Examining Preservice EFL Teachers' TPACK Competencies in Turkey

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Abstract

The purpose of the study was to understand the TPACK (Technological Pedagogical Content Knowledge) competency of preservice English teachers and to determine whether there were any significant differences in terms of gender and academic achievement. This study was conducted at a state-run university and subjects were 137 preservice English teachers. The results of the research suggest that males' technological knowledge was higher than females; however, females were better than males in pedagogical knowledge. Moreover, no significant difference was found between TPACK mean and academic achievement in terms of the correlation between TPACK scale and academic achievement of the participants.

Key words: Technological Pedagogical Content Knowledge, TPACK, language teaching and TPACK, TPACK competencies of EFL teachers

INTRODUCTION

Living at an age of information and communication technology, teachers, themselves, should be computer literate and bring their technological knowledge into classroom practices in a meaningful and appropriate way to train technology literate teachers. Researchers suggest that teachers should have the competence to plan, design, analyze, assess and solve any technological problems and reshape them according to learners' needs (Mishra & Koehler,

2006; Koehler, Mishra &Yahya, 2007; Valanides & Angeli, 2008; Angeli & Valanides, 2009).

In the early years of educational technology, technological skills were taught free from pedagogical and content knowledge (Hargvare and Hsu, 2000; Graham, 2011; Graham et. al., 2004). Then, it was understood that pure technology alone could not help to develop pedagogical and content knowledge and their integration into teaching and learning process was taken into consideration (Kaya, Özdemir, Emre, & Kaya, 2011). On this way, technological knowledge was adapted to the pedagogical knowledge which was proposed by Shulman (1986) and Technological Pedagogical and Content Knowledge (TPACK) came out as a new model.

Different majors have been interested in TPACK because each subject matter has technological dimensions. Although some fields like science and mathematics have large amount of literature on this issue, studies related to TPACK in language teaching area have been quite rare. Few recent studies can be considered to be the first steps on combining two subjects, language teaching and TPACK. Furthermore, it can be stated that studies related to TPACK in Turkish context generally focus on developing TPACK scales and proving the reliability and validity of these scales rather than analyzing the subject matter in detail (Yurdakul et al, 2012; Öztürk & Horzum, 2011; Timur & Taşar, 2011; Sahin, 2011).

Conceptual Framework

According to Mishra & Koehler (2009), TPACK is teaching of concepts through technology, the use of technology in order to teach pedagogical knowledge, helping to understand difficult

concepts and solving problems via technology and developing new methods to generate new information by building onto the previous one through technology. TPACK can also be considered as the application of the technology in an effective way to develop pedagogical and technological knowledge and its integration into the classroom practices.

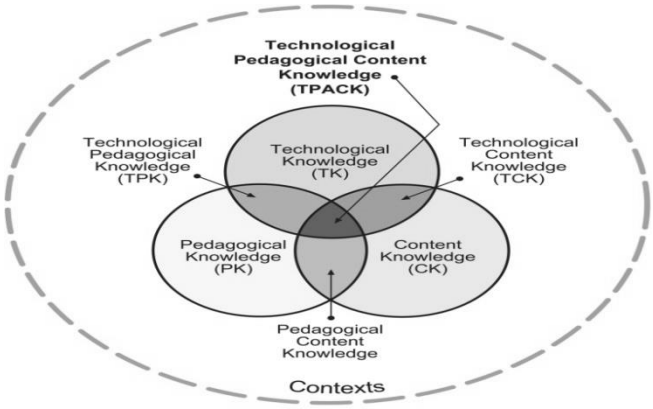

Figure 1. TPACK and its Interactive Information Types (Archambault & Barnett, 2009, s.2)

Teachers' knowledge about digital videos and computers is considered their Technological knowledge (TK)**;** integration of the features of technology and its advantages into content knowledge are Technological Content Knowledge (TCK); teachers' knowledge on the components of technology and using its features in teaching is called Technological Pedagogical Content (Mishra & Koehler, 2006; Harris et al, 2007; Koehler et al., 2007; Shin et al., 2009).

Content Knowledge (CK): It is the knowledge that teachers are supposed to have about the content matter. This knowledge consists of scientific theories, facts, methods and mind maps based on evidence (Koehler & Mishra, 2008; Koehler& Mishra, 2009).

Pedagogical Knowledge (PK): The knowledge of the teachers about teaching process, practices or methods. PK consists of understanding how learners learn, classroom management, lesson planning, teaching techniques and methods, knowing the qualifications

of the target group and using the strategies to evaluate students' perceptions. Therefore, PK requires understanding cognitive, social and developmental theories of learning and knowing how to administer them in the classroom (Koehler & Mishra, 2008; Koehler & Mishra, 2009).

Technological Knowledge (TK): It involves skills which are required to use different Technologies. In other words, it is the ability to use digital technologies, software, processors, scanners, e-mails, loading and removing programs and storing the information (Mishra & Koehler, 2006).

Technological Content Knowledge (TCK): It requires not only the knowledge of subject matter to be taught but also knowing how to teach subject matter via technology (Koehler et al., 2007).

Technological Pedagogical Knowledge (TPK): This knowledge consists of knowing the advantages and disadvantages of technological means in terms of pedagogy (Koehler & Mishra, 2008; 2009). According to Graham (2011), TPK which represents the integration of pedagogical strategies with technology is the type of knowledge that a teacher is supposed to have for managing teaching in computer-supported classroom.

Pedagogical Content Knowledge (PCK): It is the knowledge that is required to have for effective subject matter teaching. According to Mishra and Koehler (2006), a teacher who has PCK has the ability to design and practice the subject matter to be taught.

REVIEW OF LITERATURE

The literature on TPACK studies in various areas especially like mathematics, science and social sciences have been many, but the literature on language teaching has been few. Thai and Chuang (2012) proposed a "TPACK-in-Action model" to help in-service English teachers to integrate technology into language classroom in Taiwan. They designed a computer

Assisted Language Learning workshop to develop in-service English teachers' TPACK competency in five steps as (1) Modeling; (2) Analysis; (3) Demonstration; (4) Application; and (5) Reflection. Via this program in-service English teachers learn how to teach with technology with pedagogical decisions. Moreover, they figured out to transfer their experiences which were acquired in the workshop to their teaching in classrooms.

Koçoğlu (2009) conducted a study on 27 preservice EFL teachers at the Department of Foreign Language Education, which offered a four-year undergraduate program in English Language Teacher Education at a Turkish university. The purpose of the study was to discuss technological pedagogical content knowledge from preservice EFL teachers' perspective in Turkey. The results of the study suggested that "Computer-assisted language learning course was confirmed as being helpful in developing preservice teachers' TPCK and supporting them in practicing their TPCK."

Archambault and Crippen (2009) studied the competency level of 596 teachers delivering their teaching online in terms of technological and pedagogical content knowledge. The results of the study suggested that participants had high level of pedagogical content knowledge, but they had low level of confidence when technological component was added.

Compton (2009) proposes four major recommendations to prepare future language teachers for online language teaching. These are developing online language teaching skills through existing courses, developing online teaching skills at different levels of expertise and

responsibilities for different roles, revamping existing technology training and implementing early virtual field experiences and virtual practicum.

Lee and Tsai (2010) investigated the perceptions of preservice teachers on TPACK while using web-based technology and found that senior teachers had less confidence towards technology.

Koh and Sing (2011) focused on the perceptions of preservice teachers in accordance with age, gender and seven components of TPACK. The results of the research suggested that TPACK components had significant effect on TPACK perceptions of preservice teachers, but demographic factors like age and gender did not play a significant role in this process. In addition, among TPACK components, TPK and TCK were the determiners of TPACK.

Ansyari (2012) developed a professional development programme for technology integration through a design-based research and 12 English Instructors participated in the study. The results suggested that "all participants reported having positive experiences with the TPACK professional development programmes, and weaknesses were found related to time, technology exploration, and students' engagement."

Kurt et al (2013) designed a 12-week TPACK development program for 22 Turkish preservice English teachers in Turkey to examine their TPACK development. During this period, TPACK framework was presented to the preservice teachers; they developed technological materials, explored various technologies collaboratively, designed technology-integrated lessons and taught in a real classroom atmosphere. Results showed that "there was

a statistically significant increase in TK, TCK, TPK and TPACK scores of PTs of English from the beginning to the end of the study."

METHOD

Survey method was used in this study to collect data about the TPACK competency level of preservice English teachers. Survey method is a descriptive research method and a researcher aims to collect data about the characteristics of the participants (Fraenkel and Wallen, 2005). This study was considered significant, because very few studies have been found in the current literature about TPACK in English Language Teaching area. The following research questions were answered in the study.

1) What is the competency level of preservice English teachers in terms of TPACK and TPACK sub factors?
2) Is there a significant difference in participants' TPACK competency in accordance with gender?
3) Is there a significant difference in participants' TPACK competency in accordance with academic achievement?
4) What is the correlation among the TPACK sub factors of Preservice English teachers?

Instrument and Subjects

TPACK Competency Survey which was developed by Archambault and Crippen (2009) was used in this study. This survey consists of 24 items and five point-likert scale ranging from poor (1) to excellent (5). The reliability coefficient in terms of sub factors was reported between 0,89 and 0,70 (Archambault and Crippen, 2009).

Participants were senior Preservice English teachers who were attending at an English Language Teaching Department of a state-run university. 27 males and 110 females, totally 137 subjects, participated in this study on volunteering basis.

Findings

According to the data collected, each participant uses internet every day regularly. Table 1 shows the use of frequency of internet by the participants. It can be understood that half of the participants use internet 1-3 hours a day.

Table 1. The use of frequency of internet by the participants.

	Frequency	**Percent**
Less than 1 hour	39	28,5
1-3 hours	68	49,6
4-6 hours	22	16,1
More than 6 hours	6	4,4
Total	135	98,5

Table 2 presents the descriptive statistics of the survey in terms of sub factors of TPACK. The item which had the highest mean was TPK16 saying **"**My ability to create an environment which allows students to build new knowledge and skills" (M=3.71, SD=0.83). On the other hand, the item with the lowest mean was TK1 "My ability to troubleshoot technical problems associated with hardware (M=2.53, SD=0.94).

Table 2. Descriptive statistics of the items in the survey.

ITEMS	**Mean**	**S.D.**
TK1 My ability to troubleshoot technical problems associated with hardware	2,53	,94
TK2 My ability to address various computer issues related to software	2,64	,92

TK3 My ability to assist students with troubleshooting technical problems with their personal computers	2,66	,94
CK4 My ability to plan the sequence of concepts taught within my class	3,31	,79
CK5 My ability to decide on the scope of concepts taught within in my class	3,36	,80
CK6 My ability to create materials that map to specific MEB standards	3,34	,95
PK7 My ability to use a variety of teaching strategies to relate various concepts to students	3,62	,82
PK8 My ability to adjust teaching methodology based on student performance/feedback	3,61	,83
PCK9 My ability to comfortably produce lesson plans with an appreciation for the topic	3,58	,81
PCK10 My ability to determine a particular strategy best suited to teach a specific concept	3,42	,76
PCK11 My ability to assist students in noticing connections between various concepts in a curriculum	3,46	,79
PCK12 My ability to distinguish between correct and incorrect problem solving attempts by students	3,45	,80
PCK13 My ability to anticipate likely student misconceptions within a particular topic	3,40	,83
TPK14 My ability to encourage interactivity among student	3,68	,90
TPK15 My ability to implement different methods of teaching English	3,68	,80
TPK16 My ability to create an environment which allows students to build new knowledge and skills	3,71	,83
TCK17 My ability to moderate interactivity among students	3,50	,93

TCK18 My ability to use various courseware programs to deliver instruction (e.g., Blackboard, Centra, Moodle)	3,22	,96
TCK19 My ability to use technological representations (i.e. multimedia, visual demonstrations, etc.) to demonstrate specific concepts in my content area)	3,69	,87
TCK20 My ability to implement curriculum in an environment	3,43	,79
TPACK21 My ability to meet the overall demands of English teaching	3,45	,75
TPACK22 My ability to use technology to create effective representations of content that depart from text book knowledge	3,53	,85
TPACK23 My ability to use technology in student assessment to modify instruction	3,35	,76
TPACK24 My ability to use technology to predict students' skill/understanding of a particular topic	3,40	,80

Table 3.Descriptive Statistics of the survey in terms of sub factors of TPACK

Subfactors	**Mean**	**S.D**
TK	2,61	,85
CK	3,54	,72
PK	3,61	,75
PCK	3,46	,60
TPK	3,69	,75
TCK	3,42	,71
TPACK	3,47	,62
TPACKtotal	3,50	,56

Table 3 indicates the descriptive statistics of the survey in terms of sub factors of TPACK. According to the data, while TPK (technological pedagogical knowledge) sub factor had the highest mean (M=3, 69, SD=0,75), TK (technological knowledge) sub factor had the lowest mean (M= 2,61, SD=0,85). In addition, the mean for TCK (technological content knowledge) of preservice English teachers was 3,42. This data proved that the knowledge of preservice English teachers about the content and the technology use was at a good level; however, they needed further training and assistance in terms of this sub factor.

The mean for all TPACK sub factors was (M=3, 50, SS=, 56) which can be considered high. It could be understood that preservice English teachers took into consideration pedagogical and content characteristics while using technology.

Table 4. Descriptive Statistics of TPACK sub factors in terms of gender

	Gender	**N**	**Mean**	**S.D.**
TK	male	27	3,38	,86
	female	110	2,42	,74
CK	male	27	3,44	,67
	female	110	3,31	,73
PK	male	27	3,30	,54
	female	110	3,70	,78
PCK	male	27	3,39	,34
	female	110	3,48	,65
TPK	male	27	3,61	,64
	female	110	3,71	,77

TCK	male	27	3,56	,67
	female	110	3,44	,72
TPACK	male	27	3,47	,53
	female	110	3,43	,65
TPACKtotal	male	27	3,46	,41
	female	110	3,51	,59

Table 4 illustrates the descriptive statistics of TPACK sub factors in terms of gender. According to the data collected, the mean of males (M= 3,38) was higher than females (M=2,42) in terms of Technological Knowledge (TK). However, females (M=3,70) had higher mean than males (M=3,30) in Pedagogical Knowledge (PK). Considering all TPACK factors, the mean for females was higher than males'.

Table 5. The results of independent t test in terms of gender differences

	F	**t**	**df**	**P**	**Mean Difference**
TK	,29	5,88	135	,000	,96
PK	4,59	-2,5	135	,014	-,40

Table 5 shows the results of independent t test in terms of gender differences. According to the results of independent t test, there was a significant difference in favor of males in terms of Technological Knowledge (TK) ($t(135)=5,88$, $p<0,05$). On the other hand, there was a significant difference in favor of females in terms of Pedagogical Knowledge (PK) ($t(135) = -2,5$, $p<0,005$).

As from the correlation between TPACK scale and academic achievement of the participants, no significant difference was found between TPACK mean and academic achievement(r=0,02, p>0,005).

Table 6. The Correlation between TPACK and Its sub factors

	TK	**CK**	**PK**	**PCK**	**TPK**	**TCK**	**TPACK**
TK	1						
CK	.223**	1					
PK	.256**	.476**	1				
PCK	.335**	.678**	.654**	1			
TPK	.567**	.453**	.344**	.467**	1		
TCK	.432**	.549**	.412**	.357**	.589**	1	
TPACK	.534**	.345**	.528**	.579**	.612**	.643**	1

Table 6 displays the correlation between TPACK and Its sub factors. Analyzing the data collected, there was a significant correlation between TPACK and its sub factors. On the other hand, the correlation between technological knowledge (TK) and pedagogical knowledge (PK) and between technological knowledge (TK) and content knowledge (CK) could be considered low. The highest correlation was observed between PCK and CK and between PCK and PK.

Discussion

The purpose of the study was to understand the TPACK competency of preservice English teachers and to determine whether there were any significant differences in terms of gender and academic achievement. TPACK is an important issue for language teachers, because using technology effectively and appropriately in the language classroom increases learners' performance (Donnelly, McGarr, & O'Reilly, 2011; Ertmer, 2005; Hew & Brush, 2007).

According to the data collected, participants can be considered technology literate, because each participant uses internet every day regularly. This finding is in line with the current literature on this issue (Kirschner & Karpinski, 2010).

It can be stated that participants think their ability to create an environment which allows students to build new knowledge and skills is at a high level. However, they believe that their ability to trouble shoot technical problems associated with hardware needs improvement. In order words, preservice English teachers can constitute positive learning atmosphere in the language classroom by using technology while their technology knowledge is not at the desired level especially when they encounter any technical failure. In addition, the result revealed the technological knowledge of preservice English teacher is at the lowest level (M=2,61). Although participants use internet very often, it is understood that they have difficulty in integrating new technological developments into the previous one. This statement is endorsed by the finding that technological content knowledge has the second lowest mean after technological knowledge (M=3, 41).

Pamuk (2012) also studied the achievement of preservice information and technology teachers' technology integration through TPACK and he found that participants' learning experiences hindered the effective integration of technology. However, it was observed that TPACK training programs boosted the theoretical, methodological and technological competency of preservice teachers.

The preservice English teachers' views towards all sub factors of TPACK are quiet positive and it can be understood that preservice English teachers take into consideration the pedagogical and content characteristics while using technology. In addition, while TPK (technological pedagogical knowledge) sub factor is at the highest level for the participants, TK (technological knowledge) sub factor is observed at the lowest level when compared with the other sub factors. This data prove that the knowledge of preservice English teachers about the content and the technology use is at the medium level; however, they need further training and assistance in terms of using technology more effectively. Terpstra (2009) also found that preservice teachers' technological knowledge level was higher than technological pedagogical knowledge and technological pedagogical knowledge level was higher than technological pedagogical content knowledge. Moreover, Terpstra emphasized that an interaction among TK, PK and CK came out after preservice teachers had perceived the advantages of TPACK on a subject matter.

As from the gender differences towards TPACK, males' technological knowledge is higher than females, however, females are better than males in Pedagogical Knowledge (PK). In other words, females can use foreign language teaching methodology more effectively but their knowledge on technology needs improvement. It can be stated that there is a significant difference in favor of males in terms of Technological Knowledge, while there is a significant difference in favor of females in terms of Pedagogical Knowledge. In general, considering all TPACK factors, females can be considered better than males. Koh, Sing and Tsai(2010) also studied the gender role in TPACK and they found that males' technological and content knowledge was higher than females'. On the other hand, in another study, Koh and Sing (2011) studied the TPACK perceptions of preservice teachers in terms of age, gender and the components of TPACK. No significant difference was found on TPACK perceptions in terms

of gender and age. In addition, they proved that TPK and TCK were the determiners of TPACK.

As from the correlation between TPACK scale and academic achievement of the participants, no significant difference is found between TPACK mean and academic achievement. In other words, TPACK knowledge does not influence the academic achievement of the participants. Kurt et al (2013) findings are not in line with this the result of this study. They found that TK, TCK, TPK and TPACK scores of Preservice teachers of English were increased significantly through a 12-week TPACK development program.

Analyzing the data collected, there is a significant correlation between TPACK and its sub factors. On the other hand, the correlation between technology and pedagogy and between technology and content can be considered low. This result is in consistent with the findings of Archambault and Crippen's study (2009). They also found that participants' level in pedagogical and content knowledge were high, their confidence lessened when technological dimension was added.

CONCLUSION

The current literature and the results of this study imply that TPACK training increases awareness about technology use integrated with pedagogy and content. Rodriguez-van Olphen, (2004) states "when teachers have an understanding of TPACK, they have the foundation to enhance second language learning with a purpose". In other words, if teachers do not have a good level of knowledge base, technology can only be "an ornament in the lesson plan." According to Olphen (2008), effective and appropriate use of TPACK in the language classroom advances students' second language competence.

It is believed that teachers are supposed to use technological tools effectively in the classroom and guide students to use them in the same way. In this direction, regarding the lack of competency level of preservice English teachers in terms of TK and TCK, in-service training on TPACK can increase the awareness of teachers about the effective use of TPACK.

In parallel to new technological developments, the curriculum of ELT programs should be updated. In addition, via workshops, seminars and various activities, preservice teachers can learn how to use some new technological tools and materials during the learning process and to adapt them into the current program. Moreover, they should be informed about the popular, especially, web 2.0 programs like face book, twitter, blog, prezi, etc. and these practices should be integrated into the current programs. Moreover, preservice teachers may be informed how these applications can be used effectively in classroom.

The scope of the study is limited with the target group characteristics. Therefore, interview with the teachers can provide more reliable data and their competency can be measured more accurately.

It is mandatory for language teachers to use the technology effectively as members of the 21st Century. To lead this goal, improving a shared and better understanding of TPACK through courses, seminars and programs will help teachers to reach objectives in a fast and easy way.

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