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Assessing Pre-service English as a Foreign Language Teachers' Technological Pedagogical Content Knowledge

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Abstract

The present research aimed to assess pre-service English as a foreign language teachers' technological pedagogical content knowledge. A total of 76 undergraduate students enrolled in an English language teaching (ELT) program at a major state university in Turkey were recruited in the study and were asked to anonymously complete the Technological Pedagogical Content Knowledge Scale and answered some open-ended questions. The findings revealed a highly developed knowledge of TPACK (Mean > 3.5; 81%). Gender differences were found to be significant with respect to Technological Knowledge (TK) and Pedagogical Knowledge (PK) dimensions with females proportionally having higher TPACK development. The findings of qualitative data analysis also revealed that compared with cooperating teachers, faculty members in the department used more TPACK in a classroom lesson. Thus, these findings contribute to understanding the nature and development of TPACK based instruction among pre-service English teachers, suggesting that the integration of content, pedagogy and technological knowledge into the existing teacher education paradigm and fostering technologically-rich environment for language learners will contribute to quality learning and teaching.

Keywords: pre-service English teachers, teacher education, technological pedagogical content knowledge, TPACK

1. Introduction

Turkey has recently identified and emphasized the use of Information and Communications Technologies (ICT) as an important instructional tool within schools across the country (Ministry of National Education [MoNE], 2010) in line with the significant educational reform efforts being made by the EU countries (European Commission, 2003). Since English language teaching (ELT) is one of the subject areas in which ICT plays a crucial role, ELT teachers are required to enter classrooms with the knowledge and skills necessary to plan and implement quality lessons using technology to support curriculum objectives in the 21st century. This means that language teachers who want to utilize and integrate technology into their teaching must be competent in not only content and pedagogy but the potential of technology as well. Thus, the Technological Pedagogical Content Knowledge (TPACK) model has been introduced to describe an integrated conceptual framework for the knowledge base that teachers must possess to effectively teach with technology in classroom settings (Mishra & Koehler, 2006).

TPACK builds on Schulman's (1987) conceptualization of pedagogical content knowledge (PCK) regarded as an important feature to the teacher's profession. Many transformational technological developments have occurred since the advent of the PCK framework at a time when ICT tools like computers were just making an appearance in schools. Due to many developments in ICT over the last decade, teacher education programs must train the 21st century teachers in a way that enables them to possess skills and experience as well as the knowledge required to effectively integrate technology into their teaching (Alayyar, Fisser, & Voogt, 2012; Jamieson-Proctor, Finger, & Albion, 2010; Koehler, Mishra, & Yahya, 2007; Mishra & Koehler, 2006). Mishra and Koehler (2006) designed the TPACK framework to explain the dynamic relationships among content knowledge, pedagogical knowledge, and technology knowledge. This framework now forms the crucial knowledge base of the 21st century teacher's profession (Figure 1).

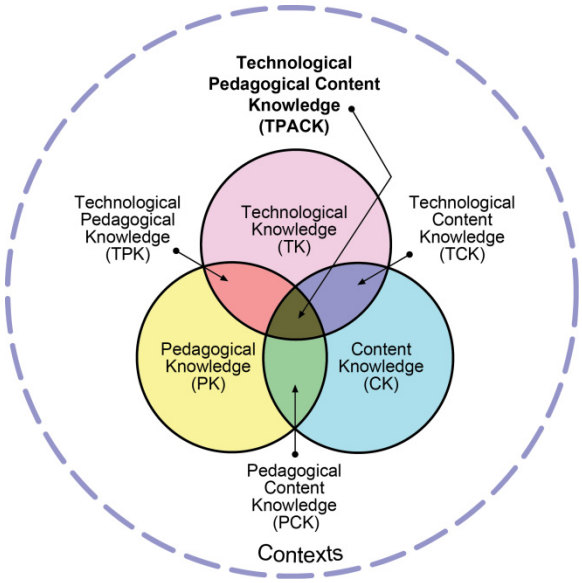

Figure 1. Graphic representation of technological pedagogical content knowledge (From http://tpack.org)

The three major components of teacher knowledge in this framework consist of content knowledge (CK), pedagogical knowledge (PK), and technology knowledge (TK). Equally important are the significant interactions between and among these three types of knowledge. These comprise pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK) (Koehler & Mishra, 2005, 2008, 2009; Mishra & Koehler, 2006). These seven categories are briefly defined as follows:

1) Content knowledge (CK) refers to the "knowledge about actual subject matter that is to be learned or taught" (Koehler & Mishra, 2008, p. 13). Teachers need to know about both what they are going to teach (i.e., the subject matter) and how that knowledge differs for other content areas such as biology and history.

2) Pedagogical knowledge (PK) is "deep knowledge about the processes and practices or methods of teaching and learning and encompasses (among other things) overall educational purposes, values, and aims" (Koehler & Mishra, 2008, p. 14). It comprises a 'generic' type of knowledge in teaching techniques, methods, approaches, classroom management, assessment, lesson plan development, and student learning.

3) Pedagogical content knowledge (PCK) means the content knowledge that applies to the teaching of the specific subject matter (Schulman, 1987). PCK is different for various content areas because it combines content and pedagogy by aiming at developing better teaching practices in specific content areas (Schmidt et al., 2009).

4) Technology knowledge (TK) is continually in a state of change and includes the knowledge about various digital technologies such as computers, internet, mobile devices, interactive whiteboards, digital video, and software applications (Koehler & Mishra, 2008; Schmidt et al., 2009).

5) Technological content knowledge (TCK) refers to the knowledge of how technology can provide affordances for new representations of content areas (Koehler & Mishra, 2008). This means that teachers need to know not only the specific content they teach but also how the specific content can be changed by using technology. Briefly, TCK deals with how ICT and content influence each other.

6) Technological pedagogical knowledge (TPK) means knowing how numerous technologies can be used in teaching, and understanding that using particular technologies may change how teachers teach in classrooms (Koehler & Mishra, 2008; Schmidt et al., 2009).

7) Technological pedagogical content knowledge (TPACK) integrates knowledge of technology, pedagogy, and content at the same time. It "is different from knowledge of all three concepts individually" and "is the basis of effective teaching with technology" (Koehler & Mishra, 2008, p. 17). Teachers must have the knowledge of how they can integrate technology in the subject matter and "an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies" (Schmidt et al., 2009).

Overall, these definitions indicate that the TPACK model is a robust and useful framework for thinking about the knowledge and skills that teachers should have in order to effectively integrate technology into teaching and how they may develop their knowledge and skills. Using this comprehensive framework for assessing teaching knowledge of pre-service English teachers might potentially affect the kind of teacher training and professional development endeavors designed for them. As Schmidt et al. (2009, p. 126) rightly put it, "there is a continual need to rethink our preparation practices in the teacher education field and propose new strategies that better prepare teachers to effectively integrate technology into their teaching".

Given that pre-service teachers' TPACK development is also a major concern of ELT teacher preparation programs in Turkey, this study aimed at exploring the development of pre-service English teachers' TPACK in an ELT department. A review of TPACK literature indicates that although studies on teachers' TPACK have considerably increased in recent years, research mostly focuses on pre-service teachers' development of TPACK in other content areas such science, mathematics or social sciences (Abbitt, 2011; Horzum, 2011; Jamieson-Proctor et al., 2010; Kabakci-Yurdakul, 2011; Z. Kaya, O. Kaya, & Emre, 2013; Koehler & Mishra, 2005; Schmidt et al., 2009; Voogt et al., 2013). A detailed search in scientific databases (ULAKBIM-Turkish Academic Network and Information Center, Web of Science, Scopus, Education Resources Information Center (ERIC), and PsychINFO) has revealed a very limited number of studies conducted to investigate the TPACK development of pre-service English teachers.

Two recent national studies used the TPACK framework and investigated EFL teachers' knowledge and skills in technology integration. As one of the first studies, Koçoğlu's (2009) qualitative study explored how pre-service EFL teachers developed the knowledge and skills in integrating technology into L2 teaching. Her findings revealed that building EFL teachers' TPACK during a pre-service teacher education program and supporting them in their TPACK implementation would help them to successfully integrate ICT in language classrooms. Similarly, Kurt, Mishra, and Koçoğlu (2013) examined the TPACK development of Turkish pre-service EFL teachers as they engaged in an explicit TPACK development program based on Learning Technology by Design approach (Mishra & Koehler, 2006). The findings of their study revealed that after a 12-week treatment there was a statistically significant increase in TK, TCK, TPK and TPACK scores of participants without prior training on technology integration into L2 teaching. Another significant finding of their study was that the TPACK development program helped pre-service EFL teachers to gain high confidence in choosing technologies that enhance the teaching approaches and students' learning in a lesson.

International research into EFL teachers' TPACK development is now emerging. In a recent study exploring English lecturers' TPACK development for technology integration in an EFL teaching setting, Ansyari's (2012) findings revealed that all participants had positive experiences with the professional development program for technology integration and that the drawbacks of the program mostly focused on limited time, technology exploration, and students' active engagement. Among the significant aspects of EFL teachers' TPACK development reported were a knowledge base, learning technology by design approach, active engagement, authentic learning experiences in a collaborative environment, guidance, support, and feedback, curriculum coherency, and intensive program. In addition, two recent studies (Tai & Chuanh, 2012; Tai, 2013) explored the impact of TPACK-in-action workshops on EFL teachers from different perspectives including teachers' development of TPACK competencies. Their findings also revealed that the workshops had a strong positive impact on English teachers' competencies, such as choosing appropriate technology for content teaching and matching the affordance of technology to their instructional goals and pedagogy.

Given that EFL teacher preparation programs in Turkey continually need to assess their teacher preparation practices and propose new instructional practices that will better train teachers to integrate technology into language teaching, there is a need to explore the TPACK development of pre-service EFL teachers who get training in ICT integration into teaching. Whereas there are numerous studies conducted to measure teachers' development of TPACK in various content areas (see Voogt et al., 2013 for a review), there is limited research into EFL teachers' knowledge and skills in the integration of technology in language teaching. To address the lack, the present study aims to investigate pre-service English teachers' development of TPACK and identify the strengths and weaknesses of teacher preparation practices in an ELT program. To this end, the following research questions were formulated to guide the study.

1) How well does an ELT teacher education program prepare EFL teachers with respect to their levels of TPACK development?

2) What are pre-service EFL teachers' models of TPACK combining content, technologies, and teaching approaches in a classroom lesson?

3) Is there a significant difference in pre-service EFL teachers' development of TPACK by gender and academic achievement?

2. Method

2.1 Research Design

This study was conducted using a mixed-methods search design, a procedure for gathering, analyzing, and mixing qualitative and quantitative research methods in a single study to understand a research problem (Creswell, 2012). Mixed method approach combines the strengths of both qualitative and quantitative research, thus providing more insight about the problem (Dörnyei, 2007). This section presents the participants, instrumentation, and procedures for data collection and analysis.

2.2 Participants

The study was conducted in an English language teaching (ELT) department at a major state university in Turkey. In selecting the participants, the researchers employed convenience sampling technique, a common non-probability sampling technique in L2 research where an important criterion of sample selection is the convenience to and resources of the researcher (Dörnyei, 2007). A total of 76 participants in their final semester of the teacher education program completed an online survey, responding to the statements on a 5-point (ranging from 1. strongly disagree to 5. strongly agree) Likert scale and answering some open-ended questions. Of the 76 students who completed the survey, 55 (72.5%) were female and 21 (27.5%) were male. Their mean age was 22.38 years (SD = .76, range 21~24). When the study was conducted, all the participants were practicing English teaching as part of the practicum course in the curriculum, and they had already earned about 145-150 credits, including a four-hour, three-credit instructional technologies and materials design course.

2.3 Research Instrument

The instrument of this study included an adapted English version of "Survey of Pre-service Teachers' Knowledge of Teaching and Technology" (Schmidt et al., 2009). This instrument has been extensively used in various subject areas to assess pre-service teachers' development of Technological Pedagogical Content Knowledge (TPACK) and related knowledge domains within the framework. The scale includes seven components: Technological Knowledge (TK), Content Knowledge (CK), Pedagogical Knowledge (PK) Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK). Since the original scale did not contain second or foreign language (L2) specific items, the researchers adapted items in CK (e.g., "I have sufficient knowledge of English (e.g., listening, speaking, reading, writing, vocabulary, etc."), in PCK (e.g., "I know how to modify English language content to suit different types of students"), and TCK (e.g., "I know about technologies that I can use for teaching English language skills"). As a result, the TPACK instrument consists of 34 items on a 5-point Likert scale. The internal consistency was examined using Cronbach's alpha for seven components as well as the whole scale. Cronbach's alpha coefficients of the scale with seven factors (i.e., TK, CK, PK, PCK, TCK, TPK and TPACK) ranged from .72 to .88, and the reliability estimate of the whole scale was α=.93 (Table 1).

Table 1. Variables and reliabilities

Variables	Number of items	Cronbach's alpha
Technology Knowledge	7	.83
Content Knowledge	4	.78
Pedagogical Knowledge	7	.87
Pedagogical Content Knowledge	3	.79
Technological Content Knowledge	3	.72
Technological Pedagogical Knowledge	5	.79
Technological Pedagogical and Content Knowledge	5	.88
Total	34	.93

Additionally, the survey included three questions related to models of TPACK combining content, technologies, and teaching approaches in a classroom lesson as demonstrated by departmental and non-departmental teachers as well as the cooperating teachers in the practice school they attended. The participants were also asked open-ended questions aimed at getting insights into their own perceived models of TPACK. The data collected with these questions were used to support the quantitative findings of the study.

2.4 Procedures for Data Collection and Analysis

Data for the study were collected through a questionnaire administered online. To obtain the most representative sample possible, an invitation to complete the questionnaire was sent to 105 online ELT students, using either e-mail or a social networking service. A total of 76 responses were gathered, yielding a 72.5% response rate for the survey. This response rate was considered very satisfactory and higher than most web-based surveys (Shih & Fan, 2008). Data analysis was conducted to address the previously formulated research questions. Descriptive analyses such as frequency and mean were obtained to characterize the collected data. The independent-samples t-test was conducted to compare female and male pre-service teachers' perceptions of TPACK development while one-way ANOVA was used to determine whether there was any statistically significant difference of perceptions among participants according to gender and grade point average (GPA).

3. Results

This study sought to investigate pre-service teachers' development of technological pedagogical content knowledge (TPACK) in an English language teaching (ELT) program. The study was also aimed at exploring effective models of TPACK demonstrated by departmental and non-departmental teachers as well as the cooperating teachers in the practice school they attended, and determine differences in pre-service EFL teachers' development of TPACK by gender and grade point average. This section presents the results of the study in terms of descriptive and inferential statistics, and qualitative analysis, followed by a discussion of the findings.

3.1 Results of Quantitative Data Analysis

The results for seven TPACK factors (Table 2) showed that pre-service English teachers had highly developed knowledge of TPACK. The analysis of mean scores also revealed that the highest mean scores were received for PK (M = 29.14, SD = 3.47) and TK (M = 25.80, SD = 3.98) dimensions whereas the lowest mean scores were ascribed to TCK (M = 11.73, SD = 1.60) and PCK (M = 12.21, SD = 1.84) dimensions.

Table 2. Descriptive statistics for TPACK scale with seven factors

Factors	*N*	*Mean*	*SD*	Minimum	Maximum
Technology Knowledge	76	25.80	3.98	7	35
Content Knowledge	76	17.17	1.87	4	20
Pedagogical Knowledge	76	29.14	3.47	7	35
Pedagogical Content Knowledge	76	12.21	1.84	3	15
Technological Content Knowledge	76	11.73	1.60	3	15
Technological Pedagogical Knowledge	76	21.53	2.47	5	25
Technological Pedagogical and Content Knowledge	76	20.82	3.03	5	25
Total	76	138.22	13.31	34	170

3.1.1 Results for Technological Knowledge

The item with highest mean score for TK was about the pre-service teachers' ability to learn technology easier (M = 4.16, SD = .71), followed by some other items referring to their potentials attributed to having technological skills (M = 3.80, SD = .86), knowing how to solve their technological problems (M = 3.80, SD = .73), and keeping up with developments in new technologies (M = 3.72, SD = .87). Furthermore, the items with relatively low mean scores for TK were about the participants' opportunity to work with different technologies (M = 3.46, SD = .80), and knowledge of different technologies (M = 3.21, SD = .85). Overall, 60% of the participants expressed their higher self-confidence with technological knowledge and its importance for their teacher education program.

3.1.2 Results for Content Knowledge

The descriptive statistics for CK revealed that nearly all the participants (94%) rated the items positively and all obtained mean scores were above 4 (a mean value of 4 in a 5-point Likert scale). The highest mean score was received for the participants' having sufficient knowledge of English language skills (M = 4.42, SD =.54), sufficient knowledge of English as an international language (M = 4.32, SD = .59), sufficient linguistic knowledge of English (M = 4.28, SD = .58), and various ways and strategies for the development of understanding English (M = 4.16, SD = .67).

3.1.3 Results for Pedagogical Knowledge

Results regarding pedagogical knowledge indicated that 84% of the participants agreed with items measuring their pedagogical knowledge, suggesting that a great majority of them had sufficient pedagogical knowledge. Akin to content knowledge, nearly all participants had mean scores higher than 4 except for the one related to their familiarity with common student understandings and misconceptions (M = 3.96, SD = .80).

3.1.4 Results for Pedagogical Content Knowledge

The results indicated that most participants (81.5%) perceive that PCK is a significant factor in teacher education programs, helping them to opt for appropriate approaches in guiding students and selecting suitable pedagogical content. All the items related to PCK were rated positively (M > 4). The highest mean score (M = 4.13, SD = .69) was ascribed to the participants' knowledge of selecting effective teaching approaches to guide student thinking and learning in English. They also perceive that knowing how to enable students to interact in order to negotiate meaning in English (M = 4.05, SD = .74) and modify English language content to suit different types of students (M = 4.03, SD = .74) are equally important for English language teachers.

3.1.5 Results for Technological Content Knowledge

The results regarding TCK demonstrated that 74% of the participants agreed with significance of TCK for language teachers. All the participants scored higher in TCK. However, the highest mean score (M = 4.01, SD = .57) was received for the participants' knowledge about technologies that can be used for teaching English language skills whereas the lowest mean score (M = 3.80, SD = .71) was ascribed to their knowledge about technologies that they can use for teaching different cultures as well as English culture.

3.1.6 Results for Technological Pedagogical Knowledge

The results regarding TPK revealed that the mean scores for all items were above 4, indicating that pre-service English teachers had favorable attitudes towards the role of choosing pedagogically oriented technologies that enhance teaching approaches. They mostly (91%) agreed that teacher education program deeply influences their perceptions of how technology could influence the teaching approaches they use in the classroom (M = 4.38, SD = .76) and that they were thinking critically about how to use technology in the classroom (M = 4.36, SD = .66). Moreover, other items with high mean scores were about their ability to choose technologies that enhance students' learning for a lesson (M = 4.32, SD = .57), and adapt the use of the technologies about different teaching activities (M = 4.26, SD = .71).

3.1.7 Results for Technological Pedagogical and Content Knowledge

The results of descriptive statistics regarding TPACK indicated that 74% of the participants had highly developed TPACK. The items with mean scores above 4 were about the pre-service English teachers' ability to choose technologies that enhance the content for a lesson (M = 4.34, SD = .64), to use strategies that combine content, technologies, and teaching approaches taught during coursework in the classroom (M = 4.33, SD = .71, to teach lessons that appropriately combine English, technologies, and teaching approaches (M = 4.16, SD = .71), and knowledge of how to evaluate software, tasks and students' performance in a technologically-rich class (M = 3.68, SD = .91). Finally, 80% of the participants reported high self-perception and competence in overall technical pedagogical content knowledge, suggesting the efficiency of integrating technopedagogical content knowledge into teacher education programs.

3.1.8 Results for Models of TPACK

The second research question addressed the effective models of TPACK provided by teacher education lecturers (department teachers), teachers outside of teacher education program (non-ELT department), and the cooperating teachers in the practice school (henceforth Model 1, Model 2, and Model 3). The participants were asked to rate the percentages of the TPACK models provided by teachers from different educational encounters. The percentages ranged from 25% or less to 76%−100% (Figure 2). More than 4 in ten (43.4%) of the participants stated that their teacher education lecturers spent 51%−75% of the class time providing TPACK-based

instruction, while nearly half of them reported that their teachers outside of teacher education program (non-ELT department) showed little interest, i.e. 25% or less time, in using TPACK in their practical teaching. Evidently, 34.2% of the participants stated that much of the class time (51%–75%) was spent on using technology as supplementary tool in real classroom teaching within Models 1 and 3. Compared with Models 2 and 3, teacher education lecturers from their ELT department used more TPACK-based instruction (21.1%) during teacher education. Figure 1 diagrammatically illustrates the percentages of using TPACK by teachers within the three models.

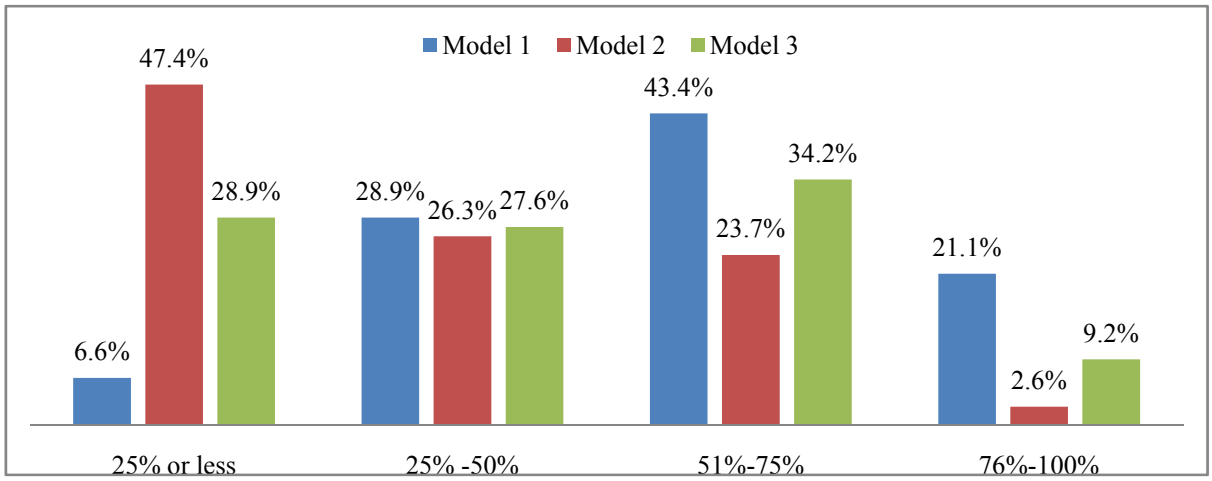

Figure 2. Percentages of TPACK models

3.1.9 Results for the Relationship between Gender, GPA and TPACK

The results of independent–sample t test (Table 3) showed significant differences between male and female participants in TK, t (74) = -2.62, $p < .05$, and PK, t (74) = 2.279, $p < .05$, dimensions with females scoring higher than males in PK and males scoring higher than females in TK. Moreover, 'Effect Size' statistic based on the 'Eta Square' value (η^2) of Cohen (1988) indicated a moderate significant difference between groups in both of the significant dimensions ($\eta^2 < 0.14$). However, no significant differences were observed between the groups regarding other dimensions. Although the magnitude of differences in the means did not reach a significant level in non-significant dimensions, females received higher scores in PCK, TPK, and overall TPACK while males scored higher than females in CK and TCK dimensions. The findings also showed slightly higher mean scores for females in overall technological pedagogical and content knowledge among pre-service English teachers. Finally, the results of one way analysis of variance (ANOVA) revealed no statistically significant differences between the participants' perceptions of TPACK and their academic achievement.

Table 3. Descriptives and t-test for the Relationship between Gender and TPACK

Factors	Gender	N	Mean	SD	t	df	Sig.	η^2
TK	Female	55	25.09	3.47	-2.620	74	.011	.08
	Male	21	27.66	4.66				
CK	Female	55	17.14	1.89	-.192	74	.849	-
	Male	21	17.23	1.84				
PK	Female	55	29.69	3.33	2.279	74	.026	.07
	Male	21	27.71	3.49				
PCK	Female	55	12.36	1.71	1.175	74	.244	-
	Male	21	11.80	2.13				
TCK	Female	55	11.58	1.49	-1.372	74	.174	-

	Male	21	12.14	1.82				
TPK	Female	55	21.74	2.25	1.178	74	.243	-
	Male	21	21.00	2.96				
TPACK	Female	55	20.98	2.87	.709	74	.480	-
	Male	21	20.42	3.44				
Overall	Female	55	138.30	12.68	.090	74	.929	-
	Male	21	138.00	15.17				

3.2 Results for Qualitative Data Analysis

In order to support the findings of quantitative data analyses, participants were asked three open-ended questions aimed at getting insights into their perceived models of TPACK. With respect to a specific episode where their department professors effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson, their responses revealed two major models of TPACK. First, they reported that their professors all made use of computers, internet and PowerPoint presentations during their regular classroom lectures and discussions. For example, one participant stated that "…in most of our courses we have used technology intensively. Also, all our teachers use facilities such as video and slides during their regular classroom lectures". Second, an overwhelming number of students reported that their professors demonstrated how to integrate technology into English in instructional technologies and materials development, methodology, using video in foreign language teaching, and listening and pronunciation courses. In this regard, most participants provided descriptions of technology use in their instructional technologies and materials development and listening and pronunciation courses.

Concerning a specific episode where one of their cooperating teachers in the practice school effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson, the participants reported different models of TPACK. First of all, administrational factors were reported to be hindering technology use at schools. They also said that technological facilities in schools have come to be increasingly employed as facilitative tools, i.e. as replacement for books, instead of supplementary teaching aids to enhance language learning outcomes. That is, schools are equipped with such technologies as interactive whiteboards (IWBs) just with the purpose of getting rid of books. They are not used appropriately to add variety to the way subject matters are taught. Put simply, technology use in the classrooms was not pedagogically-oriented and was not aimed at presenting a specific content or adopting a TPACK-based teaching approach.

Of significant importance, and indeed the crux of dilemma, was the fact that most cooperating teachers were not using technological facilities just because they were "banned" by the administrators with the justification that those tools must be used sparingly in case there might occur some technological problems which could not be solved at any cost. "... At first, actually she could not use smartboard, because the administration put a ban on it ", said one participant. Individual factors were also found to be moderating technology use in classrooms. Although there were IWBs and internet in the classrooms, most teachers, as reported by the participants, refrained from using those facilities as supplementary tools and teaching aids due to personal factors, lack of TPACK knowledge and skills, or administrational factors. For instance, one of the students said that, " Unfortunately, I haven't witnessed our cooperating teacher in practice school even using smartboard' and "We do not have that kind of application in the internship classes" and "I have observed the teacher, but unfortunately the only technology she uses in the classroom is smartboard for doing the activities in the coursebook". Interestingly, other teachers who used technology during their teaching used it only for presenting previously installed course books not for creating language learning tasks or activities. "My cooperating teacher hasn't modeled combining content, technology and different teaching approaches in the lessons so far. She only uses interactive whiteboard as a technology in the class. However, she does not create different activities by using it. She only uses coursebooks installed into it", reported another participant. A few participants, however, reported frequent use of technology, especially IWBs, by teachers for language teaching purposes. The close scrutiny of the responses revealed that these participants were attending schools where MoNE's (2010) "Fatih Project" was being implemented.

With respect to a specific episode where the participants effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson, various models of TPACK were observed. About

three in ten participants stated that they had not had the opportunity to use TPACK in a classroom lesson. However, a great majority of them had used videos and internet in the warm-up part of the lessons or presentations, especially using internet-based word puzzles to teach vocabulary and games for teaching language structures. These qualitative findings support the quantitative findings that the participating pre-service English teachers had highly developed knowledge of TPACK.

On the other hand, participants also reported often using PowerPoint presentations for teaching purposes. For example, one participant said, "Since I started my practice teaching, I have often used slides and video. I haven't experienced different technological materials. Yet technology provides effective learning for students. It is very beneficial". Some others stated that they integrated content and technology for pedagogical purposes and material development. "We prepared digital stories. In these digital stories, we integrated literature into language teaching, by turning short stories into language teaching materials. This enabled us to teach both grammar and vocabulary items inductively" reported one of the students who used technology to produce course materials in "Literature and Language Teaching" course. Similarly, some reported that they often integrated digital software for teaching collocations and grammatical structures. For example, one student said, "...We used the software 'AntConc' for looking up collocations and their frequencies, etc. to teach the topic 'Question Tags'", and also added they integrated different technologies and content to create activities and design lesson plans. Similarly, another student said, "...we integrated songs, the picture of the scenes, videos that included question tags, different communicative activities to write a whole, detailed lesson plan and we presented them to the lecturer. It was really a nice experience, and in this way I think we just combined the three".

4. Discussion and Conclusion

This study set out with the aim of investigating the pre-service English as a foreign language (EFL) teachers' levels of the TPACK development in an ELT teacher education program. It also sought to explore their models of TPACK combining content, technologies, and teaching approaches in a classroom lesson as well as probable differences of TPACK development by gender and academic achievement.

The findings of this study revealed that the participants generally expressed high levels of TPACK development (Mean > 3.5; 81%) for their professional purposes. This implies that pre-service teacher education program have proved to be successful in training teachers with highly developed TPACK knowledge which in turn provides them with necessary skills and knowledge of technology to be implemented in their practical teaching. Similar results were found by Kabakci-Yurdakul (2011) who studied the relationship between pre-service teachers' (N = 3105) TPACK competency and ICT usage level from seven higher educational institutions in Turkey during the 2009–2010 academic year. Her findings revealed that pre-service teachers in the study had high levels of technopedagogical knowledge competency.

What is of utmost important in the present study, regarding TPACK development, is the degree to which the acquired TPACK is actually put into practice in order to promote L2 learning outcomes. Put differently, the mere TPACK development does not necessarily guarantee the application of the knowledge and skills in language learning classrooms. It was found that not all teachers provide TPACK-based instruction throughout the whole period of class time. This may be attributed to either the insufficient knowledge of TK, CK, and PK, or the teachers' lack of competencies in combining these three sources of knowledge for the betterment of their real teaching. Moreover, some of the teachers may use their TPACK only for 'straightforward' uses which do not need sophisticated technological skills. However, TPACK-based language teaching as a complex task requires high levels of technological skills. Studies conducted by many researchers (Harris, Mishra, & Koehler, 2009; Jamieson-Proctor, Finger, & Albion, 2010) have shown that teachers predominantly use technology for low-level tasks such as internet search, and as presentation software (Campbell & Baroutsis, 2011).

The analysis of the qualitative data about models of TPACK revealed that faculty members in the department taught the students how to use and combine content, technologies and teaching approaches in a classroom lesson. Conversely, cooperating teachers were found to be less enthusiastic to make use of technological developments in their practical teaching. These findings are consistent with the results of quantitative data analysis which revealed that there is a mismatch between TPACK models used by department professors to effectively demonstrate or model combining content, technologies and teaching approaches in a classroom lessons and cooperating teachers in the practice school. This large discrepancy between the two models will certainly admit impediments in the way of using technology for enhanced and quality language learning. Evidently, the integration of technology and language teaching is a must both by teacher education departments and cooperating schools. Indeed, research into the TPACK development (Campbell & Baroutsis, 2011; Jamieson-Proctor, Finger, & Albion, 2010; Koçoğlu, 2009; Kurt et al., 2013; Mishra & Koehler, 2006; Watson et

al., 2004; Tai & Chuang, 2012) has highlighted the significant role of integrating technology into real teaching profession and its effects on promoting successful language learning.

The present study also found a difference between male and female teachers with respect to their self-reported confidence with TK and PK. Male participants indicated higher self-perception and self-confidence in possessing and application of technological knowledge while females express much more knowledge of pedagogical knowledge. These findings were in line with those of Jamieson, Finger, and Albion (2010) who found a considerable increase in the proportion of female pre-service teachers' self-confident, despite the general contention that females have been found to be less confident than males in TPACK (Jamieson-Proctor et al., 2007; Jamieson-Proctor & Finger, 2008; Jamieson-Proctor et al., 2005).

Given the fact that teacher quality, i.e. training qualified and competent teachers, is central to quality learning outcomes among language learners and that "the quality of an education system cannot exceed the quality of its teachers" (Barber & Mourshed, 2007, p. 7), the findings of the present study highlight the challenging mission and responsibility of pre-service teacher education programs to train quality teachers. Therefore, focusing on the use of highly developed technological knowledge may be rewarding for both the pre-service teachers and the lecturers in teacher education programs. Equipped with technological knowledge and skills, the pre-service teachers will be able to successfully integrate technology as well as technological knowledge and skills with a subject matter and can navigate between these interrelated sections as an expert who can easily pass the borders of subject matter, pedagogy, and technology (Baran et al., 2011; Mishra & Koehler, 2006). Thus, it is necessary that curriculum planners, especially those involved in planning teacher education programs, should provide technologically-rich environment for prospective teachers and involve them in activities that help them to develop technopedagogical teaching materials that will ultimately result in enhanced learning outcomes.

The present study based on both quantitative and qualitative data is not without its drawbacks. It investigated the current state of the TPACK development among pre-service English teachers with the purpose of assessing their knowledge and skills of integrating technology with subject matter. The aim was to unfold the participants' self-perception of and self-confidence in TPACK development. Therefore, the results of the present study must be treated with caution. Moreover, further research may approach the issue from different perspectives such as pre-service and/or in-service teachers' technological pedagogical content knowledge in practice.

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