/02607476.2019.1708632

Garrison, D. R. (2003). Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self-direction and metacognition. In J. Bourne, & J.C. Moore (Eds). *Elements of Quality Online Education: Practice and Direction*. The University of Calgary. *4,* 47–58.

Gibson, K. (2008). Technology and technological knowledge: A challenge for school curricula, *Teachers and Teaching: Theory and Practice*, *14*, 3–15. https://doi.org/10.1080/13540600701837582

Gitomer, D. H., & Zisk, R. C. (2015). Knowing what teachers know, *Review of Research in Education*, *39*, 1–53. https://doi.org/10.1080/21532974.2011.10784670

# Goddard, R. D., Hoy, W.K.& Hoy, A. W. (2000). Collective teacher efficacy: Its meaning, measure, and Iipact on student achievement,. *American Research Journal, 37*(2), 479–507*.* <https://doi.org/10.3102/00028312037002479>

Göker, S. D. (2012). Impact of EFL teachers’ collective efficacy and job stress on job satisfaction, *Theory and Practice in Language Studies*, *2*(8), 1545–1551. https://doi.org/10.4304/tpls.2.8.1545-1551

Grossman, P. L., & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education, *American Educational Research Journal*, 45(1), 184–205. https://doi.org/10.3102/0002831207312906

Hoang, T. (2018). Teacher self-efficacy research in English as foreign language contexts: A systematic review, *The Journal of Asia TEFL*, *15*(4), Winter 2018, 976–900. http://dx.doi.org/10.18823/asiatefl.2018.15.4.6.976

Hodges, C. Moore, S. Lockee, B. Trust, T. and Bond, A. (2020), The difference between emergency remote teaching and online learning, DUCAUSE.https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning.

 Jacobse, A. E., & Harskamp, E. G. (2012). Towards efficient measurement of metacognition in mathematical problem solving, *Metacognition and Learning*, *7*(2), 133–149. https://doi-org.mgs.oranim.ac.il/10.1007/s11409-012-9088-x

Javid, S., Alavi, H. R., & Pour, M. F. (2013). The relationship between religious commitment with meta-cognitive skills and philosophical mindedness of the graduate students of Kerman City Universities in the academic year 2011–2012, *Journal of Religion and Health*, *54*(3), 943–953. https://doi.org/10.1007/s10943-013-9808-9

Jeung, H. H. (2014). Understanding teachers’ continuance intentions towards distance training program: An extension of technology acceptance model, *Journal of Lifelong Learning Society*, *10*(2), 229–262. https://www.jstor.org/stable/26458506

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research, *Journal of Mixed Methods Research*, *1*(2), 112–133. https://doi.org/10.1177/1558689806298224

Joo, Y., Bong, M., & Choi, H. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction. *Educational Technology Research and Development*, *48*(2), 5–17. https://doi.org/10.1007/BF02313398

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.

Kaygisiz, G.M., Ulgun, N. & Ulcar, F. M. (2020). The relationship between the level of self-efficacy beliefs of pre-service teachers and their levels of determining suitable taxonomy, strategy, and method-technique for science objectives, *Science Education International*, *31*(1),117–126. https://doi.org/10.33828/sei.v31.i1.12

Kitao, K., & Kitao, K. (2000). Online resources and journals: ELT, linguistics, and communication, http://www.ling.lancs.ac.uk/staff/visitors/kenji/onlin.htm.

Klassen, R. M., Tze, V. M., Betts, S. M., & Gordon, K. A. (2011). Teacher efficacy research 1998–2009: Signs of progress or unfulfilled promise? *Educational Psychology Review*, *23*(1), 21–43. https://doi.org/10.1007/s10648-010-9141-8

Klassen, R.M. & Tze, VMC. (2014). Teachers’ self-efficacy, personality, and teaching effectiveness: a meta-analysis, *Educational Research Review*, *12*, 59–76. https://doi.org/10.1016/j.edurev.2014.06.001.

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

Koehler, M. J., & Mishra, P. (2008). Introducing TPACK. In J. A. Colbert, K. E. Boyd, K. A. Clark, S. Guan, J. B. Harris, M. A. Kelly & A. D. Thompson (Eds.), *Handbook of Technological Pedagogical Content Knowledge for Educators* (pp. 1–29). Routledge.

Koh, J. H. L. (2019). TPACK design scaffolds for supporting teacher pedagogical change, *Educational Technology Research and Development* *67,*577–595 https://doi.org/10.1007/s11423-018-9627-5

König, J., Lammerding, S, Nold, G., Rohde, J., Strauss, S., & Tachtsoglou, S. (2016). Teachers’ professional knowledge for teaching English as a foreign language: Assessing the outcomes of teacher education, *Journal of Teacher Education*. 67(4) 320–337. https://doi.org/10.1177/0022487116644956

Krishnan, I. A., Ching H. S., Ramalingam, S.J., Maruthai, E., Kandasamy, P., De Mello, G., Munian, S., Ling, W.W. (2020). Challenges of learning English in 21st century: Online vs. traditional during Covid-19, *Malaysian Journal of Social Sciences and Humanities*, *5*(9), 1–15. https://doi.org/10.47405/mjssh.v5i9.494

Marta, L. M.C. (2018). Comparing online English language learning and face-to-face English language learning at el Bosque university in Colombia, https://doi.org/10.25772/CPER-NM95

Martin, F; Budhrani, K; Kumar, S. & Ritzhaupt, A. (2019). Award-winning faculty online teaching practices: roles and competencies, *Online Learning,* *23*(1), 184–205. https://doi.org/10.1016/j.iheduc.2019.04.001

Meloni, C. (2000). The internet in the classroom: A valuable tool and resource for ESL/EFL Teachers, *ESL Magazine*. www.eslmag.com/Article.htm.

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

Morris, D. B., Usher, E. L., & Chen, J. A. (2016). Reconceptualizing the sources of teaching self-efficacy: A critical review of emerging literature, *Educational Psychology Review*, *29*(4), 795–833. https://doi-org.mgs.oranim.ac.il/10.1007/s10648-016-9378-y

Newby, T. J., et al., (2011) *Educational Technology for Teaching and Learning*, 4th ed., Allyn & Bacon/Pearson Education, Inc.

Niederhauser, D. S. & Stoddart, T. (2001) Teachers instructional perspectives and use of educational software, *Teaching and Teacher Education*, *17*, 15–31. https://doi.org/10.1016/S0742-051X(00)00036-6

Pajares, F. (2006). Self-efficacy during childhood and adolescence: implications for teachers and parents. In F. Pajares & T. Urdan (Eds.), *Self-efficacy Beliefs of Adolescents,* 117–137. Information Age Publishing.

# Phan, N.T.T. & Locke, T. (2015). Sources of self-efficacy of Vietnamese EFL teachers: A qualitative study, *Teaching and Teacher Education*. *52*, 73–82. https://doi.org/10.1016/j.tate.2015.09.006

Pu, H. (2020). Implementing online ELT in the time of crisis: ordeal or opportunity*? English Language Teaching,* *74*(3). https://doi-org.mgs.oranim.ac.il/10.1093/elt/ccaa030

Schraw, G. (1998). Promoting general metacognitive awareness, *Instructional Science*, *26*(1– 2), 113–125. https://doi.org/10.1023/A:1003044231033

Semiz, K., &Ince, L. I. (2012). Pre-service physical education teachers’ technological pedagogical content knowledge, technology integration self-efficacy and instructional technology outcome expectations, *Australasian Journal of Educational Technology*, *28*(7), 1248–1265. https://doi.org/10.14742/ajet.800

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching, *Educational Researcher*, *15*(2), 4–14. https://doi.org/10.3102/0013189X015002004

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform, *Harvard Educational Review*, *57*, 1–22. https://doi.org/10.17763/haer.57.1.j463w79r56455411

Sperling, R. A., Howard, B. C., Miller, L. A., & Murphy, C. (2002). Measures of children’s knowledge and regulation of cognition, *Contemporary Educational Psychology*, *27*(1), 51–79. https://doi.org/10.1006/ceps.2001.1091.

Sugiharto, B; Corebima, A Susilo, H. & Ibrohim. (2018). A comparison of types of knowledge of cognition of pre-service biology teachers, *Asia-Pacific Forum on Science Learning and Teaching*, *19*(1), 1–16.

Thomas, S. (2016). Future ready learning: Reimagining the role of technology in education, 2016 National Education Technology Plan, Office of Educational Technology, U.S. Department of Education*.* http://www2.ed.gov/about/offices/list/os/technology/index.html.

Thompson, G. & Woodman, K, (2018): Exploring Japanese high school English teachers’ foreign language teacher efficacy beliefs, *Asia-Pacific Journal of Teacher Education*, https://doi.org/10.1080/1359866X.2018.1498062

Tschannen-Moran, M & Woolfolk Hoy, A. (2001). Teacher efficacy: capturing an elusive construct, *Teaching and Teacher Education*, *17*(1), 783–805. https://doi.org/10.1016/S0742-051X(01)00036-1

Underwood, P. R. (2012). Teacher beliefs and intentions regarding the instruction of English grammar under national curriculum reforms: A theory of planned behaviour perspective, *Teaching and Teacher Education*, *28*(6), 911–925. https://doi.org/10.1016/j.tate.2012.04.004

Usher, E. L., & Pajares, F. (2008). Sources of self-efficacy in school: critical review of the literature and future directions, *Review of Educational Research*, *78*, 751–796. https://doi.org/10.3102/0034654308321456

Valtonen, T., Kukkonen, J., Kontkanen, S., Dillon, P., & Sointu, E. (2015). The impact of authentic learning experiences with ICT on pre-service teachers’ intentions to use ICT for teaching and learning, *Computers & Education*, *81*, 49–58. https://doi.org/10.1016/j.compedu.2014.09.008

Valtonen, T., Sointu, E., Kukkonen, J., Makital, J., Hoang, N., Paivi, H., Jarvela, S. Naykki, A., Pontinen, S., Kostianen, E., Tondeuir, J. (2019). Examining pre-service teachers’ technological pedagogical content knowledge as evolving knowledge domains: a longitudinal research, *Journal of Computer Assisted Research*. https://doi-org.mgs.oranim.ac.il/10.1111/jcal.12353

Warschauer, M. (2000). The changing global economy and the future of English teaching, *TESOL Quarterly*, *34*(3), 511–535. https://doi-org.mgs.oranim.ac.il/10.2307/3587741

Wyatt, M. (2014). Towards a re-conceptualization of teachers’ self-efficacy beliefs: tackling enduring problems with the quantitative research and moving on, *International Journal of Research and Method in Education*, *37*(2), 166–189. https://doi.org/10.1080/1743727X.2012.705275

Yilmaz, C. (2011). Teachers’ perceptions of self-efficacy, English proficiency, and instructional strategies, *Social Behavior and Personality,* *39*(10), 91–100. https://doi.org/10.2224/sbp.2011.39.1.91

Yore, L. D., & Treagust, D. F. (2006). Current realities and future possibilities: Language and science literacy—empowering research and informing instruction, *International Journal of Science Education*, *28*(2–3), 291–314. https://doi.org/10.1080/09500690500336973

Zimmerman, B.J.2000. Self-efficacy: an essential motive to learn, *Contemporary Educational Psychology*, *25,* 82 –91. https://doi.org/10.1006/ceps.1999.1016

# Zonoubi, R., Eslami Rasekh, A., & Tavakoli, M. (2017). EFL teacher self-efficacy development in professional learning communities, *System*, *66*, 1–12. https://doi.org/10.1016/j.system.2017.03.003

Figures

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| Figure 1a: WhatsApp | Figure 1b: Email |
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| Figure 1c: Video conferencing | Figure 1d: Presentations |
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|  |
| Figure 2a: WhatsApp | Figure 2b: Email |
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| Figure 2c: Video conferencing | Figure 2d: Presentations |
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Error bars represent ±SD.

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|  |
| Figure 3a: WhatsApp | Figure 3b: Email |
|  |  |
| Figure 3c: Video conferencing | Figure 3d: Presentations |
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Error bars represent ±SD.

Figure Captions

Figures 1a–1d. Mean Differences in implementation of teaching skills according to the three profiles representing the gap between knowledge and usage.

Figures 2a–2d. Differences in implementation of digital tools according to the three profiles representing the gap between knowledge and usage.

Figures 3a–3d. Differences in implementation of digital tools according to the three profiles representing the gap between knowledge and usage.