ENAD ONLINE
EĞİTİMDE NİTEL ARAŞTIRMALAR DERGİSİ
Journal of Qualitative Research in Education

Cilt 6 / Sayı 1, 2018
Eğitimde Nitel Araştırmalar Dergisi - ENAD
Journal of Qualitative Research in Education - JOQRE

Investigating Learning Technology By Design Approach in Pre-Service Language Teacher Education: Collaborative and Reflective Experiences

Yabancı Dil Öğretmenliği Eğitiminde Tasarım Yaparak Teknolojiyi Öğrenme Yaklaşımının Araştırılması: İşbirlikli ve Yansıtıcı Deneyimler

Asuman Aşık*
Burtay Hatice Eroğlu İnce**
Arzu Şarlanoğlu Vural***

To cite this acticle/ Atıf için:
Aşık, A., Eroğlu İnce, B. H., & Şarlanoğlu Vural, A. (2018). Investigating learning technology by design approach in pre-service language teacher education: Collaborative and reflective experiences. *Eğitimde Nitel Araştırmalar Dergisi - Journal of Qualitative Research in Education,* 6(1), 37-53. DOI: 10.14689/issn.2148-2624.1.6c1s2m

Abstract. The study aims to present how technology integration can be fulfilled into Language Teacher Education (LTE) contexts by tracking the development of Technological Pedagogical Content Knowledge (TPACK) of the pre-service English Language teachers through Learning Technology By Design approach. A total of 100 senior student teachers (STs) of English at a large state university in Turkey participated in the study. The STs were required to train their peers about one digital tool and prepare digital materials to be used in language classrooms. The data were collected through three instruments quantitatively and qualitatively: the TPACK-EFL survey, peer reflective discussion forms and focus-group interviews. The findings revealed that the TPACK-EFL knowledge of the STs has improved significantly in all domains after the research intervention, and the STs reported considerably positive perceptions about the digital tools such as increasing motivation and positive atmosphere, more attractive and content-rich materials and more practical and found the experience of peer teaching very effective. The study suggests implications for a variety of digital tools to be used in language classrooms and an effective technology training in LTE contexts.

Keywords: TPACK (Technological Pedagogical Content Knowledge), Pre-service English Teachers, Technology Training

Öz. Bu çalışma yabancı dil öğretmen adaylarının işbirlikçi ve yansıtıcı uygulamaları yoluyla, Teknolojik Pedagojik Alan Bilgisi (TPAB) gelişimini takip ederek, teknoloji entegrasyonunun yabancı dil öğretmeni yetiştirme programlarında nasıl gerçekleştirebileceğine yönelik bir örnek teşkil etmeyi hedeflemektedir. Çalışmaya Türkiye'de bulunan bir devlet üniversitesindeki 100 İngilizce son sınıf öğretmen adayı katılmıştır. Öğretmen adaylarından, bir dijital araç hakkında arkadaşlarına eğitim vermeleri ve Tasarım Yaparak Teknoloji Öğrenme yaklaşımına göre yabancı dil sınıflarında kullanılabilecek dijital etkinlikler geliştirmeleri istenmiştir. Nicel ve nitel yöntemlerin birlikte kullanıldığı üç çeşit araç yoluyla veriler toplanmıştır: TPAB-İDÖ Ölçeği, akran değerlendirme formları ve odak grup görüşmeleri. Bulgulara göre, araştırmanın sonunda öğretmen adaylarının TPAB-İDÖ bilgisinin bütün alanlarında anlamlı bir artış olduğu ortaya çıkmıştır. Bununla birlikte, öğretmen adayları dijital araçlara ilişkin algılarının olumlu olduğunu belirtmişlerdir: güdülemeyi arttırması, olumlu bir ortam yaratmayı sağlaması, ilgi çekici olması, zengin içerikli olması, kullanışlı olması gibi. Aynı zamanda, öğretmen adayları akran öğretimi deneyimlerini oldukça etkili bulmuşlardır. Çalışmanın sonunda, yabancı dil sınıflarında kullanılabilecek çeşitli dijital araçlara ve yabancı dil öğretimi programlarında yer alabilecek etkili bir teknoloji eğitimine ilişkin önerilere yer verilmiştir.

Anahtar Kelimeler: TPAB (Teknolojik Pedagojik Alan Bilgisi), Hizmet öncesi İngilizce Öğretmenleri, Teknoloji Eğitimi

Article Info
Received Date: 05.02.2018
Revised Date: 18.03.2018
Accepted Date: 20.03.2018

* *Correspondence:* Dr. Asuman Aşık, Department of English Language Teaching, Gazi Faculty of Education, Gazi University, Ankara, Turkey, e-mail: asuman.asik@gazi.edu.tr , ORCID: http://orcid.org/0000-0003-3293-1283
** Gazi University, e-mail: burtay@gazi.edu.tr, ORCID: https://orcid.org/0000-0001-9902-6574
*** Gazi University, e-mail: vuralarzu72@gmail.com, ORCID: https://orcid.org/0000-0002-7189-1408

Introduction

Recent years have witnessed an increased interest towards the use of technology in language teacher education (LTE). In spite of the increasing need for technology integration in language teaching, there are still discrepancies between this necessity and LTE. American Council on the Teaching of Foreign Languages in the document of Standards for Foreign Language Learning in the 21st Century (2012) emphasizes that the knowledge and expertise of the qualified language teacher is fundamental in the effectiveness of the technological tool in language classrooms.

There is a consensus of research revealing the affordances of the inclusion of technology in language classrooms; however, teacher training programs still lack preparation of language teachers to utilize technology for these affordances (Kessler, 2016). Several studies point out that the majority of language teachers are not still aware how technology may enhance their particular teaching contexts (Dooly & Sadler, 2013; Egbert, Paulus & Nakamichi, 2002; Kessler & Plakans, 2008). In this sense, several studies assert that language teachers are not graduating from their teacher training programs with the necessary skills to integrate technology successfully into their practices (Dudeney & Hockly, 2007; Hubbard, 2008; Healey et al., 2011).

By reviewing the literature, Başal (2015) lists the main problems encountered in LTE regarding technology use under four main categories: the deficiencies of technology integration in the curriculum, the lack of experienced and knowledgeable teacher educators, the attitudes of teacher educators and student teachers towards technology and the inadequacy of the technology environment in the faculties.

In terms of the curriculum-wise aspects, there has been discussion on how technology integration should be done for LTE contexts. Hubbard (2008) presents four main common approaches adopted by LTE programs: (a) a single course with various technology tools, (b) a single course with a more intensive technology experience such as projects, (c) an integrated approach with technology use in any possible course, (d) online courses about technology. Single course approach is found not sufficient for STs to gain competence in technology and to cultivate this knowledge in their practices effectively (Egbert et al., 2002; Polly et al., 2010; Wildner, 2013). Moreover, the integrated approach requires teacher educators who are also expert in technology instruction while online courses are used for distance education purposes. Furthermore, Motteram (2016) points out that the technology training in LTE programs is mostly about the practice and knowledge of the physical or technological apparatus rather than an investigation of how digital tools might be used for pedagogical purposes in the classroom or at home. In addition, pre-service English teachers need to develop their understanding about how materials at this digital age can be produced, selected and adapted for particular classroom uses through digital tools, which is the scope of the current study.

Furthermore, collaborative and reflective practices have been acknowledged significantly important in LTE as STs can increase their understandings of their professional experience (Schön, 1983). Farr and Riordan (2012) assert that the reflective practices of the STs in LTE contexts can create new opportunities for continuous reassessment of their thinking in varied situations. Technology integration in LTE, in this sense, needs to be conducted in a more dialogic, interactive and collaborative manner with peers.

Technological Pedagogical Content Knowledge

In order to offer a framework for integrating content, pedagogy and technology successfully, Technological Pedagogical Content Knowledge (TPACK) model has been introduced by Mishra and Koehler (2006). TPACK framework consists of seven types of knowledge associated with the integration of technology in instruction: technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and TPACK. All these types of knowledge are interrelational to identify the meaningful uses of technology in classroom settings.

TPACK framework aims to develop "a nuanced understanding of the complex relationships between technology, content and pedagogy and the use of this understanding to develop appropriate, context-specific strategies and representations" (Mishra & Koehler, 2006, p.1029). Particularly, this framework attempts to eliminate the use of technology for technology's sake. Therefore, teacher education programmes need to use the potential of TPACK to prepare STs to integrate technology into their teaching (Graham, 2011).

For an effective implementation of technology training in teacher education, Mishra and Koehler (2006) propose a Learning Technology by Design approach which refers to learning by doing with linking theory and practice instead of explicit and traditional teaching. Thus, with this approach, STs may experience designing digital materials and exploiting digital resources for specific language teaching purposes. These hands-on activities by the STs may influence their future applications of technology in instruction (Bhattacherjee & Premkumar, 2004). In this respect, Kiraz and Özdemir (2006) also found that the STs' hands-on experiences helped to face with challenges and seek for solutions by understanding the usefulness of instructional technology. As suggested by Kurt et al. (2013), technology integration into LTE contexts need to be based on problem-centred tasks, peer collaboration and engagement in reflective practices.

In an LTE context, Öz's study (2015) focused on the assessment of TPACK knowledge of the pre-service EFL teachers and reported a highly developed knowledge of TPACK. Furthermore, rather than a descriptive study, some studies aimed to track the TPACK development in pre-service English teacher education contexts. Koçoğlu (2009) and Kurt, Mishra and Koçoğlu (2013) found that integrating technology in teacher education programs explicitly and supporting the STs in TPACK implementation were effective in the development of TPACK knowledge.

Koçoğlu (2009) qualitatively explored how pre-service EFL teachers developed the knowledge and skills in integrating technology into L2 teaching. The findings of this study revealed that if given opportunities for meaningful technology integration in LTE, the STs would be more successful in the use of technology in their language classrooms. Similarly, Kurt et al. (2013) investigated the TPACK development of Turkish pre-service EFL teachers through the Learning Technology by Design approach (Mishra & Koehler, 2006). This study reported significant increase in TK, TCK, TPK and TPACK scores of STs after the treatment. In the development of TPACK knowledge, Ansyari (2012) also reported some significant aspects to be included in LTE programs which are Learning Technology by Design approach, active engagement, authentic learning experiences in a collaborative environment, guidance, support, and feedback, curriculum coherency, and intensive program.

Aim and Significance of the Study

Literature on technology integration in LTE contexts provide mostly descriptive studies on identifying the TPACK levels of the STs. Few studies (Koçoğlu, 2009; Kurt et al. 2013) mainly focus on searching for the developmental levels of TPACK levels of the STs via hands-on experiences conducted by the STs. However, these studies have not used an EFL specific scale to measure the TPACK development. In this sense, the current study is significant as it aims to track the development of TPACK knowledge of the STs by using a TPACK-EFL survey specifically designed, piloted and suggested by Baser et al. (2015). Furthermore, the study suggests how technology integration can be fulfilled in LTE contexts by providing a specific sample implementation in a particular course in LTE. The study is also significant since it attempts to offer several digital tools which are tested and discussed to be used in LTE and suggest discussion over how STs can benefit from the training given by their peers. With this motivation in mind, the study tried to seek the answers for the following research questions:

1. Is there a significant difference in TPACK-EFL levels of STs before and after the intervention?
2. What are the reflections of STs towards the digital tools in language teaching?
3. What are the perceptions of STs' Learning Technology by Design approach based on collaborative and reflective practices?

Method

Design of the Study

The study has a mixed methods research design since analyzing, collecting, and mixing both quantitative and qualitative data offer a better understanding and discussion of research objectives. The quantitative analysis of the survey results present any improvement reported in TPACK-EFL level while qualitative data collected through peer reflective discussion forms and focus-group interviews suggest a detailed data-driven discussion over the use of technology in language teaching.

Participants

The participants in this study were fourth grade senior pre-service ELT teachers who enrolled in Material Adaptation and Design in Language Teaching (MADTL) course in 2017 fall semester academic year at a large state university in Turkey. Convenient sampling was employed to collect data. Participants consisted of the students of instructors who carried out this study. A total of 100 STs (15 % were male; 85 % were female) participated in this study. They were aged between 21 and 24.

Research context

MADLT is a compulsory course that all senior year students take in the fall semester. It is a 3-hour lesson per week that aims to introduce participants to different approaches to course design, informs STs about what the principles of syllabus design are and how to select textbooks and materials in language teaching, how textbooks and syllabi should be evaluated, how to prepare and use teaching materials and make necessary adaptations in these materials and how to integrate technological tools in language teaching. Throughout this course, the STs are expected to complete three different tasks

which are graded. Task 1 requires STs to select a course book that is currently being used and sold on the market. They work in pairs and analyze the course book and its syllabus according to an evaluation checklist that is provided by the instructors of the lesson. They are expected to prepare a presentation in order to display their findings and support their points with the examples from the course book. Task 2, which is also the subject of this study and explained below, has been introduced to the course for the first time. No digital tools were integrated as a part of the course syllabus before. Task 3 requires students to work individually to examine their course books in Task 1 again and make use of 4 different adaptation techniques where they find necessary and give their reasons for doing so. All in all, the course mainly consists of tasks that require students to be actively involved in material adaptation and evaluation through learning-by-doing experiences.

The Research Intervention

The technology integration task into MADLT course was designed within a framework according to the following four principles suggested by Kurt et al. (2013): (1) skills were developed via Learning Technology by Design approach (Mishra & Koehler, 2006) (2) design tasks were problem-centered (Merrill, 2002); (3) STs worked collaboratively (socio-cultural theory); and (4) STs engaged in reflective practice (Schön, 1983).

In the MADLT course, the participants were given a two-week training about the materials adaptation techniques, the use of technology and the role of digital tools in language teaching with some sample activities by three instructors who were also the researchers. Then the participants were informed about the task (Task 2) and its procedure which required them to prepare a digital material for classroom use. The steps were as follows when presenting their own tasks:

- A list of widely used and suggested digital tools and websites in language teaching (*Storybird, Thinglink, H5P, Clarisketch, Word Cloud, Glogster, Plickers, Kahoot, My Storymaker, Voki, HP Reveal, Padlet, Penzu, Rewordify, Telescopic text, YouGlish, Listen & Write*) is given to STs. These tools address different language areas and skills, and learners of different ages as well.

- STs were asked to choose one of them according to the level of the coursebook that they had evaluated in their first tasks as one of the course requirements.

- STs were expected to find out about how the chosen tool works and how they can use effectively. They were encouraged to make use of the websites and the tutorials of the digital tools to become proficient users.

- STs were required to work in pairs and prepare a presentation to show their classmates the basic steps to follow about how to use the tool in designing materials by discussing the advantages and limitations of using the tool in the classroom.

- During the presentation, STs were expected to invite one of their classmates to try it out and help him/her have hands-on experience by giving guidance.

- Additionally, STs were asked to design or adapt a material and insert it into the course book that they had evaluated in their previous task and present it in the class.

- After each presentation of peer teaching, other STs were required to work in pairs and discuss about the digital tool presented according to a peer reflective discussion form. The form consisted

of four questions to answer about their general thoughts related to the digital tool and the adapted material introduced in the presentation.

Data Collection Instruments

Three instruments were used to collect the data quantitavely and qualitatively: the TPACK-EFL Survey, peer reflective discussion forms and focus group interviews. The TPACK-EFL Survey adapted from Baser et. al (2015) was chosen to investigate particularly the development of TPACK-EFL knowledge of pre-service EFL teachers regarding the use of digital tools in designing language teaching materials. The TPACK-EFL survey offers teacher educators a valid and reliable instrument that addresses the specific pedagogical and technological approaches valued in EFL contexts. The survey included 39 items: 9 TK (Technological Knowledge) items, 5 CK (Content Knowledge) items, 6 PK (Pedagogical Knowledge) items, 5 PCK (Pedagogical Content Knowledge) items, 3 TCK (Technological Content Knowledge) items, 7 TPK (Technological Pedagogical Knowledge) items and 4 TPACK (Technological Pedagogical Content Knowledge) items. The survey was used as a pre- and post-test to understand the STs' TPACK development and to investigate whether any development has occurred or not. Post tests were conducted after a five-week period.

The TPACK-EFL Survey designed by Baser et al. (2015) was adapted and used with 5 point Likert scale. In order to test the validity of the survey, Confirmatory Factor Analysis was used with a sample of 203 participants in the same context. The fit indexes were above .90 and RMSEA value is below 0.06, which confirms the evidence for the validity of the survey and the seven factors of the TPACK-EFL Survey. The survey was also found reliable with Cronbach's alpha value of .95.

Additionally, for data triangulation, after each presentation the STs were required to work in pairs and they were given a peer reflective discussion form to fill in by discussing with each other. The form consisted of four questions related to the digital tool introduced in the presentations. It was aimed to elicit the opinions of the participants about the newly presented digital tool and to engage them into a more reflective discussion. A total of 422 peer reflective discussion forms were collected till the end of the course. Moreover, each researcher conducted a focus group interview with 10 randomly selected participants from their classes upon the completion of the course. A total of 30 STs participated in the focus group interviews. It was aimed to get a detailed understanding of the participants' use of digital tools. Although six questions prepared in advance were asked to the STs, the interviews unfolded as conversations. Due to this conversational nature, the participants' names were not used in the recordings. The interviews were recorded with the consent of the participants and transcribed by the researchers.

Data Analysis

In order to identify whether there is a significant difference between pre-test and post-test of the TPACK-EFL survey results, descriptive statistics, paired samples t-test and Wilcoxon Signed Rank were used. Since the factors TK and PK were based on normality, paired samples t-test were used while the factors CK, PCK, TCK, TPK, and TPACK deviate from normality, a non-parametric analysis Wilcoxon Signed Rank was used.

Peer reflective discussion forms and focus-group interviews were analyzed qualitatively based on grounded theory as it allows interaction with the data and for ideas about it to emerge through continuous comparisons (Smith, 2008). The Constant Comparison Method was used since it offers sorting, coding and connecting pieces of data according to emerging patterns and themes rather than

predetermined sets of categories (Miles & Hubermann, 1984). First all communication units were gathered through the written discussions and the transcribed interviews. Then sub-themes and main themes were identified and quantified according to their frequency. In order to ensure the reliability of the qualitative analysis, three separate raters analyzed the data by sorting, coding and identifying the categories. For inter-rater reliability the formula (the number of agreements/the number of agreements (x) the number of disagreements multiplied by 100) suggested by Tawney and Gast (1984) was used. Inter-rater reliability was .88. This high degree of reliability indicated that raters reached a consensus on the coding and categorization of data (Gwet, 2014).

Results and Discussion

The study aimed at identifying any significant difference occurred in the development of TPACK-EFL development after the intervention and investigating the reflections and perceptions of STs towards each digital tool used and the Learning Technology by Design approach. For the first research question which is whether there is a significant difference in TPACK-EFL levels of ST's before and after the intervention, Table 1 below presents the results of the paired samples test for TK and PK development.

Table 1.
The Results of the Paired Samples Test

Scale		M	SD	t	df	P*
TK	Pre	28.82	6.36	- 9.35	99	.000
	Post	33.35	6.12			
PK	Pre	22.18	3.57	- 4.633	99	.000
	Post	23.87	3.64			

***p<0.05**

Table 1 shows that there is a significant difference between the pre-test and post-test in the TK (t=-9.35, p<0.05) and PK (t=-4.633, p<0.05) development of the STs. These results indicate that the STs improved in TK such as utilizing certain devices, multimedia programs and web-based tools and in PK such as using appropriate teaching methods and designing more collaborative and self-regulated learning activities. Moreover, the results about the other dimensions of TPACK-EFL knowledge were analyzed through Wilcoxon Signed Rank Tests, as shown in Table 2 below.

Table 2 displays that there is a statistically significant difference between the development of CK (z= -4.729, p<0.05), PCK (z=-4.092, p<0.05), TCK (z=-5.425, p<0.05), TPK (z=- 5.901, p<0.05) and TPACK (z=- 6.307i p<0.05).

All these findings indicate that there are statistically significant differences in all scales in TPACK development of the STs. The STs reported that they gained improvement in each and every dimension of TPACK knowledge. Moreover, these findings display that the STs reported improvement mostly in TPACK, TK and TCK and TPK. The results support the findings of Kurt, Mishra, and Koçoğlu (2013) which found increase in TK, TCK, TPK and TPACK after explicit TPACK treatment. Another qualitative study by Koçoğlu (2009) also found that the technology training improved mostly PCK, TPK, TCK and TPACK. The results of the current study indicate that Learning Technology by Design approach within the framework of TPACK is found effective and significant in developing the TPACK knowledge of STs through peer teaching practices.

Table 2.
The Results of the Wilcoxon Signed Rank Tests

Scale	Ranks	N	Mean Ranks	Sum of	z	p
CK	Negative Value	19	30.34	576.5	-4.729	.000
	Positive Value	58	41.84	2426.5		
	Equal	23				
PCK	Negative Value	28	31.11	871	-4.092	.000
	Positive Value	56	48.2	2699		
	Equal	16				
TCK	Negative Value	16	26.75	428	-5.425	.000
	Positive Value	60	41.63	2498		
	Equal	24				
TPK	Negative Value	17	31.97	543.5	- 5.901	.000
	Positive Value	71	47.5	3372.5		
	Equal	12				
TPACK	Negative Value	15	28.77	431.5	- 6.307	.000
	Positive Value	72	47.17	3396.5		
	Equal	13				

***p<0.05**

As for the second research question of the study which is to investigate the reflections and perceptions of the STs towards the digital tools tested and the use of technology in language teaching, written peer reflective discussion forms and transcribed focus-group interviews were analyzed. The analysis of the qualitative data resulted in three main categories with 15 sub-categories and a total of 2163 communication units. STs' reflections and perceptions were categorized under positive and negative perceptions about the digital tools and the use of technology and possible classroom use suggestions in language teaching. The findings are discussed below by giving specific references to particular digital tools and some interesting quotations from written reflections and interviews. The analysis of the perceptions and reflections were also discussed in relation with the components of TPACK. The examples are given within parentheses.

Table 3.
Evaluation of the Digital Tools by the STs

		N
Positive perceptions	Usefulness	326
	Enjoyable atmosphere	216
	Attractiveness	211
	Practicality	167
	Rich Content	79
	Creativity	63
	Motivating	43
	Total	1153
Negative perceptions	Not Useful	171
	Not Practical	139
	Not Attractive	12
	Total	322
Classroom Use	Practice of language areas and skills	364
	Any stage of the lesson	130
	Out of classroom use	127
	Evaluation	58
	Feedback	27
	Total	688
	Sum	**2163**

N*: Number of codes

Positive Perceptions

When these three major categories are concerned, it is obvious that STs mainly held positive attitudes (*n* = 1153) towards the use of digital tools in language teaching in the classroom. First of all, they found digital tools very *useful* (*n* = 326) when teaching language in the classroom. They described them as effective, informative, (multi)functional, and suitable for students (for instance, *Glogster* and *HP Reveal*). One of the STs described a class where technology is used as an *'upgraded version'* of a class where no technology is used. STs also described digitals tools as a way to create an *enjoyable atmosphere* (*n* = 216) in the classroom that employs the element of fun. Tools such as *Glogster*, *Kahoot*, *Storybird, My Storymaker* and *Voki* were described as funny due to offering a positive atmosphere in the classroom. One ST underlined the importance of their students enjoying the learning experience as follows:

Our aim is not only to inform students but also help them enjoy this experience. Help them want to learn English. I think we can achieve this through tools like Kahoot.

Digital tools are also described as being *attractive* (*n* = 211) in terms of many aspects. First of all, they are visually addressing the learners with their bright and eye-catching colors that get their attention (For example, *H5P, Word Cloud* and *Voki*). Especially with young learners, *Storybird* and *My Storymaker* were the favorites of STs. Students regarded them as intriguing and creative when compared to course books. They also found them innovative and interesting. Some of the implications stated by the STs are given in the following statements:

Digital tools are motivating since students find printed books less attractive and they even like and prefer reading e-books outside of the class.

In my opinion digital tools break the monotony in classes. Who does not like a lively atmosphere in the class?

I think digital tools help the teachers to lower the level of affective filter and students may overcome the fear of making mistakes in the class.

I believe that teachers may provide enjoyable atmosphere with the digital tools to facilitate learning.

Students can get bored a lot in classical methods. We have just experienced how to use Kahoot. This might get their attention a lot.

Another positive perception is the *practicality* (*n* = 167) of the digital tools. When compared to course books, digital tools do not necessitate a physical load and they are easy to carry or handle such as *Glogster*, *HP Reveal* and *Plickers*. An ST stated that:

When the teacher does not use technology, then s/he has to prepare a lot of visual materials to support his/her teaching. But when there is technology, teacher's job is a lot easier. She can make use of readily made materials and videos and provide a native speaker exposure for children.

STs considered digital tools such as *Plickers*, *My Storymaker*, *Voki* and *Word Cloud*, as simple and easy to use and share with others. Some of the tools are downloadable (for instance, *H5P*, *Word Cloud*) and they are also reusable such as *H5P*, *My Storymaker*, *Plickers*, *Word Cloud*. They can address to all ages and levels of students, and practice all language areas and skills (*Kahoot, Padlet, Storybird and Word Cloud*). Tools like *Plickers* can also be used with large classes. Digital tools were also reported

as practical and easy to design and prepare materials for classroom use, to collect assignments with less paperwork and to have effective time management in the class. The excerpts below illustrate clearly the practicality of the technology use.

Suppose that there is a washing machine at home, but you insist on hand washing clothes. Isn't it time consuming?

These tools can be downloaded to their phones. They can get exposed to English everywhere, even when going in metro.

Obviously, I used to believe it was difficult to use technology. I couldn't use computers… But these websites made a radical change. They are easier and more fun… I don't regard them as a waste of time and they are effective as well.

Furthermore, when compared to course books, these digital tools are considered as *rich in content* (*n* = 79). Some of these tools include *Glogster*, *H5P*, *Voki* and *YouGlish*. Some of the STs' statements implied that digital tools offer a rich variety of accents and authentic texts that teachers or course books cannot provide by themselves.

Teacher by her/himself cannot provide enough input. There are a lot of accents…

I think it is more advantageous in terms of authentic texts as well.

The level of exposure to English increases when technology is used. Because when it isn't used, then the classroom context only depends on the teacher… I mean only one thing.

However, it should be noted that this aspect should be considered with regards to the use of all digital tools as a whole, not one by one as each tool is addressing a different aspect of language. Yet, in terms of visuals, audios and interactions, they offer a generous content for the language teacher and learner. The STs also stated that the digital tools could provide flexibility for teachers to decrease over dependency on the course books and they could help the teachers to address different learning styles and to boost retention.

Another point is the *creativity* (*n* = 63) of digital tools. STs believed that due to their interactive nature, their students' creativity is tapped (For instance, *Storybird, Voki*). They also believed that these tools decrease the anxiety of students in the classroom and also develop a positive attitude towards language learning. Some of the digital tools are found as *motivating* (*n* = 43) that increase students' willingness (For example: *Glogster, H5P, HP Reveal, Kahoot*). *Plickers* and *Voki* are particularly described as tools that encourage shy students to participate in classroom activities, as illustrated in the following.

You know there might be shy and introverted students in the class, so digital tools may help us to encourage participation and interaction.

Negative Perceptions

When compared to positive perceptions of STs, their *negative perceptions* are much less (*n* = 322). Some digital tools such as *Rewordify*, *YouGlish* and *Penzu* are considered as *not useful* (*n* = 171) because they have limitations. Some tools are limiting because they have restricted content in terms of activity type, characters, settings, visuals, lack of editing after completion, limited sharing (For example, *Storybird* and *My Storymaker*). They are limited to a specific language skill for example just

for dictation (*Listen & Write*), vocabulary (*Word Cloud* and *Rewordify*) or writing (*Telescopic Text*) etc. They might cause problems in large classes (*Padlet* and *Plickers*). They can be used with a specific device for example only for android users (*Clarisketch*) or apple users (*Glogster*). They can have inappropriate content or no control over content (For example, *Padlet*, *Storybird, My Storymaker*, *Voki* and *YouGlish*) which might cause problems in the classroom.

STs also thought of some of the digital tool as *not practical* (*n* = 139). Some tools are thought as time consuming (*Plickers*), as it will take too much teacher's time to prepare and not worth using in the classroom when the amount of time used for preparation is considered. One ST noted that:

There are some tools that cause major loss of time. This loss of time does not bring any gains for the students.

Some of them are found to be too complicated to be learnt and used in the classroom by the teacher. For instance, *H5P* is considered as too complicated until one finds out how it works, otherwise it has a diversified content. As some tools charge membership, they are found expensive (For example, *Glogster*, *Penzu* and *Thinglink*). As some of the tools require technological tools such as mobile phones, it could be a problem in the class if students do not have one or the school does not allow use of mobile phones in the classrooms. There might be some drawbacks as well, such as poor quality of the printed materials required by the digital tool (For example, *Plickers*).

Similarly some tools are considered as *not attractive* (*n* = 12) such as *Listen & Write* due to their interface or they are found boring. Overall, a lack of resources in the class, potential technical problems and management of overcrowded classrooms were reported as negative perceptions of using the digital tools (PCK).

Moreover, it was also pointed out that over reliance on technology could affect the classroom interaction negatively, as is reflected in the following statements:

I believe if we overuse the digital tools or technology, creativity may decrease in the class.

In fact, overuse of technology in the classroom activities may make the students lazy since today's children do not even like writing in their notebooks.

Classroom use

When all digital tools that were employed in this study are considered as a whole, it can be said that they have a *comprehensive classroom use* (*n* = 688). The digital tools were found as useful and effective in teaching all language skills and areas, especially listening, writing and vocabulary (TPK).

First of all, they address to different and wide variety of *language skills and areas* (*n* = 364). Tools like *Kahoot*, *Plickers* and *My Storymaker* practice listening, pronunciation, reading, speaking, writing as well as grammar and vocabulary while providing meaningful context for the language learner.

Digital tools can be used in *any stage of the lesson* (*n* = 130). They can be employed as doing warm-ups (for instance, *H5P* and *Word Cloud*), ice breakers (For example, *Plickers* and *Voki*), brainstorming such as *Word Cloud*, storytelling such as *Storybird*, *My Storymaker* and *Voki* or activating schemata. They can be employed as a pre-activity for all skills (for instance, *Glogster*), used for presenting subjects (*H5P*), drama or role plays (*Storybird*, *Voki*) as well as games (*Kahoot*).

Out of class activities (*n* = 127) is another major classroom use of digital tools suggested as well. They provide a wide opportunity for teachers to help students keep learning out of the class (For example, *Clarisketch, H5P, Rewordify*). Teachers can give homework that they might enjoy doing rather than pencil and paper ones such as *Penzu*, *Storybird* and *Storymaker*. They can use them for keeping journals or blogs, carrying out group projects and preparing posters (For example, *Glogster, Padlet* and *Penzu*). They can also provide self-study opportunities (For instance, *Rewordify, Voki* and YouGlish).

Another classroom use for digital tools is *evaluation* (*n* = 58). These tools can be employed for self-assessment for students. Teachers can also use tools like *H5P* or *Kahoot* for quizzes, True/False or Multiple Choice questions, surveys, checking learners' comprehension, for revision and checking their homework, or they can test their students' language skills through tools like *H5P, Listen & Write* and *Plickers*. STs also think that digital tools provide *immediate feedback* (*n* = 27) for the teacher and learners as well. Some tools such as, *H5P, Kahoot*, and *Listen & Write* offer teachers feedback on the spot to evaluate the performance of the learner. Similarly, students can also give feedback to their classmates' performance in or out of the classroom (*Padlet* and *Storybird*).

The interviews also revealed how each tool presented in the class intrigues critical thinking on further classroom use of each tool by STs.

I always watched the presentations with the question in mind "Where and how else can I use this digital tool?" Actually all language skills can be developed through these digital tools, but in my opinion they are very effective in teaching writing and vocabulary.

Reflections on peer teaching

The last research question of the study was to find out the reflections of the STs on the hands-on experiences and peer teaching within the framework of Learning Technology by Design approach. In this respect, all of the STs reported that the experience through peer teaching and hands-on practices were considerably useful and effective. The STs stated that as they were required to prepare a presentation about the digital tool chosen, they became competent in using at least one digital tool (TK). The STs also stated their satisfaction about learning all these digital tools at their last grade during practicum period, which helped them to bridge the gap between theory and practice in language teaching and technology use. These findings are in line with Hanson-Smith (2016) and Hubbard (2008) which propose the necessity of the increased awareness on actual implementation and offer training in any possible courses in LTE.

It was really the right time to learn these digital tools with our friends, because we can use them in our practicum classes second term immediately and we really understood how technology could be used for specific purposes.

Moreover, the STs pointed out that their awareness and self-confidence in using technology increased and superiority of the teacher decreased. Therefore, they felt less pressure on their learning. They also emphasized that they were able to overcome their prejudices due to much more interaction and collaboration with peers. Organizing collaborative sessions in which STs can share their experiences may foster more dialogic, interactive and collaboration among student teachers (Mann & Walsh, 2017). For example some STs stated the effectiveness of peer teaching in the following excerpts.

If you want to learn more about the tool or if you have some questions, you may contact with your friend easily, not the teacher all the time.

Learning from peers is very useful. We understand each other better. This reduces anxiety, makes the tools less confusing.

If our instructor taught each tool, it could have been boring. Different students presented different tools, which was more colorful, added more variety and time-saving.

I felt more confident because if one of my classmates can prepare and use that digital tool, I can do it as well. But if teacher taught all digital tools, I could think that she was an expert and qualified.

If you were to teach these tools, we might not remember any of them. As you were teaching all the time, we might have forgotten them after a while. But since we prepared one tool ourselves, at least we won't forget that one.

If you were to teach all of these tools, we would not look up to any of their websites… Nobody would wonder about these (digital tools') websites. But when we had hands-on practice, we both learnt what they are and our friends showed how they are used.

These results are in line with the suggested skills for digital literacy of Dudeney et al. (2013) which are not restricted to technical skills but more increased awareness of surroundings of the appropriate use of new technologies. The results indicated that peer teaching improved their digital literacy broadening their horizons since the use of technology used to mean only the employment of PowerPoints, songs and videos for them. The following statements exemplify how the intervention improved the digital literacy of STs:

I didn't know there were tools like these. Mostly, I would only have them (my students) watch videos from Youtube, or make them listen to the pronunciation of new words or use power point before this lesson. But it has changed now.

I honestly did not know any of these tools. We have learnt 10 digital tools and they are all easy to integrate to our lessons. I believe integrating even one tool to a lesson can create a huge difference. Students enjoying the tool will help them learn and remember the information about that topic. Therefore, this is perfect.

There has been a big change in my perspective. I mean, as a senior year student, I was mind-blown to find out there are tools like this.

Overall, the integration of the digital tools into the activities (TPACK), hands-on practices and peer discussions at the end of each presentation were found as the most useful and meaningful parts of their experience (PK). On the other hand, the STs reported time limitation of the training and materials adaptation as a negative part of the experience. They expressed that more time was needed to have insights about the adapted digital materials.

Conclusion and Implications

This study aimed to present how technology integration can be fulfilled in LTE contexts by tracking the development of TPACK of the pre-service English language teachers through collaborative and reflective practices. For this purpose, a total of 100 senior STs of English enrolled in MADTL course at a large state university in Turkey participated in the study. The STs were required to conduct peer teaching practices about one digital tool they have chosen according to their language teaching purposes and prepare digital materials to be used in language classrooms. The research intervention

was designed within the framework of the Learning Technology by Design approach which involves hands-on experiences through collaborative and reflective mediums. The study attempted to track the development of TPACK-EFL levels of the STs within 5-week period and investigate the perceptions of STs towards the use of digital tools in language teaching and peer teaching experiences. With the help of three data collection instruments (the TPACK-EFL survey, peer reflective discussion forms and focus-group interviews), the data were analyzed both quantitatively and qualitatively.

The findings revealed that the STs' level of the TPACK-EFL improved significantly in each dimension of the TPACK, but considerably in technology-related dimensions such as TK, TCK, TPK and TPACK. Moreover, the STs reported positive perceptions about the digital tools. This result can be interpreted as the STs perceive the use of technology for language teaching purposes to create motivating, creative, attractive, interesting and positive atmosphere with content-rich activities and materials. The peer discussions of the STs on each digital tool indicated that the digital tools can be used for a variety of purposes in language classrooms such as teaching any language skills, using at any stage of lesson, out-of-class activities and evaluation.

The study has some implications to be considered in technology integration in LTE contexts. The findings revealed that Learning Technology by Design approach has a significant impact on the learning experiences of STs. Rather than an instructor-centered approach, hands-on experiences based on problems resulted in a deeper learning and retention. The presence of a superior i.e. instructor was found intimidating by some of the STs. They described a technology integrated material design lesson taught by instructors as more theoretical rather than practical. On the other hand, learning from a peer made them feel more open to collaboration, feel free to ask questions without hesitations. It also created a sort of camaraderie among STs i.e. who had similar struggles and difficulties while accomplishing their tasks. Hence, it created an atmosphere of rapport that could not be achieved under the supervision of an instructor. Besides, presenting STs with an opportunity to bridge theory into practice through real life tasks is much more effective than just presenting them the examples of how digital tools can be used in designing materials. Therefore, in terms of integrating TPACK into LTE, it would be more convenient to design courses that focus on peer collaboration and present real life classroom problems and practices for STs so that they can integrate digital tools into language teaching. These practices should also be followed by reflective practices that encourage STs to ponder about their actions and rationalize them.

Some of the STs stated that it was the right time to introduce digital tools in their course because they were already doing their practicum. However, some of the STs stated that it could have been better if they had been given a chance to practice the implementation of these digital tools at earlier stages of their education. The fourth grade provides a context for senior year students where they have a chance to put all their knowledge into practice accumulated throughout their previous years of education. Therefore, they have more meaningful practice when they are creating their lesson plans and applying their knowledge. Even so, it could have been better if they had been introduced to digital tools at earlier stages of their education though it is not necessary to practice how they are implemented. STs mentioned during the interviews that their knowledge about digital tools was only limited to the use of PowerPoints, songs or videos and they were surprised to find out how different and varied ways digital tools could be used in language teaching. Their digital literacy, which refers to the concept of understanding and making best use of the technology available, was quite limited to these items. However, if instructors could serve as role models, who integrate a variety of digital tools in their lessons in LTE when teaching of basic skills like speaking, listening, vocabulary etc. then their perspectives will be broadened and STs may have a better understanding of the use of technology and

higher digital literacy in language classrooms. Thus, LTE programs should offer chances to STs to be the decision-makers in designing their own lessons in line with their needs instead of dictating to them particular ways of integrating technology (Kurt et al., 2013).

Some suggestions for further studies can be given based on the findings and limitations of the current study. Longitudinal studies can be conducted to track the technology use by STs from a wide range of contexts such as from technology-integrated methodology classes to practicum period, or to in-service period. Rather than integrating technology into one course in LTE programs, discussions should be held on how each and every course may utilize technology for specifically language teaching purposes.

References

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*, *29*(4), 749-764.

Başal, A. (2015). English language teachers and technology education. *Journal of Theory and Practice in Education*, *11*(4), 1496-1511.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *Management Information Systems Quarterly*, *28*(2), 351–370.

Dooly, M. & Sadler, R. (2013) 'Filling in the gaps: Linking theory and practice through telecollaboration in teacher education'. *ReCALL*, *25*, 4–29.

Dudeney, G., & Hockly, N. (2007). *How to teach English with technology*. Harlow, UK: Pearson.

Dudeney, G., Hockly, N. and Pegrum, M. (2013). *Digital literacies*, Harlow, UK: Pearson.

Egbert, J., Paulus, T. and Nakamichi, Y. (2002). The impact of CALL instruction on classroom computer use: A foundation for rethinking technology in teacher education. *Language Learning and Technology*, 6(3), 108–126.

Farr, F. & Riordan, E. (2012). Students' engagement in reflective tasks: An investigation of interactive and non-interactive discourse corpora. *Classroom Discourse 3*(2), 129-146.

Hanson-Smith, E. (2016). Teacher education and technology. In Farr, F. & Murray, L. (Eds), *The routledge handbook of language learning and technology (pp. 210-222).* London: Routledge.

Healey, D., Hanson-Smith, E., Hubbard, P., Ioannou-Georgiou, S., Kessler, G., & Ware, P. (2011). *TESOL technology standards: Description, implementation, integration*. Alexandria, VA: TESOL.

Hubbard, P. (2008). CALL and the future of language teacher education. *CALICO Journal*, *25*(2), 175–188.

Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, *57*(3), 1953–1960.

Gwet, K. L. 2014. *Handbook of inter-rater reliability: The Definitive guide to measuring the extent of agreement among raters.* Gaithersburg MD: Advanced Analytics.

Kessler, G. (2016). Technology standards for language teacher preparation. In F. & L. Murray (Eds.), *Routledge Handbook of Language Learning and Technology* (pp. 57-71). London: Routledge.

Kessler, G. & Plakans, L. (2008). Does teachers' confidence with CALL equal innovative and integrated use? *Computer Assisted Language Learning*, *21*(3), 269–282.

Kiraz, E., & Ozdemir, D. (2006). The relationship between educational ideologies and technology acceptance in pre-service teachers. *Journal of Educational Technology & Society*, *9*, 152–165.

Koçoğlu, Z. (2009). Exploring the technological pedagogical content knowledge of pre-service teachers in language education. *Procedia-Social and Behavioral Sciences*, *1*, 2734-2737.

Kurt, G., Mishra, P. & Koçoğlu, Z. (2013). Technological pedagogical content knowledge development of Turkish pre-service teachers of English. In R. McBride & M. Searson (Eds.), *Proceedings of SITE 2013--Society for Information Technology & Teacher Education International Conference* (pp. 5073-5077). Retrieved January 30, 2018 from https://www.learntechlib.org/p/48937/.

Mann, S. & Walsh, S. (2017). *Reflective practice in english language teaching: Research-based principles and practices*. New York: Routledge.

Merrill, M.D. (2002). First principles of instruction. *Educational Technology, Research and Development*, *50*(3), 43–59.

Miles, M. B. & Huberman, A. M. (1984). *Qualitative data analysis: An Expanded Sourcebook.* Beverly Hills: Sage.

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

Motteram, G. (2016). Language materials development in a digital age. In F. Farr, & L. Murray (Eds.), *Routledge handbook of language learning and technology* (pp. 88-100). London: Routledge

Öz, H. (2015). Assessing pre-service English as a foreign language teachers' technological pedagogical content knowledge. *International Education Studies*. *8*(5), 119-130.

Polly, D., Mims, C., Shepherd, C. E., & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education, 26*(4), 863-870.

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Smith, J. A. (2008). *Qualitative psychology: A practical guide to research methods*. London: Sage Publications.

Standards for Foreign Language Learning in the 21st Century (2012). The role of technology in language learning. Retrieved September 12, 2017, from http://www.actfl.org/news/position-statements/role-technologylanguage-learning at 17.12.2017.

Tawney, J. W., & D. L. Gast. (1984). *single subject research in special education.* Columbus, OH: Charles E. Merrill Co.

Wildner, S. (2013). Technology integration into preservice foreign language teacher education programs. *CALICO journal*, *17*(2), 223-250.

Authors *Contact*

Asuman Aşık (PhD) is a lecturer at Gazi University, ELT Department. Her research interests are technology training, corpus linguistics, classroom discourse, language teacher education. asuman.asik@gazi.edu.tr

Burtay Hatice İnce (PhD) is an instructor at Gazi University, ELT Department. Her research interests include pre-service teacher training, role of feedback in teacher education, use of technology in language teaching. burtay@gazi.edu.tr

Arzu Şarlanoğlu Vural is an instructor at Gazi University, ELT Department. Her research interests include lexical competence, teacher cognition, students'beliefs and course design. vuralarzu72@gmail.com