The Impact of an Online Professional Development Course on EFL Teachers' TPACK

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Abstract

Technological Pedagogical Content Knowledge (TPACK) is a theory for teacher knowledge for effective and creative teaching which has created opportunities for research on teachers' professional development. This sequential explanatory mixed methods study sought to investigate the impact of a TPACK-focused online professional development course on EFL teachers' TPACK through employing TPACK theory and explored their views on their experiences of attending the course. Regarding the quantitative stage, 30 EFL teachers (15 novice and 15 experienced) attended the course through volunteer sampling. Prior to course initiation and after its completion, the TPACK-EFL survey was administered and re-administered as pre-test and post-tests, respectively. Concerning the qualitative phase, 12 EFL teacher participants voluntarily attended a

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semi-structured interview. The Wilcoxon Signed Ranks Test and paired sample t-test results suggested that the online course had significantly affected EFL teachers concerning their TPACK except in PCK (Pedagogical Content Knowledge) of the novice group and CK (Content Knowledge) of both groups. Experienced teachers could benefit more from the course in terms of TPACK and PCK (Pedagogical Content Knowledge). Regarding the qualitative results, it was revealed that all interviewees expressed positive attitudes toward the course. Also, themes related to distinctive features of the course, challenges they encountered and aspects of TPACK they had improved emerged in their responses. The results of the study offer precious educational implications for TTC educators, education course developers, EFL teachers, administrators, supervisors, policy makers, and stakeholders.

Keywords: TPACK, Online Teacher Professional Development, Technology Integration, Educational Technology, Engineering Education

Introduction

Professional development is a practical solution to improve the supply of high quality teachers (Hartono, 2016). It is crucial in keeping teachers apprised of the shifts in student achievements levels, making them cognizant of new teaching methodologies in the content areas, learning how to benefit from pedagogical use of technological tools for instruction and learning, and tailoring their pedagogy to variable school settings and a progressively heterogeneous student population (Lawless & Pellegrino, 2007).

Considering the growing emphasis being placed on teacher professional development (TPD) programs for EFL teachers, TPD training practices are valuable components of any such professional development (PD) program. TPD requires a lot of planning and attempt on teachers' existing hectic schedules. Even though teachers' capacity for development needs to be increased, it is important to ensure that planning, endeavor, and limited sources are spent only on effective programs that focus on the best methods (Dede et al., 2009). The necessity for PD that fits with teachers' overburdened timetables, that benefits effective means often not accessible regionally, and creates a developmental route for offering online, continued, work-integrated assistance has provoked the evolution of online Teacher Professional Development (oTPD) programs. A large number of teachers in Iran are required to attend PD courses. However, owing to distance, time, funding, and/or personal requirements, they cannot access the courses (Boehm et al., 2012). Hence, online TPD creates opportunities for larger accessibility of teachers (Bustamante, 2019).

Recently, the application of technology for TPD has been highlighted in teacher education development (Gu et al., 2012). Teachers' competence in incorporating technology in various pedagogical methods has become indispensable in view of the accelerating growth of technology in the twenty-first century (Tanak, 2018). In addition, the significance of improving teachers' technological pedagogical content knowledge (TPACK) for incorporating technology in

TPD programs has been accentuated in recent literature (see e.g., Elliott, 2018; Koh, 2019; Pareto & Willermark, 2019). Technological pedagogical content knowledge (TPACK) which is expanded from Shulman's (1986) Pedagogical Content Knowledge (PCK), is a theoretical model of teacher knowledge presented by Mishra and Koehler (2006). This model of teacher knowledge explains teachers' competence to incorporate technology in the syllabus. TPACK is the knowledge of embedding technology in teaching the content using specific pedagogical methods. The TPACK framework indicates that good teaching calls for improving a fine awareness of the complicated bonds among technology, content, and pedagogy, and applying this awareness to promote pertinent, context-dependent approaches and representations. Incorporating technology effectively in instruction requires to take into account all three bodies of knowledge together within the intricate links in the system explained by the three key bodies of knowledge (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Teaching experience can be also considered as a key contributor accounting for the development of teachers' TPACK (Jang & Chang, 2016).

Admittedly, one can collect data from novice teachers independently of experienced teachers and vice versa. However, evaluating both sets of teachers together in the same study enables one to compare them on highly particular points and discover more explicitly their differences or similarities. Likewise, Pelgrum and Law (2003) argue that teacher education in general, and initial teacher education in particular, need to go through changes to educate and prepare teachers for the challenges of the information age. Since its introduction in 2006, TPACK has become one of the leading frameworks concerning technology integration in education. According to Doering et al., (2009) TPD for online and blended education ought to consider the TPACK framework. Although some studies have been undertaken in content-specific TPACK in various fields such as mathematics and science (see e.g. Jang & Tsai, 2012; Young et al., 2019), there was a need for conducting research in the EFL context of Iran as well. Additionally, the application of technology has been found to be quite inconsistent among Iranian novice and experienced EFL teachers. Moreover, knowing how these teachers perceive TPACK was a gap in the literature. Furthermore, most TPACK research has evaluated novice and experienced teachers separately (Dong et al., 2015).

However, few attempts have been made in the context of Iran for novice and experienced EFL instructors to enhance their technological knowledge within the framework of TPACK. Therefore, there seemed to be a need for novice and experienced EFL educators to be trained for technology as part of the TPACK-focused online PD course. The results of this study could enable EFL teachers, teacher trainers, TPD program planners, syllabus designers and observers to recognize the significance of TPACK in TPD and its application in teaching. Despite an enormous amount of research on TPD (e.g. Elliott, 2017; Parsons, et al., 2019; Prestridge, 2017) and teachers' TPACK and PD (e.g. Nazari et al., 2019; Pareto & Willermark, 2019) in addition to TPACK and oTPD (e.g. Bustamante, 2019; Hafiz & Kwong, 2019), there was a paucity of research specifically linking the impact of training of Iranian novice and experienced EFL instructors

through an online professional development course on TPACK, focusing predominantly on knowledge of technology and knowledge of pedagogy as a second priority.

The theoretical framework underpinning this sequential explanatory mixed methods study was TPACK model.This study was undertaken to determine the effect of a TPACK-focused online PD course on novice and experienced EFL teachers' perceived TPACK. It also intended to explore their views on their experiences attending the course. The TPACK framework was utilized to account for how EFL teachers with different teaching experiences could learn from the course to incorporate technology, pedagogy, and content more effectively contributing to their PD and ultimately leading to student improvement. It also evaluated the experiences of EFL teachers concerning how their TPACK and PD had developed following participation in TPACK-focused online PD course. This study intended to answer the following research questions:

1. Does a TPACK-focused online PD course significantly affect novice and experienced EFL teachers concerning their perceived TPACK?
2. How does a TPACK-focused online PD course contribute to EFL teachers' PD?

Literature Review

Teachers are required to develop lessons for the students that will integrate the best of pedagogy, content, and technology (Matherson et al., 2014). According to Shulman (1986), it is incumbent upon competent instructors to specialize in both content and pedagogical knowledge and the convergence of both, i.e. Pedagogical Content Knowledge (PCK). Mishra and Koehler (2006) developed Shulman's (1986) model of PCK and added the construct of technology knowledge to his model for teacher knowledge. Hence, they proposed the Technological Pedagogical Content Knowledge (TPACK) framework. TPACK is a theoretical model for teacher knowledge for effective and creative teaching which has created opportunities for research on TPD. TPACK is a theoretical framework for exhaustively delineating how teachers can implement technology to support learning (Dong et al., 2015).

The TPACK framework explains in what way instructors teach content by applying certain pedagogical methods with particular technology in specific contexts (Tseng, 2018). TPACK suggests that effectual teaching with technology ought to highlight the interplays and associations among content, pedagogy, and technology. Presumably, instructors having strong TPACK design lessons that effectively incorporate technology into the teaching of content (Chai et al., 2011). Concerning the integration of three bodies of knowledge, i.e. Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), four further areas of knowledge are identified: Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological, Pedagogical, and Content Knowledge (TPACK) (Mishra & Koehler, 2006). The definitions of the seven

knowledge constructs of the TPACK model have been explained by Mishra and Koehler in that CK refers to knowledge of content of instruction, PK refers to knowledge of teaching methodologies and techniques, TK refers to knowledge of applying technological tools and resources, TCK refers to knowledge of representing target language content with technology, TPK refers to knowledge of how to apply technology to change teaching practices, PCK refers to knowledge of implementing pertinent teaching practices to teach content, and TPACK refers to knowledge of promoting students' learning of a particular content through relevant pedagogy and technology.

The TPACK framework is illustrated in Figure 1. As explained by Mishra and Koehler (2006), all three domains of knowledge are essential in instruction in addition to the intersection of each of these knowledge domains and the heart of the diagram which is TPACK. However, they emphasize the significance of utilizing the developing technological resources. TPACK refers to the integrated knowledge that highlights teachers' actions for incorporating technology creatively (Tseng, 2018). Since the TPACK model was proposed, researchers have been evaluating TPACK in subject-specific contexts, examining TPACK development in different teacher development contexts, and analyzing the TPACK construct (e.g. Baser et al., 2015; Chai et al., 2010).

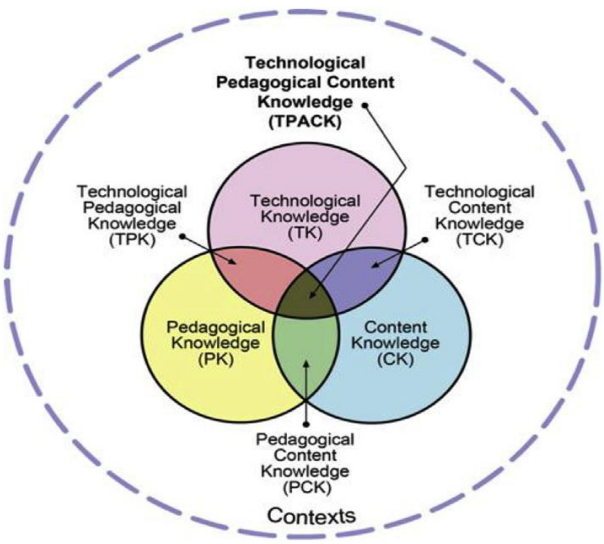

Figure 1. *TPACK Framework (Adapted from www.tpack.org)*

Applying the integration of technology, pedagogy, and content in a TPACK framework is complex for EFL teachers without PD. The concurrent integration of these components into PD could contribute to an effective technology incorporation in the EFL classroom (Mishra & Koehler, 2006; Bustamante, 2019). According to Malik et al., (2019) TPACK can contribute to student achievement,

assist students and parents, make classes more pleasurable and relevant for each student, and can promote TPD.

The term "professional development" is described by the National Staff Development Council (NSDC) as "a comprehensive, sustained, and intensive approach to improving teachers' and principals' effectiveness in raising student achievement, and may be supported by activities such as courses, workshops, institutes, networks, and conferences" (Darling-Hammond et al., 2009, p.4). As Richards and Farrell (2005) maintain, many things involving English teachers are changing. Hence, it is a sine qua non for English teachers to develop professionally.

Presently, numerous initiatives are taken in oTPD assissting a great number of teachers. These programs are, by and large, accessible to instructors as desired and can offer just-in-time service. Moreover, they usually provide schools with access to specialists and archival resources that monetary and organizational restrictions would otherwise limit. Additionally, online PD programs are virtually more flexible than those that rely merely on local capacities and face-to-face communications (Dede et al., 2009). An abundance of these programs are operating to realize other possible advantages of online communities of practice among teachers. An example would be the opportunities for reflection provided by asynchronous interaction. Asynchronous online communication does not demand the simultaneous participation of teacher and students, which can be facilitated through tools including e-mails, discussion boards, blogs, wikis, or video/audio recordings. (Benbunan-Fich & Hiltz, 1999; Bonk & King, 1998; Duffy et al., 1998, as cited in Hsiao, 2012).

Edmodo website is a free and protected instructional platform for educators and is accessible at (www.edmodo.com). It is a private platform since it only permits teachers to create groups for their classes and manage accounts; only those students obtaining a group code and register in the group can access and join the group. Teachers can post files, videos and links, share content, and post alerts, assignments, quizzes, polls, and grades on the group page. Among the special features of the platform, Edmodo can function as a platform to provide personal or on-demand global PD (Hammonds et al., 2013). The rationale for selecting Edmodo by the researchers was that it is free, allows users to set up monthly calendars in advance showing assignments and upcoming events, and provides unlimited library storage and asynchronous discussion forums for participant collaboration, and is user-friendly.

Teaching EFL by a non-native English-speaking teacher who is also a language learner, leads to a paucity of exposure to authentic language learning environment which is considered a limitation. By means of technological tools and resources for effective communication (particularly for listening and speaking), TPACK is considered a significant part of EFL teachers' PD (Liu et al., 2014). Various studies have examined TPACK in teacher education and TPD (e.g., Kwangsawad, 2016; Voogt & McKenney, 2017). As a case in point, in a study conducted on assessing Iranian EFL teachers' TPACK from their students' perspectives, Fathi and Yousefifard (2019) found out most EFL learners per-

ceived that EFL teachers were competent in TK, PK, CK, and PCK and less competent in TCK, TPK, and TPACK.

There have been a number of studies on online TPD (e.g. Collins & Liang, 2015; Dede et al., 2009; Powell & Bodur, 2019; Smith & Sivo, 2012) and Edmodo (Hammonds et al., 2013; Trust, 2012). As a case in point, Parsons et al. (2019) conducted a study on US teachers' perceived online PD by seeking to discover the teachers' prior experiences with online PD and their perceptions of various models for online PD through survey methods. It transpired that most respondents found online PD experiences beneficial. Likewise, respondents who were required to join online PD found it less advantageous than those who voluntarily participated. A study conducted by Hodge (2015) examined the effect of an Edmodo-based PD workshop on teachers' views of an online social network as a pedagogical platform. The findings offered relevant information on adopting a learner-centered approach to pedagogy together with an example for administrators looking for a platform supporting a professional learning community.

TPACK and online TPD have been researched from some perspectives (e.g. Benson, & Ward, 2013; Doering et al., 2009; Niess et al., 2010). For instance, in a study conducted by Bustamante (2019) on TPACK-based PD on web 2.0 for Spanish instructors, the results of the case study basically suggested favorable learning experiences in three areas - technology, pedagogy, and content - together with technology integration. According to the aforementioned studies and the literature reviewed, findings are scarce concerning the impact of an oTPD course on novice and experienced EFL teachers perceived TPACK. To fill this gap, this study aimed to investigate the impact of a TPACK-focused oTPD course on EFL teachers' TPACK in terms of years of teaching experience and their views concerning their experiences of attending the oTPD course, which was based on Farrell's (2000) bottom-up model of professional development.

Method

Participants and Research Context

This sequential explanatory mixed methods study was primarily conducted with 46 novice and experienced EFL teachers selected through volunteer sampling restricted to Tehran English language academies, out of whom, due to participant attrition, only 37 teachers remained. For comparative purposes, only the data of 30 EFL teachers with 15 teachers as novice and 15 teachers as experienced were analyzed. The participants comprised both male (23%) and female (77%) novice and experienced teachers. Novice teachers are those having little experience (less than two years) whereas experienced teachers have many years of teaching, i.e. at least four to five years in various studies (Gatbonton, 2008). Hence, novice teachers had less than 2 years and experienced teachers beyond 5 years of experience. Table 1 demonstrates the characteristics of participants in terms of experience, education, and gender.

Table 1.
Experience, Education, and Gender of Participants in the Online Class

Demographic Variable		Frequency	Percentage
Gender	Female	23	77%
	Male	7	23%
Degree	BA	15	50%
	MA	9	30%
	PhD	1	3%
	Other Degrees	5	17%
Teaching Experience in EFL	Novice	15	50%
	Experienced	15	50%
Total		30	100%

Note: BA=Bachelor of Arts, MA=Master of Arts, PhD=Doctor of Philosophy

Participants' age ranged between 23-45. None of the participants had previously joined an online course or any course on TPACK or educational technology. Additionally, the novice teachers' teaching level ranged from elementary to intermediate whereas the experienced teaching level ranged from intermediate to advanced. Prior to research initiation, informed consent was obtained from all the participants. Following the completion of the course, 12 EFL teachers volunteered to attend the interview.

Instruments and Materials

TPACK-EFL Survey

To examine the responses to the quantitative research question, a questionnaire on participants' demographic characteristics including participants' age, educational background, years of teaching experience, gender, and their experiences concerning online classes, TPACK, or educational technology was completed by participants. Regarding the assessment of TPACK, a 39-item instrument designed specifically for the context of EFL was administered to the participants. The TPACK-EFL survey (Baser et al., 2015) is a 9-point Likert scale ranging from "nothing/none" (1) to "very little" (3) to "some" (5) to "quite a bit" (7) to "a great deal" (9). Concerning validity, the instrument was developed and validated by Baser et al.. The instrument measures seven TPACK factors. In their study, the seven factors were labeled in accordance with the TPACK framework. The final TPACK-EFL survey contained 39 items altogether: 9 TK items, 5 CK items, 6 PK items, 5 PCK items, 3 TCK items, 7 TPK items, and 4 TPACK items. The reliability indices of this instrument were computed in this study whose results are as follow:

Table 2.
Reliability Indices of TPACK-EFL Survey

SubScale	Cronbach's Alpha
TK	.78
PK	.83
CK	.86
TPK	.93
PCK	.82
TCK	.81
TPACK	.94
Total.TPACK	.91

As expressed in Table 2, the alpha's range is between .78 and .94, which is evidence of the existence of high internal consistency reliability.

Online PD Course Materials

The PD course in this study was titled "A TPACK-focused online Professional Development course for EFL Teachers". The course was run in an online environment on the Edmodo website (www.Edmodo.com). The online course syllabus was developed by the researchers through reviewing the related literature. The themes of the course revolved around an introduction to TPACK, the integration of technology in English teaching, the pedagogical strategies focusing on nonverbal immediacy behaviors, and how to reflect for PD. The focus of this course was mainly on the technological aspect of TPACK and the pedagogical aspect was considered as the secondary priority as these are the two important means to teach any content in English language classrooms.

In view of the purpose of the course, content knowledge was not explicitly addressed in the syllabus as EFL teachers are believed to possess appropriate CK. The purpose of the intervention was to promote the understanding of novice and experienced EFL teachers on TPACK framework and technology integration in English classes. It focused, by and large, on technology integration and its combination with other forms of teacher knowledge. In addition, as a second priority, it concentrated on the pedagogical aspect of TPACK only through including nonverbal immediacy behaviors and reflective teaching techniques. The online course provided teachers with innovative ideas and effective techniques for integrating technologies into classroom pedagogy with an eye toward promoting TPD such as using various technological resources and tools to teach sub-skills, technological games, applying reflection techniques, using nonverbal immediacy behaviors as one strategy in their pedagogical knowledge, establishing a blog or website, networking via social media, and how to integrate technology with pedagogy for effective teaching.

The ideas of digital literacy and digital etiquette and how to teach integrated language skills through technology were presented. In addition, various online tools such as screen casts, blogs, wikis, e-portfolios, WebQuests, RSS feeds, and podcasts were also presented. Moreover, online courses such as Udemy, Coursear, Lynda, EdX, and so on were introduced. Furthermore, Massive Online Open Course (MOOCs), Virtual Learning Environment (VLE), flipped classroom model, creating online quizzes, the importance of online collaboration and social presence were also presented. Concerning the pedagogical knowledge, reflective teaching techniques and nonverbal immediacy behaviors were introduced to teachers who were supposed to provide the instructor with their teaching reflection journals in the assignment section of Edmodo after watching or reading the materials of each session and having an EFL teaching class. Therefore, the course centered on TK and PK as two important means to teach any content in EFL classrooms.

Likewise, online materials for teaching the skills and sub-skills of English through technology were also included in the syllabus. The materials of the course were either in the form of You-Tube videos, links or some readings and images to explain a topic. Prior to running the course, all the selected materials were saved in the Edmodo library with unlimited storage space. The materials were, by and large, selected from educational You-Tube videos, or some websites. The rationale for designing such a syllabus was practicality and not the mere explanation of theories so that teachers could implement what they had learned more conveniently and effectively. The integration of multimedia content would add variety to the course materials. Moreover, the teachers were supposed to collaborate with each other on the course materials via sending messages in the Edmodo classroom and share their experiences and ideas on the materials.

Follow-up Interview

Following the completion of the online course, a semi-structured interview was held with 12 volunteer teachers, aiming to explore EFL teachers' views on their experiences of attending the online PD course. The interview items were developed by the researchers through reviewing the literature and items were modified, checked, and confirmed by three TEFL professors.

Procedure

To begin with, the researchers requested the supervisors of some of Tehran English language institutes to identify volunteer participants for attending the online course by clarifying the study objectives and the guidelines for attending the course. In the spring of 2019, 46 participants volunteered to attend the course out of whom the data of 30 were analyzed for comparative purposes. Prior to course initiation, a TPACK-EFL survey was administered to EFL teachers both in printed and electronic versions and the questionnaires were returned either to the institution secretary, supervisor, or the researchers. The TPACK-EFL survey was submitted to EFL teachers, either in person or by email. The participants were required to leave their phone numbers and emails at the end of the demographic section of the questionnaire for more information on the course. Following questinnaires collection, a small-scale pilot study was undertaken on the data of 30 participants to confirm the reliability of the results. Participants' responses to the questionnaire in the quantitative phase were considered as a pretest.

Afterwards, the researcher called every teacher individually and informed them about the TPACK-focused online PD course and how to sign up to the Edmodo website and provided all the necessary information about the asynchronous online class of Edmodo and emailed the syllabus to teachers. The 14-session asynchronous online course started in May 2019 and lasted for five weeks. The teachers were supposed to complete the course by the end of the

fifth week and submit 14 teaching reflections (at least 100-120 words each) after watching and/or reading the materials of each session. They were also required to collaborate with each other on Edomondo's discussion forum. Regular reminders were sent to them about submitting their teaching reflections to make sure they participated in each session. Prior to course initiation and after its completion, the TPACK-EFL survey was administered and readministered as pre- and post-tests, respectively. Finally, a semi-structured interview was conducted with 12 volunteer participants on their experiences of attending the course.

Data Analysis

Concerning the quantitative data, after feeding the data into SPSS (Statistical Package for Social Sciences) version 24, both total scores and subscale scores of the dependent variable were compared. For all the analyses, the normality of the data was checked and accordingly, parametric and non-parametric statistics were run. Descriptive and inferential statistics were computed. Depending on the skewness ratios, Wilcoxon Signed Ranks test and paired samples *t*-test were run. Likewise, ANCOVA (Analysis of covariate) was run to control for the effect of covariate. Since the TPACK was multiple total and multiple subscales, multivariate analysis of covariance (MANCOVA) was run to include all the dependent variables. Finally, repeated measures ANOVA was run to compare the subscales' achievement scores.

Regarding the qualitative phase, the interview data were analyzed qualitatively through thematic analysis to discover possible themes and sub-themes. To this end, primarily, all the interviews were transcribed, summarized, categorized, and reviewed by the researchers. Next, predominant themes were identified in teachers' responses. Afterwards, the emerging themes and sub-themes in the transcriptions were grouped according to their frequency of occurrence. Finally, the themes were placed into a thematic table according to the interview questions along with a report on the qualitative results comprising the themes, subthemes, and interviewees' quotes.

Results and Discussion

Quantitative Data

The first research question focused on answering if the TPACK-focused online PD course significantly affected novice and experienced EFL teachers concerning their perceived TPACK. The results are as follows:

TPACK Change from Pretest to Posttest

To have separate comparisons of novice and experienced teachers in terms of their TPACK (both total TPACK and subscales' scores) change from pretest to

posttest, first the descriptive statistics of both groups were computed (Table 3). Evidently, some changes from pretest to posttest were obvious, but these changes needed to be checked for statistical significance by running inferential statistics. To choose between parametric paired samples *t*-test and non-parametric Wilcoxon Signed Ranks test, the normality of the data was checked by calculating skewness and kurtosis ratios (i.e. skewness or kurtosis values divided by their standard error) from Table 3. For those skewness ratios beyond 1.96 (i.e. violating normality assumption), Wilcoxon Signed Ranks test was run; however, for those skewness ratios within 1.96 (i.e. meeting normality assumption), paired samples *t*-test was run.

Table 3.
Descriptive Statistics

Experience		N	Min	Max	Mean	SD	Skewness		Kurtosis	
								Std. Error		Std. Error
Novice	TK.Pretest	15	6.11	8.00	7.28	.59	-.69	.58	-.53	1.12
	CK.Pretest	15	9.00	9.00	9.00	.00	.	.	.	.
	PK.Pretest	15	4.67	8.33	7.11	1.09	-.78	.58	-.04	1.12
	PCK.Pretest	15	7.20	8.60	7.97	.53	-.01	.58	-1.52	1.12
	TCK.Pretest	15	3.67	6.33	4.06	.81	2.27	.58	4.36	1.12
	TPK.Pretest	15	2.86	4.14	3.21	.37	1.44	.58	1.42	1.12
	TPACK.Pretest	15	1.25	3.25	1.86	.63	1.27	.58	.29	1.12
	To-tal.TPACK.Pretest	15	222.00	253.00	235.26	10.20	.40	.58	-.89	1.12
	TK.Posttest	15	7.89	8.67	8.34	.23	-.52	.58	-.43	1.12
	CK.Posttest	15	9.00	9.00	9.00	.00	.	.	.	.
	PK.Posttest	15	6.50	8.67	7.86	.57	-1.24	.58	1.60	1.12
	PCK.Posttest	15	7.20	8.60	8.01	.42	-.10	.58	-.67	1.12
	TCK.Posttest	15	8.00	9.00	8.48	.30	-.53	.58	-.60	1.12
	TPK.Posttest	15	8.14	8.71	8.37	.21	.36	.58	-1.37	1.12
	TPACK.Posttest	15	7.50	9.00	8.38	.33	-.77	.58	2.83	1.12
	To-tal.TPACK.Posttest	15	316.00	337.00	325.00	4.89	.77	.58	1.92	1.12
	Valid N (listwise)	15								
Experienced	TK.Pretest	15	4.44	6.22	5.63	.65	-1.13	.58	-.05	1.12
	CK.Pretest	15	8.80	9.00	8.98	.05	-3.87	.58	15.00	1.12
	PK.Pretest	15	8.33	9.00	8.66	.21	-.22	.58	-.62	1.12
	PCK.Pretest	15	8.00	9.00	8.61	.33	-.44	.58	-.91	1.12
	TCK.Pretest	15	2.67	3.67	3.40	.36	-.84	.58	-.93	1.12
	TPK.Pretest	15	1.86	3.71	2.80	.43	.08	.58	1.47	1.12
	TPACK.Pretest	15	1.00	2.50	1.78	.36	-.26	.58	.52	1.12
	To-tal.TPACK.Pretest	15	213.00	236.00	227.33	7.40	-.93	.58	-.32	1.12
	TK.Posttest	15	7.89	8.44	8.19	.17	-.12	.58	-1.17	1.12
	CK.Posttest	15	9.00	9.00	9.00	.00	.	.	.	.
	PK.Posttest	15	8.67	9.00	8.87	.14	-.60	.58	-1.49	1.12
	PCK.Posttest	15	8.60	9.00	8.89	.14	-1.07	.58	-.10	1.12
	TCK.Posttest	15	7.67	9.00	8.33	.39	-.29	.58	-.75	1.12
	TPK.Posttest	15	7.86	9.00	8.37	.31	.40	.58	-.18	1.12
	TPACK.Posttest	15	8.25	9.00	8.65	.22	-.34	.58	-.33	1.12
	To-tal.TPACK.Posttest	15	330.00	339.00	334.66	2.66	-.50	.58	-.17	1.12
	Valid N (listwise)	15								

In addition, Wilcoxon Signed Ranks test and *t*-test results for novice and experienced teachers showed both groups had significantly improved in their TPACK (both total TPACK and subscales' scores) from pretest to posttest ($p < .05$) except that in the novice group, no significant change had happened in PCK, and in both experience groups no significant change had happened in CK ($p > .05$). Hence, the null hypothesis on TPACK was rejected. That is, TPACK-focused online PD course significantly increased novice and experienced EFL teachers' TPACK (both total TPACK and subscales' scores) except in PCK of novice group and CK of both groups.

Comparison of Novice and Experienced EFL Teachers Concerning their TPACK

Despite the above finding, the researchers wanted to figure out which group of teachers (i.e. novice and experienced) showed more improvement from pretest to posttest in terms of TPACK (both total TPACK and subscales' scores) after completing the course. To do so, it was necessary to compare the posttest TPACK (both total TPACK and subscales' scores) mean scores of novice and experienced EFL teachers; however, since it was not clear whether the two groups had equal means on the pretests, analysis of covariance (ANCOVA) was run to control for the effect of covariate (i.e. pretest initial differences).

Moreover, since the dependent variable was multiple total and subscales, multivariate analysis of covariance (MANCOVA) was run to include all the dependent variables (i.e. total TPACK and subscales' scores) in one analysis. In so doing, after computing the descriptives of the novice and experienced EFL teachers in terms of TPACK (both total TPACK and subscales' scores) (Table 3), normality of the data was checked by calculating skewness and kurtosis ratios. Since the majority of the ratios were within ±1.96, the data were all in all considered as meeting normality assumption.

Table 4 presents the multivariate comparison of posttests, showing when all the dependent variables are taken into consideration, no significant increase has happened from pretest to posttest concerning their TPACK (both total TPACK and subscales' scores) ($p > .05$).

Table 4.
Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Experience	Pillai's Trace	.37	1.50[b]	6.00	15.00	.24	.37
	Wilks' Lambda	.62	1.50[b]	6.00	15.00	.24	.37
	Hotelling's Trace	.60	1.50[b]	6.00	15.00	.24	.37
	Roy's Largest Root	.60	1.50[b]	6.00	15.00	.24	.37

a. Design: Intercept + TK.Pretest + CK.Pretest + PK.Pretest + PCK.Pretest + TCK.Pretest + TPK.Pretest + TPACK.Pretest + Total.TPACK.Pretest + Experience
b. Exact statistic

The next step in MANCOVA is checking whether significant increase has happened from pretest to posttest in terms of TPACK total and subscales considered separately. To do so, for each dependent variable (i.e. total TPACK and subscales' means), one separate ANCOVA was run (i.e. Tests of Between-Subjects Effects as presented in Table 5). An assumption of ANCOVA is the homogeneity of variances, checked by running the Levene's test, where results revealed that this assumption was met ($p > .05$) for all the dependent variables except PCK scores ($p > .05$); therefore, a stricter p value was considered in the main ANCOVA results in Table 6 to avoid Type I Error in rejecting the null hypothesis.

Table 5 presents the results of posttest comparisons (i.e. main ANCOVA results) in terms of TPACK (both total TPACK and subscales' scores). As is indicated in Table 5, only the TPACK total scores and PCK subscale score means on the posttest of novice and experienced EFL teachers are significantly different ($p < .05$). As the adjusted TPACK (both total TPACK and subscales' scores) means in Table 6 indicate, the experienced EFL teachers have higher TPACK total scores and PCK subscale score means than the novice group. This result shows that experienced teachers can benefit more from the online PD course than novice teachers in terms of their TPACK total and PCK.

Table 5.
Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Experience	TK.Posttest	.076	1	.076	2.208	.153	.09
	CK.Posttest	.000	1	.000	.	.	.
	PK.Posttest	.127	1	.127	2.614	.122	.11
	PCK.Posttest	.341	1	.341	8.017	.010	.28
	TCK.Posttest	3.979E-006	1	3.979E-006	.000	.996	.00
	TPK.Posttest	1.599E-006	1	1.599E-006	.000	.996	.00
	TPACK.Posttest	.031	1	.031	.381	.544	.01
	Total.TPACK.Posttest	67.738	1	67.738	8.323	.009	.29

a. R Squared = .502 (Adjusted R Squared = .278)
b. R Squared = . (Adjusted R Squared = .)
c. R Squared = .922 (Adjusted R Squared = .887)
d. R Squared = .901 (Adjusted R Squared = .857)
e. R Squared = .231 (Adjusted R Squared = -.115)
f. R Squared = .282 (Adjusted R Squared = -.041)
g. R Squared = .428 (Adjusted R Squared = .171)
h. R Squared = .857 (Adjusted R Squared = .792)

Table 6.
Adjusted TPACK (both total TPACK and Subscales' Scores) Means after Controlling Covariate

Dependent Variable	Experience	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
TK.Posttest	N	8.12[a]	.10	7.91	8.34
	E	8.41[a]	.10	8.20	8.62
CK.Posttest	N	9.00[a]	.00	9.00	9.00
	E	9.00[a]	.00	9.00	9.00
PK.Posttest	N	8.18[a]	.12	7.93	8.44
	E	8.55[a]	.12	8.30	8.80
PCK.Posttest	N	8.15[a]	.11	7.91	8.38
	E	8.75[a]	.11	8.51	8.98
TCK.Posttest	N	8.41[a]	.20	7.98	8.84
	E	8.41[a]	.20	7.98	8.84
TPK.Posttest	N	8.37[a]	.14	8.06	8.67
	E	8.37[a]	.14	8.06	8.67
TPACK.Posttest	N	8.42[a]	.15	8.10	8.75
	E	8.60[a]	.15	8.28	8.93
Total.TPACK.Posttest	N	325.59[a]	1.55	322.35	328.84
	E	334.06[a]	1.55	330.81	337.31

a. Covariates appearing in the model are evaluated at the following values: TK.Pretest = 6.4574, CK.Pretest = 8.9933, PK.Pretest = 7.8889, PCK.Pretest = 8.2933, TCK.Pretest = 3.7333, TPK.Pretest = 3.0095, TPACK.Pretest = 1.8250, Total.TPACK.Pretest = 231.3000.
N=Novice, E=Experienced

Comparison of TPACK Subscales from Pretest to Posttest

A further analysis which was deemed necessary at this point was which TPACK subscale(s) showed more increase from pretest to posttest under the effect of intervention. Evidently, for such comparisons, first the posttest scores were subtracted from pretest scores (for each subscale) to come up with achievement scores in terms of each TPACK subscale. Then, Repeated Measures ANOVA was run to compare the subscales' achievement scores.

Comparison of TPACK Subscales Achievement Scores across the Experience Level

To begin Repeated Measures ANOVA for each experience level, first the descriptives of TPACK achievement scores were computed for each experience level separately (Table 7). Since most of the skewness and kurtosis ratios were within ±1.96, the data was all in all considered meeting the normality assumption to allow Repeated Measures ANOVA as a parametric test.

Table 7.
Descriptive Statistics

Experience		N	Min	Max	Mean	SD	Skewness		Kurtosis	
								Std. Error		Std. Error
Novice	TK.ACH	15	.44	1.78	1.06	.45	.11	.58	-1.29	1.12
	CK.ACH	15	.00	.00	.00	.00	.	.	.	.
	PK.ACH	15	.00	2.00	.75	.62	.69	.58	-.41	1.121
	PCK.ACH	15	-.40	.60	.04	.28	.96	.58	.58	1.121
	TCK.ACH	15	2.67	5.00	4.42	.70	-1.70	.58	2.46	1.121
	TPK.ACH	15	4.00	5.71	5.15	.44	-1.41	.58	2.45	1.121
	TPACK.ACH	15	5.50	7.75	6.51	.60	-.09	.58	.21	1.121
	Valid N (listwise)	15								
Experienced	TK.ACH	15	1.78	3.72	2.55	.64	1.00	.58	-.28	1.12
	CK.ACH	15	.00	.20	.01	.05	3.87	.58	15.00	1.12
	PK.ACH	15	-.17	.67	.21	.23	.00	.58	-.08	1.12
	PCK.ACH	15	.00	.80	.28	.28	.77	.58	-.44	1.12
	TCK.ACH	15	4.00	6.00	4.93	.56	.35	.58	-.59	1.12
	TPK.ACH	15	4.43	6.43	5.57	.55	-.56	.58	-.38	1.12
	TPACK.ACH	15	6.00	7.75	6.86	.49	-.06	.58	-.70	1.12
	Valid N (listwise)	15								

Additionally, the results of the sphericity assumption test indicated this assumption was not met ($p < .05$); therefore, sphericity was not assumed in Table 8 of the main Repeated Measures ANOVA results.

According to Table 8 of the Repeated Measures ANOVA results, there is significant difference among the TPACK subscales means ($p < .05$) in both experience levels; therefore, to locate the difference, post hoc pairwise comparisons were run but not adjusting for the multiple comparisons since there were too many comparisons involved among 7 subscales, which would result in Type II Error.

Table 8.
Tests of Within-Subjects Effects
Measure: MEASURE_1

Experience	Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Novice	Scale	Sphericity Assumed	663.50	6	110.58	428.66	.00	.96
		Greenhouse-Geisser	663.50	3.34	198.36	428.66	.00	.96
		Huynh-Feldt	663.50	4.52	146.75	428.66	.00	.96
		Lower-bound	663.50	1.00	663.50	428.66	.00	.96
Experienced	Scale	Sphericity Assumed	743.19	6	123.86	608.69	.00	.97
		Greenhouse-Geisser	743.19	2.59	286.60	608.69	.00	.97
		Huynh-Feldt	743.19	3.23	229.76	608.69	.00	.97
		Lower-bound	743.19	1.00	743.19	608.69	.00	.97

According to the Table of pairwise comparisons in the Appendix and regarding the descriptives in Table 7:

- In the novice group:
    - The subscales with the highest to the lowest achievements are as follows: TPACK (Maximum Achievement), TPK, TCK, TK, PK, PCK, CK (minimum Achievement).
    - TK and PK do not differ significantly (p> .05)
    - PCK and CK do not differ significantly (p> .05)
- In the experienced group:
    - The subscales with the highest to the lowest achievements are as follow: TPACK (Maximum Achievement), TPK, TCK, TK, PCK, PK, CK (minimum Achievement).
    - PCK and PK do not differ significantly (p> .05)

Qualitative Data

The second question focused on exploring how the TPACK-focused online PD course contributed to EFL teachers' PD. The interview questions were focused on examining the teachers' attitudes toward the course, the distinctive features and challenges they encountered, and the aspects they have improved both in their TPACK and their PD.

All the teachers who attended the interview expressed positive attitudes toward the online PD course and were interested in the materials of the course. As one of the teachers (Teacher 3, experienced) noted:

> *Well, at first it was kind of stressful to go online and watch or read the materials. I thought I cannot accomplish the course. However, thanks to all the materials of the first session which were really comprehensive that I figured out what I was going to do each and every session. You know, it was amazing to attend such a wonderful course. All the things I had been looking for were included in the course. Also since it was my first experience of attending an online course, I did learn a lot of new things concerning technology integration in my classes.*

Table 9 below expresses themes concerning the distinctive features of the course, the challenges they encountered, aspects of TPACK they had improved after attending the course and aspects of TPACK which have influenced TPD.

Table 9.
Extracted Themes from EFL Teachers' Interviews Regarding the Online Course

Themes	**EFL teachers' views**
	Sub themes
Distinctive features of the course	Multimedia integration Study anytime anywhere Availability of course instructor Time flexibility of asynchronous environment Learning technology skills Self-paced learning Community building and peer collaboration Teacher empowerment Sustained technology support Asking for and receiving peer feedback Reflective practice
Challenges teachers encountered	Technical problems Lack of access to You-Tube without VPN Feedback to questions were not always prompt
Aspects of TPACK improvement	Improvement of novice teachers in TPACK, TPK, TCK, TK, PK and PCK. Improvement of experienced teachers in TPACK, TK, TPK, and TCK

As expressed in Table 9, among the distinctive features of the course, multimedia integration of materials was mentioned by the interviewees. As one of the teachers (teacher 2, experienced) noted:

> *Actually, the integration of a wide range of multimedia content was very interesting to me. To me, they were highly engaging and every time I went online I was very curious about going to the online class and watching or reading the rest of the materials. I learned a lot of new things through those different types of multimedia content.*

Another positive characteristic of the course was considered learning from outside of the classsroom and studying anytime anywhere without any restrictions. In addition, self-paced learning was another distinctive feature of the course pointed out by teacher participants. They mentioned they could watch the videos as many times as desired or read the materials at their own pace. Moreover, community building and peer collaboration were among the emerged themes. Teachers maintained they were very satisfied with the course and the element of community building helped them collaborate with their novice or experienced colleagues and learn from each other which, in turn, contributed to their PD.

Moreover, teacher empowerment also emerged as one of the themes. According to one of the interviewees (teacher 10, experienced):

> *Before attending this professional development course, I never knew I could learn this much regarding technology and TPACK. Now I feel*

> *more confident and I guess I have developed professionally, I have become much more independent in using technology and I can make the right decisions as to how to teach a specific content through the best technological pedagogical practices.*

Similarly, themes of sustained technology support, and asking for and receiving peer feedback were regarded as its distinctive features by the interviewees. Concerning the challenges EFL teachers encountered, four themes emerged out of which technical problems were the most frequent ones. As one of the teachers (teacher 7, novice) noted:

> *Well, one of the challenges I encountered was troubleshooting internet connection problems. Sometimes it would take a video forever to be streamed. It was really frustrating. Of course it is not the course's fault, but the fact that online courses are dependent on the internet can sometimes cause problems for class members.*

Furthermore, all novice and experienced teachers mentioned that they had improved in their TPACK the most after the completion of the course. With regard to novice teachers' development in TPACK aspects, it was explored that they had improved more in their TPK, TCK, TK, PK, and PCK. Likewise, concerning experienced teachers' development in TPACK aspects, it was revealed they had improved more in their TK, TPK, and TCK. Last but not least, all of the teachers confirmed that those improved TPACK aspects had influenced their PD in that they were more satisfied with their teaching experiences and their students' motivation and learning had also increased.

Discussion

The findings of the study on the TPACK change from pretest to post test, the findings demonstrated that both groups showed significant improvement in their TPACK (both TPACK and its subscales' scores) from pre-test to post-test except that there was no significant difference in PCK of the novice group and CK of both groups. The reason behind this finding is that the focus of the syllabus was, by and large, on technology and its combination with other forms of teacher knowledge. In addition, as a second priority, it focused on the pedagogical aspect of TPACK only through including nonverbal immediacy behaviors and reflective teaching techniques. The component of CK was not addressed due to the focus of the study. When EFL teachers learn about useful technology tools and pedagogical strategies for effective teaching, they can teach any content. Likewise, they are already English teachers. Therefore, they possess the content knowledge. However, in order to develop their TPACK as a way to promote their PD, EFL teachers need to acquire the knowledge of technology in addition to some less attended strategies of pedagogical knowledge.

Regarding the comparison of novice and experienced EFL teachers concerning their TPACK, it was found that experienced EFL teachers had higher TPACK

scores and PCK subscale score means compared with the novice group. This result showed that experienced teachers could benefit more from the online course compared to novice teachers regarding TPACK and PCK. This finding concerning higher PCK is in agreement with those of Cheng (2017), Jang and Chang (2016), and Jang and Tsai (2012) in that experienced teachers had higher PCK. Similarly, it is in harmony with that of Nilsson (2008) in that it was stated an experienced teacher is different from a novice since the experienced one is more capable of implementing different teaching models and techniques and is more skilled in facilitating classroom interaction. However, in a recent study by Ozudogru and Ozudogru (2019), teaching experience was not found to have a crucial effect on the teachers' TPACK.

In view of comparison of TPACK subscales achievement scores across the experience level, it transpired that in the novice group, the subscales with the highest to the lowest achievements were as follows: TPACK (maximum achievement), TPK, TCK, TK, PK, PCK, CK (minimum achievement). In addition, in the experienced group, the subscales with the highest to the lowest achievements were as follows: TPACK (maximum achievement), TPK, TCK, TK, PCK, PK, CK (minimum achievement).

With regard to the above findings, one explanation might be the purpose of the course which was focused on TPACK and technology integration in general and the pedagogical knowledge domain in terms of nonverbal immediacy and reflectivity in particular. In fact, a strong TPACK is fundamentally important in EFL teaching (Liu et al., 2014; Mishra & Koehler, 2006). The aforementioned finding on the development of TPACK after an online course for teachers is in accordance with that of Doering et al. (2009), in that the teachers gained metacognitive awareness of TPACK for their PD.

The second research question focused on exploring teachers' views on the experience of participating in the online course which, in turn, promoted their PD. All the teachers who attended the course had positive attitudes toward the course. This is consistent with that of Le and Song (2018) in that teachers had positive ideas about TPACK in a CALL course. As technology has been incorporated in all aspects of their pedagogical practices, it is regarded as their immediate and crucial need. It also resonates with the findings of Cahyono et al., (2016) in that the professional development of EFL instructors benefited from the TPACK-based course. Additionally, it is in line with that of Ansyari (2015) in that EFL teachers had positive experiences with the teacher PD program for technology integration.

As the distinctive features of the course, multimedia integration, study anytime anywhere, availability of course instructor, time flexibility of asynchronous environment, and self-paced learning were among the most frequent ones. Additionally, the finding on community building and peer collaboration is partly in agreement with that of Yang (2009) in that EFL teachers regarded technology a practical platform for reflective communication with each other. This finding and the findings on peer collaboration is also in line with those of Liu and Kleinsasser' s study (2014) on fostering online PD for EFL pre-service and

in-service teachers in that the course afforded reflective practice and collaborative interaction. Moreover, teacher empowerment through developing TPACK is in compliance with that of Doering et al. (2009). The finding on technical issues as one of the challenges is in harmony with that of Song et al. (2004). Regarding the challenges, the finding on technical issues is commensurate with that of Valtonen et al. (2020) in that technical problems and the ability to solve them was discovered among the challenges concerning TK in teachers' views.

Concerning the improved TPACK aspects, given that not all aspects were addressed equally in the class, the teachers had not improved in all aspects of TPACK equally. One explanation could be the function of context which is quite inevitable and the requirements of class level and lesson themes. This finding is commensurate with that of Doering et al. (2009) in that teachers did not apply all three knowledge domains equally depending on the context of a situation and the different levels of knowledge a teacher possesses. All things considered, it appears that the goals of this study were achieved. It intended to make contributions to the current literature by investigating the effect of an online PD course on novice and experienced EFL teachers' perceived TPACK. Furthermore, it was successful in exploring EFL teachers' views on the online course experience.

Conclusion and Implications

With respect to EFL teachers' views on the experience of attending the TPACK-focused online PD course, it was observed that they had very positive views towards the course. In addition, multimedia integration studying anytime anywhere, availability of course instructor, time flexibility of asynchronous environment, learning technology skills, self-paced learning, community building and peer collaboration, teacher empowerment, sustained technology support, asking for and receiving peer feedback in Edmodo were mentioned as the distinctive features of the course.

Concerning the challenges they encountered, technical problems, lack of access to You-Tube without VPNs, and delayed feedback to questions were mentioned by the interviewees. In addition, novice and experienced EFL teachers improved in different aspects of TPACK, i.e. novice teachers generally developed more in TPACK (maximum achievement), TPK, TCK, TK, PK, and PCK (minimum achievement). Moreover, experienced teachers, by and large, developed more in TPACK (maximum achievement), TK, TPK, and TCK in their views. In view of the fact that novice and experienced EFL teachers had different levels of TPACK prior to attending the course and through intervention, they developed in the required aspects of TPACK for their PD, it could be concluded that TPACK is both a function of context as well as teaching experience and its levels vary across teaching experiences and contexts.

This research will serve as a base for future studies providing precious pedagogical implications for Teacher Training Course (TTC) trainers, education course developers, supervisors, EFL teachers, administrators and supervisors,

policy makers and stakeholders. Firstly, the findings could help TTC educators to recognize the significance of technology-embedded instruction in foreign language classes, teach teachers many instructional technological capabilities, and inform them about the substantial role of possessing a strong TPACK and its significance in teaching with technology creatively contributing to their PD. Equally important, it is recommended that TTC trainers create tailor-made online PD communities of practice for both groups of teachers and facilitate peer collaboration taking the variable of experience into account to gain the professional knowledge of pedagogy and content in combination with other bodies of core knowledge in TPACK.

Secondly, it is crucial that teacher education course developers to integrate technology into the syllabus for promoting teaching and learning and to design different bottom-up, needs-based TTC courses considering the needs of both groups of EFL teachers to support their PD. Next, there appears to be a need for supervisors to feed back EFL teachers of varying teaching experience on their TPACK levels. Additionally, the results of this study would assist interested EFL teachers to create lesson plans incorporating all TPACK levels for successful teaching. Moreover, administrators and supervisors ought to provide EFL teachers (novice and experienced) with tailor-made PD courses on TPACK to incorporate the three TPACK knowledge domains in the appropriate context contributing to their PD. Finally, the findings could inform policy makers and stakeholders as to the importance of teacher TPACK and how this concept can be included in evaluative measures for EFL teachers' PD.

The results of this research must be interpreted with caution and a number of limitations should be borne in mind. One of the limitations of this study lies in the generalizability scope of the study due to its small scope and volunteer sampling. The researchers also could not control the age, gender, and educational background of the participants. Additionally, since self-report data assess perception, some instructors might have made socially acceptable responses. Likewise, the lack of a control group is considered another limitation which might weaken the findings.

This research has brought forth many questions requiring further investigation. Further research will have to address the impact of contextual knowledge as the most important element of TPACK in an oTPD course. Likewise, qualitative studies could be conducted through having observation techniques and stimulated recall protocols, and focused group interviews for the analysis of TPACK application by EFL teachers. Furthermore, a qualitative study could be conducted through creating communities of practice for novice and experienced EFL teachers aimed at designing lesson plans for different contexts of teaching and allowing them to share their lesson plans to add to their levels of TPACK. Likewise, a further study applying criterion sampling and selecting an equal number of female and male teachers with specific years of teaching experience for attending an online PD course on TPACK would contribute to a clearer picture of EFL teachers' levels of TPACK development.

Further research is suggested to advance investigating various manifestations of the elements of EFL teachers' TPACK by means of collecting data from teachers' lesson plans, observational methods, stimulated verbal/written reports, reflective journals, and focus group discussions. It would also be worthwhile to evaluate university lecturers' or school teachers' responses to instruments as well. Although this study employed a sequential explanatory mixed methods design, other forms of mixed methods or triangulation such as using observations, field notes, and focus group interviews could be applied to gain better results as to EFL teachers' levels of TPACK leading to their PD.

References

Ansyari, M. F. (2015). Designing and evaluating a professional development programme for basic technology integration in English as a foreign language (EFL) classrooms. *Australasian Journal of Educational Technology*, *31*(6), 699-712.

Baser, D., Kopcha, T., & Ozden, M. (2015). Developing a technological pedagogical content knowledge (TPACK) assessment for preservice teachers learning to teach English as a foreign language. Computer Assisted Language Learning. 1-16. https://doi.org/10.1080/09588221.2015.1047456.

Benson, S. N. K., & Ward, C. L. (2013). Teaching with technology: Using TPACK to understand teaching expertise in online highereducation. *Journal of Educational Computing Research*, *48*(2), 153-172.

Boehm, R. G., Brysch, C. P., Mohan, A., & Backler, A. (2012). A new pathway: Video-based professional development in geography. *Journal of Geography*, *111*(2), 41-53.

Bustamante, C. (2019). TPACK-based professional development on web 2.0 for Spanish teachers: A case study. *Computer Assisted Language Learning*, *32* (1), 1-26.

Cahyono, B. Y., Kurnianti, O. D., & Mutiaraningrum, I. (2016). Indonesian EFL teachers' application of TPACK in in-service education teaching practices. *International Journal of English Language Teaching, 4*(5), 16-30.

Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2010). Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK). *Journal of Educational Technology & Society*, *13*(4), 63-73.

Chai, C. S., Koh, J. H. L., Tsai, C. C., & Tan, L. L. W. (2011). Modeling primary school preservice teachers' technological pedagogical content knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education*, *57*(1), 1184-1193.

Cheng, K. H. (2017). A survey of native language teachers' technological pedagogical and content knowledge (TPACK) in Taiwan. *Computer Assisted Language Learning*, *30*(7), 692-708.

Collins, L. J., & Liang, X. (2015). Examining high quality online teacher professional development: Teachers' voices. *International Journal of teacher leadership*, *6*(1), 18-34.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession.* National Staff Development Council. https://static1.squarespace.com

Dede, C., Jass Ketelhut, D., Whitehouse, P., Breit, L., & McCloskey, E. M. (2009). A research agenda for online teacher professional development. *Journal of Teacher Education*, *60*(1), 8-19.

Doering, A., Veletsianos, G., Scharber, C., & Miller, C. (2009). Using the technological, pedagogical, and content knowledge framework to design online learning envi-

ronments and professional development. *Journal of Educational Computing Research*, *41*(3), 319- 346.

Dong, Y., Chai, C. S., Sang, G. Y., Koh, J. H. L., & Tsai, C. C. (2015). Exploring the profiles and interplays of pre-service and in-service teachers' technological pedagogical content knowledge (TPACK) in China. *Journal of Educational Technology & Society*, *18*(1), 158-169.

Elliott, J. C. (2017). The evolution from traditional to online professional development: A review. *Journal of Digital Learning in Teacher Education*, *33*(3), 114-125.

Elliott, P. S. (2018). Practice what we teach: Using the TPACK framework to connect professional development and academic programs and processes. *College and University*, *93*(4), 16-24.

Farrell, T. S. C. (2000). English teacher development: Top-down, bottom-up or both? *Teaching and Learning, 21*(1), 27-35.

Fathi, J., & Yousefifard, S. (2019). Assessing language teachers' technological pedagogical content knowledge (TPACK): EFL students' perspectives. *Research in English Language Pedagogy, 7*(2), 255-282.

Gu, L., Jiao, J., Wang, X., Jia, Y., Qin, D., & Lindberg, J. O. (2012). Case studies on the use of technology in TPD (Teacher Professional Development). *US-China Education Review, A*(*3*), 278-290.

Hafiz, M., & Kwong, T. (2019). A structured, multi-mode professional development programme on blended learning and its influences on the participants' TPACK. *International Journal of Smart Technology and Learning, 1*(3), 267-280.

Hammonds, L., Matherson, L. H., Wilson, E. K., & Wright, V. H. (2013). Gateway tools: Five tools to allow teachers to overcome barriers to technology integration. *Delta Kappa Gamma Bulletin*, *80*(1), 36-40.

Hartono, R. (2016). *Indonesian EFL Teachers' perceptions and experiencs of professional development*. (Master's thesis). Indiana University of Pennsylvania. http://knowledge.library.iup.edu/etd

Hodge, A. (2015). *Teachers' perceptions of an online social network as an instructional platform: The impact of an Edmodo-based professional development workshop.* Doctoral Dissertations and Projects. Duquesne University.

Hsiao, E. L. (2012). Synchronous and asynchronous communication in an online environment: Faculty experiences and perceptions. *Quarterly Review of Distance Education*, *13*(1), 15-30.

Jang, S. J., & Chang, Y. (2016). Exploring the technical pedagogical and content knowledge (TPACK) of Taiwanese university physics instructors. *Australasian Journal of EducationalTechnology*, *32*(1), 107-122.

Jang, S. J., & Tsai, M. F. (2012). Exploring the TPACK of Taiwanese elementary mathematics and science teachers with respect to use of interactive whiteboards. *Computers & Education*, *59*(2), 327-338.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical knowledge (TPACK)? *Contemporary Issues in Technology Education*, *9*(1), 60-70.

Koh, J. H. L. (2019). TPACK design scaffolds for supporting teacher pedagogical change. *Educational Technology Research and Development, 67*(3), 577-595.

Kwangsawad, T. (2016). Examining EFL pre-service teachers' TPAC through self-report, lesson plans and actual practice. *Journal of Education and Learning*, *10*(2), 103-108.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research*, *77*(4), 575-614.

Le, N., & Song, J. (2018). TPACK in a CALL course and its effect on Vietnamese preservice EFL teachers1. *The Asian EFL Journal Quarterly*, *20* (9.1), 31-56.

Liu, M. H., & Kleinsasser, R. (2015). Exploring EFL teachers' knowledge and competencies: *In-service program perspectives. Language Learning & Technology, 19*(1), 119-138.

Liu, S., Liu, H., Yu, Y., Li, Y., & Wen, T. (2014). TPACK: A new dimension to EFL teachers' PCK. *Journal of Education and Human Development*, *3*(2), 681-693.

Malik, S., Rohendi, D., & Widiaty, I. (2019, February). Technological Pedagogical Content Knowledge (TPACK) with Information and Communication Technology (ICT) integration: A literature review. In *5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018)*. Atlantis Press.

Matherson, L. H., Wilson, E. K., & Wright, V. H. (2014). Need TPACK? Embrace sustained professional development. *Delta Kappa Gamma Bulletin*, *81*(1), 45.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054.

Nazari, N., Nafissi, Z., Estaji, M., & Marandi, S. S. (2019). Evaluating novice and experienced EFL teachers' perceived TPACK for their professional development. *Cogent Education, 6*(1), 1-26.

Niess, M. L., van Zee, E. H., & Gillow-Wiles, H. (2010). Knowledge growth in teaching mathematics/science with spreadsheets: Moving PCK to TPACK through online professional development. *Journal of Digital Learning in Teacher Education*, *27*(2), 42-52.

Nilsson, P. (2008). Teaching for understanding: The complex nature of pedagogical content knowledge in pre-service education. *International Journal of Science Education. 30*(10), 1281-1299.

Oster-Levinz, A., & Klieger, A. (2010). Online tasks as a tool to promote teachers' expertise within the Technological Pedagogical Content Knowledge (TPACK). *Procedia Social and Behavioral Sciences*, *2*(2), 354-358.

Ozudogru, M., & Ozudogru, F. (2019). Technological pedagogical content knowledge of mathematics teachers and the effect of demographic variables. *Contemporary educational technology, 10*(1), 1-24.

Pareto, L., & Willermark, S. (2019). TPACK in situ: A design-based approach supporting professional development in practice. *Journal of Educational Computing Research*, *57*(5),1186-1226.

Parsons, S. A., Hutchison, A. C., Hall, L. A., Parsons, A. W., Ives, S. T., & Leggett, A. B. (2019). US teachers' perceptions of online professional development. *Teaching and Teacher Education:International Journal of Research and Studies*, *82*(1), 33-42.

Pelgrum, W. J., & Law, N. W. Y. (2003). *ICT in education around the world: Trends, problems and prospects*. UNESCO: International Institute for Educational Planning.

Powell, C. G., & Bodur, Y. (2019). Teachers' perceptions of an online professional development experience: Implications for a design and implementation framework. *Teaching and Teacher Education*, *77*(1), 19-30.

Prestridge, S. (2017). Conceptualizing self-generating online teacher professional development. *Technology, Pedagogy and Education*, *26*(1), 85-104.

Richards, J. C., & Farrell, T. S. C. (2005). *Professional development for language teachers: Strategies for teacher learning.* Cambridge University Press.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Smith, J. A., & Sivo, S. A. (2012). Predicting continued use of online teacher professional development and the influence of social presence and sociability. *British Journal of Educational Technology*, *43*(6), 871-882.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The Internet and Higher Education*, *7*(1), 59-70.

Tanak, A. (2018). Designing TPACK-based course for preparing student teachers to teach science with technological pedagogical content knowledge. *Kasetsart Journal of Social Sciences*, *30*, 1-7. *https://doi.org/10.1016/j. kjss.2018.07.012*

Trust, T. (2012). Professional learning networks designed for teacher learning. *Journal of Digital Learning in Teacher Education*, *28*(4), 133-138.

Tseng, J. J. (2018). Exploring TPACK-SLA interface: Insights from the computer-enhanced classroom. *Computer Assisted Language Learning*, *31*(4), 390-412.

Valtonen, T., Leppänen, U., Hyypiä, M., Sointu, E., Smits, A., & Tondeur, J. (2020). Fresh perspectives on TPACK: Pre-service teachers' own appraisal of their challenging and confident TPACK areas. *Education and Information Technologies*, *25*, 2823-2842. https://doi.org/10.1007/s10639-019-10092-4

Voogt, J., & McKenney, S. (2017). TPACK in teacher education: Are we preparing teachers to use technology for early literacy? *Technology, pedagogy and education, 26*(1), 69-83.

Yang, S. H. (2009). Using blogs to enhance critical reflection and community of practice. *Educational Technology & Society*, *12*(2), 11-21.

Young, J. R., Young, J., Hamilton, C., & Pratt, S. S. (2019). Evaluating the effects of professional development on urban tathematics Teachers TPACK using confidence intervals. *Journal of Research in Mathematics Education*, *8*(3), 312-338.

Appendix
List of Tables

Table 1.
Pairwise Comparisons

Measure: MEASURE_1

Experience	(I) Scale	(J) Scale	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Novice	1	2	1.067*	.118	.000	.813	1.320
		3	.311	.162	.075	-.036	.659
		4	1.027*	.137	.000	.733	1.320
		5	-3.356*	.247	.000	-3.886	-2.825
		6	-4.086*	.153	.000	-4.414	-3.757
		7	-5.450*	.170	.000	-5.815	-5.085
	2	1	-1.067*	.118	.000	-1.320	-.813
		3	-.756*	.163	.000	-1.104	-.407
		4	-.040	.074	.595	-.198	.118
		5	-4.422*	.182	.000	-4.814	-4.031
		6	-5.152*	.115	.000	-5.400	-4.905
		7	-6.517*	.155	.000	-6.850	-6.184
	3	1	-.311	.162	.075	-.659	.036
		2	.756*	.163	.000	.407	1.104
		4	.716*	.169	.001	.353	1.078
		5	-3.667*	.290	.000	-4.289	-3.045
		6	-4.397*	.219	.000	-4.866	-3.928
		7	-5.761*	.217	.000	-6.227	-5.295
	4	1	-1.027*	.137	.000	-1.320	-.733
		2	.040	.074	.595	-.118	.198
		3	-.716*	.169	.001	-1.078	-.353
		5	-4.382*	.209	.000	-4.830	-3.934
		6	-5.112*	.145	.000	-5.423	-4.802
		7	-6.477*	.183	.000	-6.869	-6.085
	5	1	3.356*	.247	.000	2.825	3.886
		2	4.422*	.182	.000	4.031	4.814
		3	3.667*	.290	.000	3.045	4.289
		4	4.382*	.209	.000	3.934	4.830
		6	-.730*	.242	.009	-1.249	-.211
		7	-2.094*	.251	.000	-2.633	-1.555
	6	1	4.086*	.153	.000	3.757	4.414
		2	5.152*	.115	.000	4.905	5.400
		3	4.397*	.219	.000	3.928	4.866
		4	5.112*	.145	.000	4.802	5.423
		5	.730*	.242	.009	.211	1.249
		7	-1.364*	.142	.000	-1.668	-1.060
	7	1	5.450*	.170	.000	5.085	5.815
		2	6.517*	.155	.000	6.184	6.850
		3	5.761*	.217	.000	5.295	6.227
		4	6.477*	.183	.000	6.085	6.869
		5	2.094*	.251	.000	1.555	2.633
		6	1.364*	.142	.000	1.060	1.668

		2	2.546*	.170	.000	2.182	2.910
	1	3	2.348*	.144	.000	2.038	2.658
		4	2.279*	.187	.000	1.879	2.680
		5	-2.374*	.208	.000	-2.819	-1.929
		6	-3.012*	.292	.000	-3.638	-2.386
		7	-4.307*	.228	.000	-4.796	-3.819
	2	1	-2.546*	.170	.000	-2.910	-2.182
		3	-.198*	.064	.008	-.336	-.060
		4	-.267*	.075	.003	-.427	-.106
		5	-4.920*	.149	.000	-5.239	-4.601
		6	-5.558*	.143	.000	-5.865	-5.251
		7	-6.853*	.132	.000	-7.137	-6.570
	3	1	-2.348*	.144	.000	-2.658	-2.038
		2	.198*	.064	.008	.060	.336
		4	-.069	.086	.437	-.254	.116
		5	-4.722*	.142	.000	-5.028	-4.417
		6	-5.360*	.176	.000	-5.738	-4.983
		7	-6.656*	.140	.000	-6.957	-6.355
Experienced	4	1	-2.279*	.187	.000	-2.680	-1.879
		2	.267*	.075	.003	.106	.427
		3	.069	.086	.437	-.116	.254
		5	-4.653*	.135	.000	-4.943	-4.364
		6	-5.291*	.138	.000	-5.588	-4.995
		7	-6.587*	.132	.000	-6.870	-6.303
	5	1	2.374*	.208	.000	1.929	2.819
		2	4.920*	.149	.000	4.601	5.239
		3	4.722*	.142	.000	4.417	5.028
		4	4.653*	.135	.000	4.364	4.943
		6	-.638*	.210	.009	-1.089	-.187
		7	-1.933*	.184	.000	-2.327	-1.540
	6	1	3.012*	.292	.000	2.386	3.638
		2	5.558*	.143	.000	5.251	5.865
		3	5.360*	.176	.000	4.983	5.738
		4	5.291*	.138	.000	4.995	5.588
		5	.638*	.210	.009	.187	1.089
		7	-1.295*	.156	.000	-1.629	-.961
	7	1	4.307*	.228	.000	3.819	4.796
		2	6.853*	.132	.000	6.570	7.137
		3	6.656*	.140	.000	6.355	6.957
		4	6.587*	.132	.000	6.303	6.870
		5	1.933*	.184	.000	1.540	2.327
		6	1.295*	.156	.000	.961	1.629

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).