



Department of Foreign Languages Education
English Language Teaching Program

EVALUATION OF EFL PRE-SERVICE TEACHERS' TECHNOLOGICAL PEDAGOGICAL
AND CONTENT KNOWLEDGE (TPACK)

Emirhan ULUDAĞ

Master's Thesis

Ankara, (2022)

With leadership, research, innovation, high quality education and change,

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AND CONTENT KNOWLEDGE (TPACK)

YABANCI DİL OLARAK İNGİLİZCE ÖĞRETMENİ ADAYLARININ TEKNOLOJİK
PEDAGOJİK VE İÇERİK BİLGİLERİNİN DEĞERLENDİRİLMESİ

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Master's Thesis

Ankara, (2022)

Acceptance and Approval

To the Graduate School of Educational Sciences,

This thesis, prepared by **EMİRHAN ULUDAĞ** and entitled “EVALUATION OF EFL PRE-SERVICE TEACHERS’ TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK)” has been approved as a thesis for the Degree of **Master** in the **Program of English Language Teaching** in the **Department of Foreign Languages Education** by the members of the Examining Committee.

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This is to certify that this thesis has been approved by the aforementioned examining committee members on .../.../.... in accordance with the relevant articles of the Rules and Regulations of Hacettepe University Graduate School of Educational Sciences, and was accepted as a **Master’s Thesis** in the **Program of English Language Teaching** by the Board of Directors of the Graduate School of Educational Sciences from/...../.....

Prof. Dr. Selahattin GELBAL
Director of Graduate School of Educational Sciences

Abstract

This study aims to examine Technological Pedagogical and Content Knowledge (TPACK) level of English as a foreign language (EFL) pre-service teachers related to the use of technology in Turkey, who are at their final year in their program, in relation to demographic characteristics such as, gender, age, daily internet use, reason for department choice, academic achievement, and confidence about technology use. The participants of the study were 100 Turkish final year EFL pre-service teachers. Through online and paper surveys, the participants were asked to anonymously complete a self-assessment survey that aims to evaluate their TPACK in relation to technology use and answer some questions about their demographic characteristics. As a result of the quantitative analysis of the data collected, it was found that TPACK level of the participants was high. In terms of gender, it was observed that males had higher technology knowledge than the female participants. In addition, the males were also found to be using internet more than the females. In relation to department choice, the participants who chose their department willingly and coincidentally had higher pedagogy knowledge than the ones who chose their department compulsorily. Lastly, no relationship between academic achievement, perceived level of confidence related to the use of technology and TPACK was observed; however, some connections between particular TPACK sub-constructs were noted. It is hoped that the findings of the study will contribute to the literature in the continuous development of the teacher education programs and further support technology integration into language education.

Keywords: tpack, efl, pre-service, teacher education, quantitative analysis

Öz

Bu çalışma Türkiye’de yabancı dil olarak İngilizce öğretmeni adaylarının teknoloji kullanımına yönelik teknolojik pedagojik ve içerik bilgisi (TPACK) seviyesini cinsiyet, yaş, günlük internet kullanımı, bölüm seçimi, akademik başarı ve teknoloji kullanımına yönelik güven gibi demografik karakteristiklerle ilişkili olarak ölçmeyi amaçlar. Çalışmanın katılımcıları 100 tane Türk son sınıf yabancı dil olarak İngilizce öğretmeni adaylarıdır. Online ve kâğıt anketler kullanılarak katılımcılardan anonim bir şekilde teknoloji kullanımına yönelik TPACK’larını ölçmeyi hedefleyen anketi doldurarak kendilerini değerlendirmeleri ve belirli demografik karakteristik sorularını cevaplandırmaları istenmiştir. Toplanan verinin nicel olarak değerlendirilmesi sonucunda katılımcılarının TPACK’ları yüksek olarak bulunmuştur. Cinsiyet ile ilgili olarak, erkek katılımcıların teknoloji bilgisinin kadın katılımcılardan yüksek olduğu bulunmuştur. Buna ek olarak, erkeklerin interneti kadınlara göre daha fazla kullandığı gözlemlenmiştir. Bölüm seçimine ilişkin ise, bölümünü isteyerek veya tesadüfen seçen katılımcıların pedagoji bilgisi bu seçimi zorunlu olarak yapanlara göre daha yüksek olarak bulunmuştur. Son olarak, akademik başarı, teknoloji kullanımına yönelik güven ve TPACK arasında bir ilişki gözlemlenmemiştir ancak belirli TPACK altyapıları arasında bazı bağlantılar bulunmuştur. Bu çalışmanın bulgularının alana öğretmen eğitimi programlarının sürekli olarak geliştirilmesi çabasında katkı sağlaması ve dil eğitiminde teknoloji entegrasyonunu daha da desteklemesi umulmaktadır.

Anahtar sözcükler: tpack, yabancı dil olarak ingilizce, hizmet öncesi, öğretmen eğitimi, nicel analiz

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The journey of working on a master's thesis is considered the initial step of taking the mantle of a researcher. It is the thorny road that many choose to endure to become competent and bright contributors of their selected discipline. Personally, this has been an enlightening but quite an arduous journey for me. The experience of dancing among the both mental and physical weight between work, life, and thesis work has certainly taken its toll on me while also greatly contributing to my personal development. I do acknowledge that my work isn't perfect; however, I did my best while working on it. Naturally, I wasn't alone in this journey and I would like to express my gratitude towards people who were there to support me.

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Symbols and Abbreviations

ICT: Information Communications and Technology

EFL: English as a Foreign Language

GPA: Grade Point Average

PLC-ICT: Perceived Level of Confidence Related to the Use of ICT

TK: Technological Knowledge

PK: Pedagogical Knowledge

CK: Content Knowledge

TPK: Technological Pedagogical Knowledge

TCK: Technological Content Knowledge

PCK: Pedagogical Content Knowledge

TPACK: Technological Pedagogical and Content Knowledge

Chapter 1

Introduction

In this chapter, the problems that motivated this research, what the study aimed to accomplish and its significance and the research questions that guided the study were discussed. In addition, some assumptions, limitations, and definitions related to the study were also included.

Statement of the Problem

Ever since ICT tools have become a part of our lives, they have significantly affected how we do things in many areas. This is also the case in the field of education due to the immense amount of studies that are being published in every discipline each year related to ICT tools and the common emphasis among these studies is the importance of the integration of ICT tools into education (Tseng et al., 2020). Integration of ICT tools into education brings many new opportunities into the classrooms that are otherwise not available and English as a Foreign Language (EFL) education is one of these areas that greatly benefit from that. The primary reason for that is having the opportunity of bringing authentic English material into a classroom within a non-English speaking country is highly valuable for EFL learners (Chapelle, 2003). However, benefiting from ICT tools is not as plain as solely using them in the lessons (Koehler et al., 2016). To actually gain benefits from them, they need to be used with a particular purpose (Liu et al., 2018). Unfortunately, that is not the case as previous studies reported that ICT tools were made use of inefficiently and superficially (Koehler & Mishra, 2009; Chai et al., 2013; Tseng et al., 2020).

Having a particular purpose in using ICT tools in language education is an important factor to pay attention as using the ICT tools for the sake of using them will cause the inefficiency that was previously mentioned. The inefficient use of the ICT tools is a crucial factor to eliminate as overcoming this problem will lead to a better language education. For instance, there are many resources in the process of language education that need to be managed, and eliminating this inefficiency will lead into having less wasted resources. To name few resources that are present in the educational processes, the first thing that comes into mind is the time of the both the teachers and the students. This is an important resource which will be further improved by an efficient use of the technology. For instance, the teacher may be taking too long to set up his or her technological tool that will be used in the lesson, or the technological tool the teacher wants to make use of within the lesson may include steps that may be inconvenient or too time consuming for the class to execute. Furthermore, the students in the classroom may not be on the same

page in the use of the particular technological tools within the lesson, which may lead into wasting more time to overcome this challenge. So, by using the technology with a particular purpose, we can eliminate the previously mentioned situations and the ones similar to it, and give way to a better education. One additional resource that is worth mentioning is the money of the educational institutions and the teachers. The educational institutions and the teachers may invest in technological resources in the hopes of improving the education, however, when a particular expectation these investments will bring is not set beforehand, such transactions will be no more than a waste.

When it comes to the problematic examples that were cited by the scholars, the following ones were the ones that were recurrently mentioned in many of the studies; ICT use being limited to basic presentations and activities (Tour, 2015; Andrei, 2017; Turgut, 2017; Teo et al., 2018) and ICT tools' being only employed with the only purpose of motivating students (Tseng, 2017). Such examples may also be considered as the results of not having a particular purpose in the use of the ICT tools in education. As it was mentioned earlier, ICT tools are meant to bring opportunities within classrooms that are otherwise not available in traditional settings with no technology use. If this is not the case, then the both the time allocated and the amount of money that was invested into the use of the technology may be wasted, which, again, brings us to the problem of the inefficient use of the ICT tools.

What were put forward as the primary causes of these were, firstly, teachers not getting enough training to use ICT tools competently (Koehler & Mishra, 2009). This may be considered as one of the leading contributors of this problem. As it was previously mentioned, having a purpose in using ICT tools in language education carries significance in overcoming many challenges that might occur in the absence of such purpose, so the sufficient training of the people involved in such educational processes is essential as the lack of training will give way to such problems. In addition, getting this training at the early stages of the teacher training programs, where the pre-service teachers are at the process of creating the building blocks for their profession, might be much more effective.

Secondly, ICT tools are getting more complex day by day because of the speed of the development of the technology, which makes it hard for teachers to catch up with these developments (Koehler et al., 2014). The ICT tools are developed at a rapid pace and the language teachers might have trouble in keeping up with such pace between the busyness that their profession and life brings. Such circumstances might make it tough for the teachers to focus on the purposeful use of the specific ICT tools, as they may not have enough knowledge in the use of the most efficient ones for the things they might want to accomplish in their language lessons.

Lastly, the attempts of making both ICT tools and educational processes work is a really challenging endeavor as both of them have a complex nature (Mishra & Koehler, 2006). The educational processes might be considered complex due to the nature of the human beings, and trying to add ICT tools that are already complex to make use of into this equation makes things tougher for many of the educators that take part in language education. This might result in not being able to formulate a valid purpose for the use of ICT in language education.

All in all, it is crucial for the ICT tools to be used with a particular purpose. Doing so will prevent many of the resources within the educational processes in the language education going into waste. In addition, the existence of the previously mentioned problems such as the lack of training in ICT, the rapid development of the ICT tools, and the complexity of the educational processes and the ICT tools might be contributing to these problems the most, so a sound understanding of the ICT tools with an appropriate education related to the profession of the language teachers is crucial. These obstacles can be overcome or at least this situation could be improved during the pre-service years of the EFL teachers because during this period the students take ICT courses as part of their four year program that will be the building blocks of their future. Unfortunately, it was observed that these pre-service EFL teacher education programs had inadequate education in terms of ICT integration (Aşık et al., 2020).

This might further support the idea that the root of the previously mentioned problems might be that situation. Pre-service EFL teacher education programs are the starting point of the careers of the many EFL teachers. Having such a problematic situation at the initial point of their careers may leave problematic beliefs on the EFL pre-service teachers that they might be carrying on themselves for the rest of their lives. So, it is essential to make sure that the EFL pre-service teachers get the best education possible related to the use of ICT tools to overcome the problematic situations mentioned previously.

In order to prevent this from happening, a report on the current situation of the EFL pre-service teachers in terms of the use of technology is needed. One of the better ways of obtaining a report on the current state of EFL pre-service teachers is by studying their viewpoints towards the use of technology in educational processes. This way, we can see both the current state of them related to technology and we can also take these viewpoints as the basis to have an idea about the current state of the EFL pre-service programs in Turkey. This can be accomplished by taking a closer look into the current state of EFL pre-service teachers related to the use of ICT tools in the EFL pre-service teacher education programs. One thing to note here is that, working on the EFL pre-

service teachers who are at the last year of their program is crucial while doing that because at this point in their programs these students will have taken majority of the courses related to their programs. As a result of this, we might estimate whether there is actually a problem or not and take measures in accordance with the results. This will especially assist teacher training programs and induction programs in developing healthier courses to improve the ICT abilities of the teachers of the future. In addition, policy makers may use the findings of the study to further improve the current state of the educational processes, which can benefit the education system in general.

To accomplish this, researching the evaluation of Technological Pedagogical and Content Knowledge (TPACK) self-efficacy related to the use of technology of EFL pre-service teachers, who are at the last year of their university programs, and the analysis of a variety of contexts that may affect it is needed.

Aim and Significance of the Study

ICT tools in EFL education is an important component due to their ability to bring new opportunities into the classrooms that are not available within the traditional settings. While they have such an important place in education, the proper ways of making use of ICT tools within the lessons are often overlooked. As a result, ICT tools are used without a pre-determined particular aim. This results in these tools being used superficially, which in turn wastes many of the resources of the educational institutions, the teachers and the students. Naturally, this situation is caused by many circumstances such as ICT tools being complex, ICT tools being developed at a rapid pace, and lastly, making use of them in educational contexts being tough are one of the recurrently mentioned ones. These problems can be overcome or, at least, this situation could be improved with an appropriate training of the language teachers at the beginning stages of their careers in teacher training programs. However, to better assess the current state of these programs, it is essential to evaluate TPACK level of EFL pre-service teachers related to technology use. This will bring insight into the question of whether these training programs are effective in their ICT tool use in education, and help us bridge the gap between the current state of the EFL pre-service teachers and the optimal one.

To address this situation, this study aims to examine TPACK level of EFL pre-service teachers in Turkey, who are at their final year in their program, in relation to a variety of variables. By doing so, the questions of what is the current state of EFL pre-service language teachers in relation to technology use, how does the state of the technology use among EFL pre-service teacher interact with a variety of variables, and whether the claims of ICT training courses in teacher training programs being insufficient

for the EFL pre-service teachers or not will be examined. By examining TPACK levels of the participants about their technology use, the study aims to bring insight into the TPACK EFL research that will be helpful in considering how the teacher education programs can be improved to better educate EFL pre-service teachers in ICT integration. This will also be useful in determining whether the current practices of training EFL pre-service teachers in using ICT tools in their lessons in the teacher training programs are sufficient or not.

Moreover, through the study we will have an idea on the relationship of particular variables with TPACK levels of EFL pre-service teachers which will help us obtain a clearer picture on whether there are any links between these variables and TPACK levels of the participants, which will further add value to the insight received through this study. One important thing to note here is also the current study works on the variables that were thought to have an impact on the TPACK level of the participants, so it will provide a general insight into whether these variables are actually impactful on the TPACK level of the EFL pre-service teachers related to technology use or not.

In addition, the place the study takes place is one of the stronger sides of the study. Turkey has been a country in which many studies related to EFL TPACK took place, so it is one of the leading contributors of this line of research (Tseng et al., 2020). This will make the results of the study valuable in their comparability with the similar studies.

To date, there have been studies with similar scope; however, the current study distinguishes itself from them in two ways. Firstly, this study takes into account many of the recurrently used variables that were thought to have a relationship with the TPACK level of the EFL pre-service teachers to provide a general insight into the literature. Secondly, the previous studies made use of TPACK self-assessment surveys that were designed with a particular approach, which was observed to impact results obtained through them depending on the approach they followed (Bostancıoğlu & Handley, 2018). In this study, an up to date self-assessment survey that was designed for the self-efficacy of EFL pre-service teachers with a general approach to assessing TPACK self-efficacy in a thorough way related to technology use was used, and this instrument was developed by Bostancıoğlu and Handley (2018).

The research questions of the study have been formulated as in the following:

Research Questions

1) What is Technological Pedagogical and Content Knowledge (TPACK) self-efficacy level of final year EFL pre-service teachers related to the use of technology in Turkey?

2) Does Technological Pedagogical and Content Knowledge (TPACK) self-efficacy level of final year EFL pre-service teachers related to the use of technology in Turkey show difference in relation to;

- a) gender?
- b) age?
- c) daily internet use?
- d) reason for department choice?

3) Does Technological Pedagogical and Content Knowledge (TPACK) self-efficacy level of final year EFL pre-service teachers related to the use of technology in Turkey have any relationship with;

- a) grade point average (GPA)
- b) perceived level of confidence related to the use of ICT (PLC-ICT)

Assumptions

As part of the study, it was assumed that EFL pre-service teachers, who were at the final year of their university programs in the academic year of 2021-2022, took at least one course related to ICT. In addition, it was hoped that the participants would answer the questions of the self-assessment survey instrument honestly.

Limitations

This study is limited to 2021-2022 academic year Turkish EFL pre-service teachers in Turkey, who were in the final year of their universities at that point in time.

Definitions

Information Communications and Technology (ICT): This term is used to refer to a variety of digital technological tools, software, and applications.

English as a Foreign Language (EFL): The use of English by people that have a different native language than English.

Grade Point Average (GPA): Average grade of the participants in their universities.

Perceived Level of Confidence Related to the Use of ICT (PLC-ICT): The personal opinion of the participants towards how good they are at using digital technological tools, software, and applications.

Technological Knowledge (TK): Knowledge of standard technologies, such as books, and blackboards and advanced technologies like web 2.0 tools, and computers (Mishra & Koehler, 2006).

Pedagogical Knowledge (PK): Knowledge of educational processes, audiences, techniques, and methods for teaching subject matter (Mishra & Koehler, 2006).

Content Knowledge (CK): Knowledge about the subject matter that is being taught or learned (Mishra & Koehler, 2006).

Technological Pedagogical Knowledge (TPK): Knowledge of educational advantages and disadvantages of technological tools in line with employed teaching techniques and methods (Mishra & Koehler, 2006).

Technological Content Knowledge (TCK): Knowledge of which type of technology is appropriate for a specific subject matter (Mishra & Koehler, 2006).

Pedagogical Content Knowledge (PCK): Knowledge of which type of teaching practice is appropriate for a specific subject matter (Mishra & Koehler, 2006).

Technological Pedagogical and Content Knowledge (TPACK): Knowledge of the nature of technological tools that would enable teachers to be mindful about their strengths and weaknesses concerning subject matters that are being learned and taught, and teaching techniques and methods employed in educational contexts while considering whether the use of a specific type of technological tool would be appropriate for what is expected to be achieved (Mishra & Koehler, 2006).

Chapter 2

Literature Review

In this chapter, concepts that are essential for a better understanding of the study, the chronological development of the focal topic of the study, and previous studies that guided it were discussed.

Defining Technology

Prior to progressing further into TPACK and language education, it is considered crucial to briefly talk about what is meant by technology in this study. Research into technology has a long history. For many years, it was extensively studied in every field by countless scholars. Although this attention can be positive, it also brings a particular problem. The generalizability of the term technology makes it hard to narrow down what is actually meant by it and brings about the need for an unambiguous definition (Graham et al., 2012). One of the serious discussions on the definition of technology in education took place with the introduction of Technological Pedagogical and Content Knowledge (TPACK) framework, which will be discussed later in the literature review (Mishra & Koehler, 2006). In this framework, technology was broadly defined as tools, ranging from traditional tools such as pencils and chalkboards to Information and Communication (ICT) tools such as laptops and smart boards (Mishra & Koehler, 2006; Koehler & Mishra, 2008). This definition was criticized for being ambiguous by contemporary scholars as it was blurring the difference between ICT tools and traditional tools (Cox, 2009) and additional definitions were put forward, such as Cox's (2008) transparent technologies and emerging technologies definition. Cox (2008) categorized technological tools into two categories, transparent technologies that include traditional tools such as pencils and chalkboards, and emerging technologies that include ICT tools such as laptops and smart boards. Cox's (2008) emerging technologies definition is more in line with the recent studies on technology (Cox, 2009; Graham et al., 2012; Tseng et al., 2020), and the current study will refer to technology in the form of ICT tools in the following chapters.

ICT Tools in Education, and English Language Education. ICT tools are broadly considered as kinds of technological tools ranging from laptops to software programs (Wikipedia contributors, 2022). There is a large volume of published research on the benefits of ICT tools in every field owing to their significant potential of bringing new opportunities that are otherwise not available. The situation is not different in the field of education as there is a considerable amount of literature that has been published ever since the emergence of ICT related studies in every discipline (Tseng et al., 2020). Integration of ICT tools into education was inevitable given their significant advantages,

and over time, new ways of teaching, utilizing these newly developed ICT tools, started to emerge (Sam et al., 2005). These developments have also changed the perspectives of researchers towards education. Over the past decade, most research related to ICT tools and education has emphasized the benefits of using ICT tools in the classrooms (Chai et al., 2010; Sang et al., 2010; Kim & Hannafin, 2011; Howland et al., 2012; Inderawati, 2017) and teachers' need of getting themselves familiar with them for a healthier education. (Pierson, 2001; Mishra & Koehler, 2006; Voogt et al., 2013; DeCoito & Richardson, 2018).

English language teaching has also been one of the fields that have been significantly affected by these technological developments due to its nature. The reasons for this are many so mentioning the most influential ones will be more efficient to grasp this situation. In her seminal book Chapelle (2003) states that development of ICT tools has made it possible to bring authentic language into the classrooms in non-English speaking countries. The impact of this development is remarkable because having access to this kind of input has been pointed out to make learning the language much more accessible (Teo et al., 2018). Another side effect of this is also the enrichment of cultural sense of non-English speaking students towards English language (Yang & Chen, 2007), which may have contributed to the spread of the language to an extent. Lastly, ICT tools bring diversity into the classrooms with various activities and materials (Howland et al., 2012), this makes them engaging and effective to use in the lessons (Kern et al., 2017) while also promoting learner autonomy and learner autonomy is an important aspect of the education (Doğan & Mirici, 2017).

State of ICT Integration in English Language Teaching. Making effective use of ICT tools in English language teaching is not as simple as just bringing them into the classrooms (Koehler et al., 2016). In order for them to make an actual difference, they need to be integrated into the lessons with a particular purpose (Liu et al., 2018). Unfortunately, based on the past findings regarding ICT integration and English language teaching, it was reported that the level of ICT integration in English language teaching is inadequate (Aşık et al., 2020). Past studies also states that ICT tools in English language teaching are not made use of effectively by teachers (Tour, 2015; Andrei, 2017; Teo et al., 2018). The main problem that was recurrently observed regarding the ICT integration in English language teaching was that their use was limited to basic presentations and activities (Tour, 2015; Andrei, 2017; Turgut, 2017; Teo et al., 2018) and they were generally only used with the intent of motivating students (Tseng, 2017). Moreover, it was also found that in-service teachers as well as pre-service teachers used their pedagogical

expertise and previous encounters while deciding on ICT tools instead of their technological expertise (Boschman, 2015, 2016).

Pre-service teachers are an important group because it is the starting career point of every in-service teacher. However, similar to in-service teachers, it was found that pre-service teachers also lacked appropriate ICT knowledge to use ICT tools effectively (Kessler, 2016, 2018). Since ICT tools have been found to have high potential, teacher education programs were called for action to integrate ICT into their curriculum to prepare future teachers to adopt ICT tools into their lessons and increase the tools at their disposal (Alayyar et al., 2012; Andrei, 2017). Another important factor for this call is the result of teacher education programs having a wealth of opportunities (Mirici & Ölmez-Çağlar, 2017) to raise future teachers with much needed ICT knowledge (Hong, 2010). Literature on this seems to confirm this idea as it was put forward that pre-service teachers' having a higher ICT knowledge may positively affect the adoption rate of ICT tools in their lessons later in their careers (Turgut, 2017), which signifies the centrality of pre-service programs as places that can fix the ICT integration problems. Unfortunately, it has been over a decade since the call of Hong (2010) to focus on foreign language teacher education programs for better ICT use, however, based on the reports of the previous studies, language teachers start their careers with insufficient technology knowledge (Kessler, 2016), which further confirms the findings of Boschman (2015, 2016). One of the forthcoming reasons put forward for this situation is that language teacher education programs don't focus too much on educating pre-service teachers on ICT integration (Kessler, 2018; Aşık et al., 2020) and the current ways of educating pre-service teachers on ICT integration are superficial (McKenney et al., 2015; Kessler, 2018).

Past studies put forward that ICT use should be used in line with what teachers pedagogically want to accomplish instead of being treated as supplementary tools (Mishra & Koehler, 2006; Koehler & Mishra, 2009; Voogt et al., 2013; Kassem, 2018; Septiyanti et al., 2020). This is not an easy task as ICT tools exist in a variety of types and they are created for various purposes (Koehler & Mishra, 2008; Tseng, 2017), so having the expertise of making use of them pedagogically is not an easy endeavor. For this reason, making use of a framework such as TPACK that is designed to help teachers and teacher educators in integrating ICT into education (Mishra & Koehler, 2006) sounds much more plausible as a way of overcoming the problems related to ICT integration in pre-service training programs.

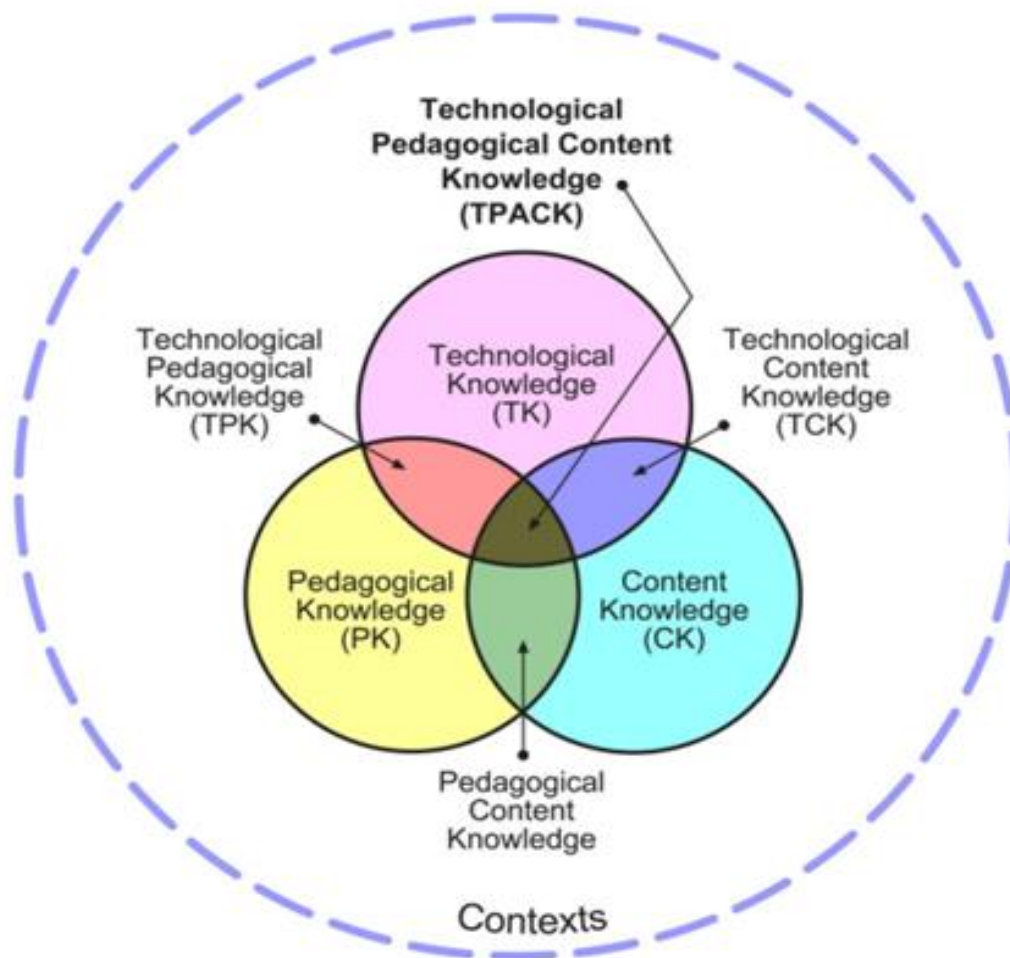
TPACK

Before the work of Shulman (1986), Pedagogy Knowledge (PK), knowledge of teachers related to educational processes, and Content Knowledge (CK), knowledge of teachers related to their subject, were treated as separate constructs and teachers were trained in accordance with that view. Shulman (1986) argued against that by putting forward the idea of Pedagogical Content Knowledge (PCK). According to him, teachers needed both the knowledge of the content they were teaching, and the knowledge of the ways of teaching that content to their students through educational processes so that they could teach effectively (Shulman, 1986, 1987). Through the creation of PCK, Shulman (1987) wanted to explicate the holistic process of teachers' utilizing their knowledge of content along with their knowledge of pedagogy for education. Towards the 21st century, this view continued gaining traction and became a point of interest of researchers in the field of education (Cochran et al., 1993).

Due to the rapid development of ICT tools, Technology Knowledge (TK), knowledge of ICT tools, was soon realized as another essential concept that needed to be considered for education (Mishra & Koehler, 2006). However, because of the high attention TK received as a result of its recency in the early 2000s, this led to researchers' and teacher educators' treating ICT tools as mere tools without considering their effective integration into educational contexts (Chai et al., 2013). To address this problem and create a framework for effective integration of technology into education, Mishra and Koehler (2006) developed the framework of Technological Pedagogical Content Knowledge (TPCK), which was later called Technological Pedagogical and Content Knowledge (TPACK) for an easier pronunciation and a better representation of its knowledge constructs (Thompson & Mishra, 2007). In addition, it is worth noting that prior to Mishra and Koehler (2006), similar terms that represented ICT integration into education were used by a variety of scholars (Pierson, 2001; Angeli & Valanides, 2005; Niess, 2005) but it was the one that got popular the most.

TPACK framework took inspiration from Shulman's (1986) PCK, and it was built on the idea of interaction among the concepts of TK, PK, and CK (Mishra & Koehler, 2006). In the framework, these concepts are further combined to form new sub constructs to explicate the requirements that are needed to effectively integrate ICT tools into education (Figure 1). The intersection among PK and CK forms Pedagogical Content Knowledge (PCK), TK and PK forms Technological Pedagogical Knowledge (TPK), and TK and CK forms Technological Content Knowledge (TCK), and lastly, the intersection of all of these forms Technological Pedagogical and Content Knowledge (TPACK) (Mishra & Koehler, 2006).

Figure 1. *TPACK framework and its knowledge components (Koehler & Mishra, 2009).*



The two main reasons that made TPACK framework popular were that; firstly, it was the earliest framework which was created for ICT integration into education (Rosenberg & Koehler, 2015) which made it receive a lot of attention from scholars studying ICT integration (Chai et al., 2013; Voogt et al., 2013). Secondly, TPACK constructs helped teachers and teacher educators in isolating and simplifying the types of knowledge that needed to be mastered to effectively integrate technology into education (Mishra & Koehler, 2009) and this made it easier to identify what was missing and track down the things that needed to be worked on to improve the process of ICT integration (Kim et al., 2013). Consequently, TPACK became the center of attention in educational literature and the focus of variety of studies (Angeli & Valanides, 2009; Koehler et al., 2014).

TPACK Critique

As a result of being in the center of many studies, TPACK was criticized by researchers for two main reasons. Firstly, TPACK was found to be too complicated to be realistically used in education and research (Angeli & Valanides, 2009; Graham, 2011; Brantley-Dias & Ertmer, 2013; Herring et al., 2016). Secondly, the definitions of its constructs and their connections were found to be vaguely defined and described (Angeli & Valanides, 2009; Cox & Graham, 2009; Graham, 2011; Niess, 2011; Olofson et al., 2016) without clear boundaries that would set them apart (Archambaut & Barnett, 2010). The effects of this vagueness can be observed within the literature as in contrast to the view that TPACK was created by the relationships among its constructs (Koehler & Mishra, 2008; Schmidt et al., 2009; Chai et al., 2011) it was also seen as a singular concept without its constructs (Angeli & Valanides, 2005, 2009; Valanides & Angeli, 2008). Lastly, whether having TPACK knowledge actually meant having competence and knowledge related to ICT integration or not was one of the debates that were affected by this vagueness within the literature (So & Kim, 2009). Almost a decade after their first publication about TPACK (Mishra & Koehler, 2006), Koehler et al., (2014) also mentioned some of the complications related to TPACK that led to the things mentioned by the scholars above. Moving from these deficiencies, many studies have been carried out to improve or build on the findings of the previous studies to develop the concept of TPACK and majority of them have been successful in carrying the concept to a better path.

TPACK Studies

Ever since its emergence, TPACK has been seen as a concept that could largely contribute to the field of education, therefore, it received attention in accordance with that view (Herring et al., 2016). Results of multiple literature reviews that have been done to date regarding TPACK seem to confirm this statement (Tseng et al., 2020). In Wu's (2013) review, which is one of the first examples of a study of trends in TPACK, it was reported that research related to TPACK was increasing each year and these studies were largely dominated by domain-general studies, types of studies without a specific subject such as TPACK in language education or mathematics compared to domain-specific studies. Findings of the succeeding reviews (Chai et al., 2013; Voogt et al., 2013; Willermark, 2018) were also in line with these findings. As far as the subjects of domain-specific studies were concerned, it was found that the most studied subjects were science and mathematics (Wu, 2013) and language education was among one of the least studied subjects (Chai et al., 2013). Five years after these reviews, Willermark (2018) conducted another study related to TPACK literature and it was observed that the number of

language education research reached to the level of science, the most popular subject in this line of research. The domain-specific TPACK studies related to language education still continue gaining popularity, mainly dominated by EFL research, as the number of studies keeps growing every year according to the latest literature review of research trends in EFL TPACK by Tseng et al. (2020). Within these EFL TPACK domain-specific language education studies, the most studied group was found to be in-service teachers compared to pre-service teachers and the most popular method employed was survey method with an emphasis on the self-efficacy of the participants (Tseng et al., 2020). Although survey method was found to be the most adopted research method due to its functionality in examining TPACK level of the participants, one worth mentioning criticism towards it is that the different approaches adopted by the researchers while preparing these instruments might affect the results of these studies and make the comparison of the results of them with the other studies harder (Bostancioğlu & Handley, 2018). Another thing to be careful about is that survey items need to have clearer descriptors to avoid manipulating the answers of the participants (Bostancioğlu & Handley, 2018; Seyitova et al., 2019). As for self-efficacy, there have been discussions on its usefulness related to TPACK (Tseng et al., 2020), however, there have been positive reports on the reliability of how pre-service teachers view themselves in many recent studies (Mirici, 2019; Canaran & Mirici, 2020; Ölmez-Çağlar et al., 2020; Mirici & Sarı, 2021).

Due to these, calls for focusing on domain-specific TPACK research (Cheng, 2017; Tseng et al., 2020) and using surveys that were designed with a more general approach and written with clearer items (Bostancioğlu & Handley, 2018) were made.

Trajectory of EFL TPACK Research

Prior to talking about EFL TPACK pre-service studies, it is essential to take a brief look at relevant EFL TPACK in-service studies to understand the direction pre-service studies took as earlier studies on EFL TPACK was about in-service teachers (Tseng et al., 2020). One of the first studies in EFL TPACK was carried out by Tseng et al., (2011) and in the examination of three EFL teachers before and after a 12 week CALL workshop through lesson plan analysis; it was found that teachers' TPACK could be examined and CALL education could improve it. Through a similar workshop design, Tai (2013) studied CALL competence of EFL teachers and similar conclusions were reached. One year later, it was further observed by Hong et al., (2014) that EFL teachers with higher technology knowledge were more eager to use these technologies in the classrooms. Some consecutive studies reported that TPACK of EFL teachers could be examined through self-assessment questionnaires (Mahdum, 2015) and TPACK level of them could also be developed through particular practices (Liu & Kleinsasser, 2015). After these initial studies

within in-service studies that found out the possibility of assessing teacher TPACK and ways of developing it, consecutive studies haven't significantly changed their trajectory and mainly dealt with expanding the findings of the past studies by conducting similar studies in different contexts and settings with varying methods (Tseng et al., 2020).

The direction of TPACK research also followed a similar path in pre-service teachers and they were also guided by the findings of the ICT studies on pre-service teachers, such as ways of developing ICT knowledge of pre-service teachers through courses and increasing the likelihood of the adoption of these tools in their lessons (Pace et al., 2010; Fook et al., 2011; Kartchava & Chung, 2015; Mei et al., 2017). In the studies of examining the likelihood of EFL pre-service teachers using ICT in their classrooms, there were differing results as some studies reported that pre-service teachers didn't feel ready to use these tools in their lessons (Cummings et al., 2016), while the others reported that they were confident in their ICT skills (Yet & Nordin, 2017). Similar to these studies, EFL TPACK pre-service studies worked on similar research topics through making use of TPACK concept. Through the use of TPACK, it was further confirmed that ICT knowledge and the likelihood of adopting ICT tools and the development of it could be represented with TPACK with a variety of instruments (Kwangsawad, 2016; Le & Song, 2018; Lisa et al., 2021). In addition, it was found that pre-service and in-service teachers had similarities within their TPACK levels (Drajati et al., 2018) but there were some differences within particular constructs of TPACK such as pre-service teachers having higher TK and in-service teachers having higher PK and CK (Nazari et al., 2019). Similar findings were also reported with additional implications such as male pre-service students reporting higher TK due to their more experience with technology (Ciptaningrum et al., 2021) and pre-service teachers' TPACK being affected by their lecturers' approach to ICT tools (Sofendi et al., 2021). The finding about lecturers having impact on TPACK of pre-service teachers was also echoed by the recent studies (Singh & Kasim, 2019; Septiyanti et al., 2020) as a strategy of developing TPACK of pre-service teachers and also the environment of the pre-service teachers was also found to be impactful on their TPACK (Inderawati et al., 2019).

EFL TPACK Research in Turkey

As far as EFL TPACK studies are concerned, Turkey has been a major contributor of this line of research (Tseng et al., 2020) so it is essential to be knowledgeable about the state of TPACK research in Turkey due to its position. One of the earliest studies related to TPACK in Turkey was a qualitative study exploring the ways EFL pre-service teachers develop their ICT integration skills into EFL education and it was found that pre-

service programs played a central role in this matter (Koçoğlu, 2009). To better investigate the centrality of the pre-service programs and devise ways of improving them, examination of TPACK level of pre-service EFL teachers became a popular research trend within the country. In this category, initial studies found that TPACK level of pre-service teachers were high (Kabakçı & Yurdakul, 2011), and among its constructs PCK was found to be the most important one that affected how pre-service teachers integrated ICT into education (Pamuk, 2012). PCK being the deciding factor shows the deficiency in the categories of Technology constructs of TPACK and it is further backed by the finding that EFL pre-service teachers in Turkey didn't have a positive attitude towards ICT use (Hismanoglu, 2012). Nevertheless, the success of pre-service programs in developing TPACK of EFL pre-service teachers was further supported through the study of Kurt et al. (2013, 2014) in which it was observed that pre-service teachers improved their TPACK level by the end of their program. In addition to solely examining TPACK level of EFL pre-service teachers, Ekrem and Recep (2014) investigated the relationship of TPACK level with variables such as gender and academic achievement and it was found that male participants tended to have higher TK while female participants had higher PK and academic achievement didn't have a major effect on TPACK. Additionally, among TPACK constructs, constructs related to technology was among the lowest when compared with the remaining ones (Ekrem & Recep, 2014). A similar direction was taken by Öz (2015), it was found that EFL TPACK pre-service teachers had high level of TPACK, PK being the highest level among the other sub-constructs, and gender and academic achievement were also found to have a slight impact on TPACK level of the participants. In addition to solely checking the development of EFL pre-service teachers TPACK level before and after pre-service courses, there were also studies on the particular practices, such as creating digital stories for EFL education, to develop TPACK level of the participants with positive results (Sancar-Tokmak & Yanpar-Yelken, 2015). Comparisons in terms of TPACK of pre-service and in-service teachers were also made and it was found that in-service teachers had more self-efficacy compared to pre-service teachers and despite having not so different TK, TPK, and PK levels it was noted that in-service teachers had more concrete understanding of these constructs compared to pre-service teachers (Yıldız, 2017). Another worth mentioning finding is that, in contrast to Hismanoglu (2012), Bağcı and Atar (2018) found that EFL pre-service teachers having high TPACK level could positively affect their attitudes towards using ICT in their lessons. Another study that focused on the relationship of TPACK with variables such as gender was also recently conducted and it was found that gender and daily internet use had an impact on the understanding of the ICT tools among pre-service teachers (Atar et al., 2019). Lastly, a study that focused on additional factors that affected ICT integration of EFL pre-service

teachers in Turkey, Portugal, and Poland was conducted and it was found that there were a lot of similarities among three countries in terms of pre-service teachers, and teacher educators played a major role as a role model in the ICT integration skills development of pre-service teachers.

To conclude, in addition to being a major contributor of TPACK research, Turkish context was found to have similarities with different countries which makes it suitable place for research. Moreover, in EFL TPACK research, pre-service programs have been seen as an important avenue for research due to their centrality in training teachers to have high ICT integration skills, and examination of TPACK level of pre-service teachers in relation to particular variables such as age, gender, academic achievement, and amount of internet usage was at the center of attention to gain better insight into the state of pre-service programs. So, by conforming to the previous calls made by the researchers, and keeping in mind the trajectory of EFL TPACK pre-service research, this study aims to examine TPACK level of Turkish EFL pre-service teachers, who were at the final year of their university programs in 2021-2022 academic years, and its relationship among a variety of widely used variables by using a general purpose self-assessment survey with a quantitative method research design.

Chapter 3

Methodology

In this chapter, detailed information about the setting and the participants of the study, the way the data was collected, which instruments were used in that process, and how the data analysis was conducted were discussed.

This study was conducted to examine the TPACK level of EFL pre-service teachers in Turkey, who were at their final year in their program in 2021-2022 in relation to a variety of variables. These variables were chosen by referring to the studies of the past that had a similar scope in research. As a result, variables such as gender, age, grade point average (GPA), daily internet usage (in terms of hours), perceived level of confidence related to the use of ICT (PLC-ICT), and the reason of the department choice of the participants, were chosen in accordance with the findings as they were thought to have an impact on the focal topic of the study that is TPACK level of the EFL pre-service teachers.

To achieve the aim of the study, final year EFL pre-service teachers studying in different universities in Turkey were chosen as the target group of the study. As a result, 101 EFL pre-service teachers participated in the study filling out a survey that was designed to assess TPACK level of EFL pre-service teachers through 85 5-point Likert scale items developed by Bostancıoğlu & Handley (2018), which also had a section asking for a variety of additional information such as, gender, age, grade point average (GPA), daily internet usage (in terms of hours), perceived level of confidence related to the use of ICT (PLC-ICT), and how did participants choose English Language Teaching Department.

Setting and Participants

The study took place in Turkey due to the centrality of the country for this research. Firstly, to date, Turkey has been an important contributor of TPACK research (Tseng et al., 2020). Secondly, it is a country that uses English as a Foreign Language, which coincides with the study's target participant characteristic. As a result of these reasons, Turkey was seen as an appropriate location for such a study to be conducted. One additional thing to note related to these features of Turkey is that, such features will provide the opportunity of comparing the results of this study with the ones that are similar to it, which further adds value to both the results of the study and the location of the study.

The participants of the study were EFL pre-service teachers, who were at their final year in their university's ELT programs in 2021-2022, in Turkey. The number of participants that voluntarily participated in the study was 100. 56 (%56) of these

participants were female, and 44 (%44) of them were male. The ages of the participants were between 20 and 25, and the average age of them was found to be 22,33. This average age coincides with a study whose target participants were also final year pre-service teachers (Shih & Fan, 2008).

The participants were chosen through convenience sampling technique (Dörnyei, 2007) because this technique enabled the most amount of flexibility for the research as a result of the complex situations brought by COVID-19 Pandemic. Participants of the study were expected to have two main characteristics; the first was that they have to speak English as a foreign language. The second one was that they were expected to be a final year pre-service EFL teacher in an English Language Teaching program in Turkey.

There were two reasons behind this decision. Firstly, many of the problems that were encountered in in-service teachers could be traced back to pre-service teachers (Tseng et al., 2020), for this reason it was seen essential to work on pre-service teachers, the initial stage of the careers of the teachers. Secondly, the study aimed to work on EFL pre-service teachers because in contrast to native English speakers, people who use English as a foreign language have to make use of technology a lot more to bring authentic input into their classrooms (Chapelle, 2003) and for a similar reason, TPACK research also focused on EFL settings due to the centrality of ICT tools for that context (Tseng et al., 2020).

Data Collection

The data of the study was collected with a self-assessment survey instrument. The instrument of the study was developed by Bostancıoğlu and Handley (2018). It is a self-assessment survey directed towards EFL pre-service teachers to evaluate their TPACK level related to technology use with a general purpose (Bostancıoğlu & Handley, 2018). Due to the complex situations and safety concerns brought by COVID-19 Pandemic for the data collection, the survey was first distributed through technological means. To accomplish this, firstly, a copy of the instrument was created in Google Forms. Then, the link of the instrument that was created in Google Forms was sent to the participants so that they could fill it out.

COVID-19 also had an impact on the way the participants were contacted. As many courses were online and the amount of exposure to the virus was trying to be kept as minimal as possible, it was seen as a necessity to use e-mails and WhatsApp messages to contact the participants of the study. As a result, a number of university programs that had English Language Teaching programs were identified and contacted with the prioritization of the institutions that were easy to access for the researcher.

Through this contact, the university departments were informed about the study and what the participants were expected to do and it was also noted that the study posed no risk for the participants and the participation was voluntary. In addition, permission to collect data from their final year EFL pre-service teachers was asked. The university programs either preferred to assign a research assistant to transfer the message of the study to the target group or shared the contact details of a voluntary student for the researcher. Through this method, the information about the study was spread along with the link of the survey instrument.

Unfortunately, the rate of the participation was not as good as expected; however, owing to the limited access to the participants due to the COVID-19 measures, this was expected. To overcome this problem, as soon as COVID-19 measures were removed and universities switched to face to face education, the same process was repeated with printed version of the survey instrument. Different universities from the initial process were chosen to avoid possible double submissions, then they were contacted by the researcher in a similar way and the voluntary participants were handed out print version of the survey. Through this method, participation was more satisfactory and the study was able to hit its 100 participants mark.

Instruments

The instrument of the study consisted of two parts. The first part asked about gender, age, grade point average (GPA), daily internet usage (in terms of hours), perceived level of confidence related to the use of ICT, and how did participants choose English Language Teaching Department. These variables were chosen particularly because these were the accumulation of the previously analyzed variables in similar studies with differing results (Tseng et al., 2020).

The second part of the instrument was a self-assessment survey that had 85 5-point Likert scale items to assess TPACK self-efficacy level of EFL pre-service teachers. This self-assessment survey was designed and validated by Bostancıoğlu and Handley (2018), to bring a general perspective of assessing TPACK level of EFL teachers into the literature, as previously developed surveys were guided by a particular approach, which was thought to be having an impact on the results (Tseng et al., 2020). The survey consisted of 7 parts; A) Technology Knowledge 22 items, B) Pedagogy Knowledge 16 items, C) Content Knowledge 9 items, D) Technological Content Knowledge 9 items, E) Pedagogical Content Knowledge 12 items, F) Technological Pedagogical Knowledge 8 items, G) Technological Pedagogical and Content Knowledge, 9 items. Validity, consistency, and reliability assessment of the questionnaire was done by Bostancıoğlu

and Handley (2018). According to their reports, composite reliability of the instrument was found to be above 0.70, which is a representation of the instrument being a reliable questionnaire. In addition, Average Variance Explained (AVE) levels were found to be higher than 0.50 in general, which shows convergent validity of the questionnaire, and the square root of its AVE were reported to be higher than the inter-factor correlations and Maximum Shared Variance (MSV), which shows discriminant validity of the questionnaire, lastly, all correlations among its 7 parts were found to be directing towards having a logical consistency (Bostancıoğlu & Handley, 2018).

Data Analysis

Before the analysis of the data of the study, normality of the distributions was analyzed. This was accomplished with the help of Skewness and Kurtosis values and the values that were found to be between ± 1.5 were accepted (Cain et al., 2017). In addition, the same values were used for each independent variable. Moreover, outliers were analyzed and no outliers were detected in the data of the study. Skewness and Kurtosis values of each independent variable were found to be between ± 1.5 . Lastly, the following statistical analyses were used for the study;

1) Frequency and percentage related to the demographic characteristics of EFL pre-service teachers were analyzed

2) In order to answer the first research question of the study that is about TPACK level of EFL pre-service teachers, Descriptive Analysis was conducted and the mean and standard deviation of the findings were analyzed.

In the analysis, following ranges were considered;

1.00-1.80=negative

1.81-2.60=negative

2.61-3.40=negative

3.41-4.20=positive

4.21-5.00=positive

3) In double comparisons, such as gender, Independent Sample t Test was used.

4) When independent variables were three or higher, if distributions were normal and variances were homogeneous, ANOVA was used. When a difference was found, to determine the source of the difference Tukey Test was applied. If distributions were normal but variations were not homogeneous, to understand the source of the difference, Games-Howell Test was employed.

5) When independent variables were more than two but the data was not distributed normally, Kruskal Wallis H Test was used. In situations where there is a difference, to understand the source of it, Mann Whitney U Test was applied.

Power Test was used to understand the significance of the difference when a difference was detected. In all of the analyses, $p=.05$ was considered and SPSS 24.0 program was used.

Correlational Analysis was used to analyze the relationship between GPA, Perceived Level of Confidence Related to the use of ICT (PLC-ICT), and TPACK of the participants.

6) To further analyze daily internet use of the participants in relation to gender to see whether there is a connection or not, Chi-Square Analysis was conducted.

Chapter 4

Findings

In this chapter, the analysis results of the data collected as part of the study was reported, starting with the analysis of the demographic characteristics data that is related to TPACK and the choice of ELT department.

4.1 Demographic Findings

4.1.1. Findings Related to the Question of “Reason for Department Choice?”

One of the questions that were directed to the EFL pre-service teachers was about their reason for choosing ELT department. Descriptive Analysis of the answers of the EFL pre-service teachers was reported in Table 1 (Table 1).

Table 1 *Reasons for Choosing ELT Department Table*

	Frequency	Percent	Cumulative Percent
Compulsorily	8	8	8
Coincidentally	12	12	20
Willingly	80	80	100

As a result of the analysis, it was observed that 8 (%8) participants chose ELT department compulsorily. The number of participants that chose ELT Department willingly was 80 (%80). Lastly, based on the results, 12 (%12) of the participants selected ELT Department coincidentally.

4.1.2. Findings Related to the Question of “Perceived Level of Confidence Related to the Use of ICT.”

The Descriptive Analysis of the perceived level of confidence of the participants related to the use of ICT was carried out. The results of the Descriptive Analysis of the question were reported in Table 2 (Table 2).

Table 2 *Perceived Level of Confidence Related to the Use of ICT Table*

	Frequency	Percent	Cumulative Percent
Not Confident Enough	0	0	0
Slightly Confident	0	0	0
Somewhat Confident	30	30	30
Fairly Confident	43	43	73
Completely Confident	27	27	100
M=3.97, SD=.76			

As a result of the analysis of the participants, it was observed that none of the participants rated their level of confidence as “Not Confident Enough” and “Slightly Confident”. The number of participants that selected the option of “Somewhat Confident” was 30 (%30). In addition, “Fairly Confident” option was chosen by 43 (%43) participants, and “Completely Confident” was picked by 27 (%27) of them. The mean score of the answers of the participants was found to be $M=3.97$ and $SD=.76$.

4.1.3. Findings Related to the Question of “Daily Internet Usage.”

An analysis of the answers of the participants related to their daily internet usage showed that 1 hour 10 minutes of daily internet usage was the lowest and 10 hours was the highest among the participants. In addition, the most frequently reported time was 4 hours and this was reported by 14 participants. The average number of daily internet usage among the participants was found to be 4 hours 37 minutes.

4.1.3.1 Daily Internet Use in Relation with Gender

After the analysis of daily internet use, to see whether there is a link between gender and daily internet use, Chi-Square Analysis was conducted and its results were represented in Table 3 (Table 3).

Table 3 *The Results of Chi-Square Analysis in Relation to Gender and Daily Internet Use*

Gender		Daily Internet Use			Total	χ^2	P
		1-3 Hour	4-5 Hour	6+ Hour			
Female	Count	14	35	7	56	14.109	.001
	Expected Count	12.9	28.0	15.1	56.0		
	% within Gender	25.0%	62.5%	12.5%	100.0%		
	% within Daily Internet Use	60.9%	70.0%	25.9%	56.0%		
	Residual	1.1	7.0	-8.1			
	Std. Residual	.3	1.3	-2.1			
	Count	9	15	20	44		
	Expected Count	10.1	22.0	11.9	44.0		
	% within Gender	20.5%	34.1%	45.5%	100.0%		
	% within Daily Internet Use	39.1%	30.0%	74.1%	44.0%		
Male	Residual	-1.1	-7.0	8.1			
	Std. Residual	-.4	-1.5	2.4			
	Count	23	50	27	100		
	Expected Count	23.0	50.0	27.0	100.0		
Total	% within Gender	23.0%	50.0%	27.0%	100.0%		

% within Daily Internet Use	100.0%	100.0%	100.0%	100.0%
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*p<.05

As a result of the analysis, it was noted that daily internet use had a relationship with gender ($X^2=14.109$, $p<.05$). The number of participants who reported their daily internet use as 1-3 hours was 14 for the females, and 9 for the males. For 4-5 hours category, there were found to be 35 female participants and 15 male participants. Lastly, the gender distribution of the participants whose daily internet use was 6+ was 7 for the female participants and 20 for the male participants. In short, the daily internet use of the most of the female participants ranges from low to moderate while the majority of the male participants uses internet daily at high amount of hours.

4.2. Findings Related to the Research Questions of the Study

In this section, the analysis of the data in relation to the research questions of the study was presented.

4.2.1. Findings Related to the Research Question of “What is Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey?”

In order to find the answer of “What is Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey?” the following was done; A Descriptive Analysis was conducted on the answers of the final year EFL pre-service teachers to the EFL TPACK self-assessment questionnaire to find out the TPACK self-efficacy levels of them related to the use of technology. The result of the analysis that was obtained as a result of the Descriptive Analysis was shown in Table 4 (Table 4).

Table 4 Descriptive Statistics of TPACK Scale

Items of the Scales	M	SD	Skewness	Kurtosis
1- I know how to solve my own technical problems	4.08	.81	-.264	-1.126
2- I can learn how to use technology easily	4.33	.68	-.527	-.762
3- I keep up with new technologies	4.14	.83	-.377	-1.147
4- I frequently play around with technology	3.98	.95	-.327	-1.133
5- I know how to use computer mediated communication (CMC) Technologies (e.g. email, chat)	4.53	.58	-.764	-.395
6- I know how to use concordancers	4.04	1.08	-.911	-.077

7-	I know how to use off the self courseware (educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer)	4.29	.64	-.344	-.669
8-	I know how to use multimedia (e.g. graphics, texts, audio, and video)	4.58	.57	-.983	-.009
9-	I know how to use online learning environments (e.g. Moodle, Blackboard, and VLE)	4.23	.75	-.553	-.521
10-	I know how to use online dictionaries	4.72	.47	-1.284	.374
11-	I know how to use an interactive white board (IWB)	4.32	.76	-1.189	2.256
12-	I know how to use mobile technologies (e.g. tablet computing, smart phones)	4.82	.39	-1.691	.878
13-	I know how to use authorware (customisable software that allows users to generate their own content by integrating different types of media such as graphic and text, e.g. hot potatoes)	3.98	1.03	-.707	-.155
14-	I know how to use web 2.0 technologies (e.g. blogs, social networks, and wikis)	4.56	.67	-2.061	6.926
15-	I know about basic computer hardware (i.e. CD-ROM, mother-board, RAM) and their functions	4.02	1.1	-.707	-.697
16-	I know how to save data into/from a digital device (i.e. flash disk, USB stick, CD)	4.63	.53	-.969	-.197
17-	I know how to use generic office applications (i.e. Word, PowerPoint, and Excel)	4.63	.56	-1.218	.558
18-	I know how to play audio and video files on my computer	4.74	.44	-1.111	-.782
19-	I know how to record audio files (i.e. using a Dictaphone)	4.60	.67	-1.837	3.574
20-	I know how to record video files (i.e. using a video camera)	4.67	.62	-1.965	3.754
21-	I know how to create images on my computer (i.e. using Windows Paint)	4.51	.73	-1.457	1.643
22-	I know how to edit images on my computer (i.e. using Photoshop)	4.24	1.01	-1.230	.631
Overall Mean Of Technology Knowledge (TK)		4.51	.52	-.970	.047
23-	I know how to maintain classroom management	4.06	.71	-.957	1.894

24- I can facilitate learning by creating a comfortable environment in which learners are willing to take risks	4.06	.71	-.608	.747
25- I can react supportively to learners' interaction	4.32	.62	-.592	.822
26- I can manage activities for individual, partner, group and whole class work	4.12	.74	-.650	.428
27- I can create opportunities for individual, partner, group and whole class work	4.19	.69	-.457	-.106
28- I can adapt my teaching style to different learners	4.11	.74	-.336	-.591
29- I can adapt my teaching based upon what students do not understand	4.14	.67	-.374	.097
30- I can use a wide range of teaching approaches in a classroom setting	4.00	.75	-.727	.798
31- I can select teaching materials appropriate to the needs of learners	4.12	.62	-.596	1.675
32- I am familiar with common student understandings and misconceptions	4.14	.79	-1.378	3.734
33- I can assess student learning in multiple ways	4.20	.57	-.010	-.193
34- I can keep students on task	4.24	.62	-.469	.714
35- I can understand curriculum requirements	4.23	.65	-.716	1.439
36- I can recognize the organizational constraints and resource limitations existent at my school	4.34	.64	-.441	-.661
37- I can draw on relevant research findings to guide my teaching	3.93	.91	-1.241	2.020
38- I can facilitate learning through creating opportunities for individual, partner, group and whole class work	4.10	.69	-1.645	6.909
Overall Mean of Pedagogical Knowledge (PK)	4.14	.48	.155	-.429
39- I can explain the grammatical features of the English language	4.38	.66	-1.453	5.373
40- I can describe the phonological features of the English language	4.08	.79	-.523	-.200
41- I am familiar with the differences between spoken and written English	4.39	.55	-.112	-.926
42- I can maintain the use of English in the classroom	4.24	.70	-.913	1.513
43- I can comprehend English texts accurately	4.47	.54	-.271	-1.130
44- I can comprehend English speech accurately	4.37	.68	-1.410	4.828
45- I can monitor my own writing for accuracy	4.34	.59	-.256	-.585
46- I can monitor my own speech for accuracy	4.25	.74	-.893	.827

47- I am familiar with the culture(s) of target language communities	4.45	.72	-1.759	5.155
Overall Mean of Content Knowledge (CK)	4.33	.50	-.054	-1.018
48- I know about technologies that I can use to teach listening in English	4.11	.65	-.561	1.154
49- I know about technologies that I can use to teach speaking in English	3.97	.87	-.881	.878
50- I know about technologies that I can use to teach reading in English	4.15	.64	-.612	1.395
51- I know about technologies that I can use to teach writing in English	4.04	.79	-.447	-.320
52- I know about technologies that I can use to teach English language grammar	4.18	.74	-.605	.016
53- I know about technologies that I can use to teach English vocabulary	4.31	.69	-.873	1.007
54- I know about technologies that I can use to teach pronunciation of English words	4.26	.76	-1.041	1.225
55- I know about technologies that I can use to teach spelling of English words	4.18	.80	-1.072	1.273
56- I know about the technologies that I can use to teach about the differences between cultures	3.96	.88	-.659	-.086
Overall Mean of Technological Content Knowledge (TCK)	4.13	.61	-.721	1.286
57- I can critically analyse my teaching in relation to theoretical principles	3.97	.77	-.757	.745
58- I can give appropriate feedback on learner language	4.17	.53	-.261	2.317
59- I can provide target language input at an appropriate level of difficulty	4.10	.63	-.575	1.552
60- I can select authentic English language resources to suit student needs (e.g. news, magazines...)	4.08	.66	-.301	.098
61- I can select activities which enhance the learners' intercultural awareness	4.04	.79	-.823	.750
62- I can choose an appropriate approach to teach learners (i.e. communicative approach, direct method)	4.00	.74	-1.075	2.751
63- I can plan when and how to use the target language, including metalanguage I may need in the classroom	3.97	.67	-.572	1.012

64- I can identify linguistic problems experienced by learners (i.e. phonological, lexical or grammatical problems)	4.27	.53	.180	-.414
65- I can design language courses around the requirements of the curriculum	4.08	.69	-1.041	3.513
66- I am aware of the contextual factors that could inhibit/ promote English teaching	4.18	.52	.208	.225
67- I am aware of current research in the field of language teaching	3.89	.83	-.991	1.395
68- I am willing to experiment with different methods of language teaching	4.36	.52	.154	-1.047
Overall Mean of Pedagogical Content Knowledge (PCK)	4.09	.50	-.056	1.108
69- I can evaluate the appropriateness of a technology for teaching a lesson	4.05	.78	-1.246	3.397
70- I can choose technologies that enhance the teaching approaches for a lesson	4.13	.66	-.360	.150
71- I can choose technologies that enhance students' learning for a lesson	4.13	.65	-.357	.336
72- I am thinking critically about how to use technology in my classroom	3.89	.86	-.457	-.368
73- I can adapt the use of the technologies that I am learning about to different teaching activities	4.05	.67	-.262	-.053
74- I can design relevant learning experiences to promote student learning, using technology	3.93	.73	-.692	.882
75- I can choose technologies to be used in assessment	3.94	.84	-.619	.030
76- I can engage students in solving authentic problems using digital technologies and resources	4.01	.80	-.627	.199
Overall Mean of Technological Pedagogical Knowledge (TPK)	4.02	.61	-.289	.393
77- I can teach lessons that appropriately combine English linguistic concepts, technologies, and teaching approaches	3.86	.77	-.582	.371
78- I can select appropriate technologies that combine English culture, technologies, and teaching approaches	3.95	.76	-.769	.878
79- I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn	3.98	.79	-.839	.815

80- I can use technology effectively to communicate relevant information to students and peers	4.07	.78	-.771	.619
81- I can use a range of technologies to help students pursue their individual curiosities	3.87	.79	-.521	.818
82- I can use a range of technologies that enable students to become active participants	3.99	.79	-1.005	1.971
83- I can provide equitable access to digital language learning tools and resources	3.37	1.00	-.311	-.252
84- I can facilitate intercultural understanding by using technology to engage students with different cultures	3.60	.90	-.392	.202
85- I can participate in digital learning communities to explore creative applications of technology to improve student learning	4.30	.75	-.702	-.335
Overall Mean of Technological Pedagogical and Content Knowledge (TPACK)	3.89	.62	-.666	.946

The results of the analysis showed that Technology Knowledge (TK) section had 4.51 mean score (M), and .52 standard deviation (SD) value. The Skewness value of TK was found to be -.970, while the Kurtosis value of it was found to be .047. The results of the items of the section were as the following: The first item "I know how to solve my own technical problems." were found to have 4.08 M and .81 SD value. The Skewness of the item was found to be -.264, and the Kurtosis value of the item was noted to be -1.126. The second item of this section of the questionnaire was "I can learn how to use technology easily." The results of this second item showed that its M was 4.33 and SD was .68. The Skewness value of it was found to be -.527, and The Kurtosis of it was noted to be -.762. The third item of the questionnaire was "I keep up with new technologies." and the results demonstrated that it had a M of 4.14 and SD of .83. The Skewness value of the item was -.377 while the Kurtosis value of it was found to be -1.147. The fourth item of the questionnaire that is "I frequently play around with technology." had M value of 3.98, and its SD was found to be .95. The Skewness of the fourth item was -.327, and the Kurtosis of it was found to be -1.133. "I know how to use computer mediated communication (CMC) Technologies (e.g. email, chat)." was the fifth item of the TK section of the questionnaire, and it was found that it had 4.53 M and .58 SD. Its Skewness was -.764, and Kurtosis was -.395. The sixth item of the survey was "I know how to use concordancers." It was found that the sixth item had 4.04 M value and 1.08 SD value while having -.911 Skewness and -.077 Kurtosis. The seventh item of the questionnaire was "I know how to use off the shelf courseware (educational material intended as kits for

teachers or trainers or as tutorials for students, usually packaged for use with a computer)." and it was seen that this item had a 4.29 M and .64 SD. Its Skewness was -.344 and Kurtosis was -.669. "I know how to use multimedia (e.g. graphics, texts, audio, and video)." item was found to have 4.58 M and .57 SD. Its Skewness was noted to be -.983, and Kurtosis was -.009. "I know how to use online learning environments (e.g. Moodle, Blackboard, and VLE)." was the ninth item of the TK section, and within that item it was observed that its M value was 4.23 and SD value was .75. Its Kurtosis was found to be -.533 and Kurtosis was noted to be -.521. "I know how to use online dictionaries." was the tenth item and it was observed to have 4.72 M value and .47 SD value. Its Skewness was found to be -1.284, and Kurtosis was noted to be .374. Eleventh item of the questionnaire was "I know how to use an interactive white board (IWB)." Its M value was found to be 4.32, and SD was .76. The Kurtosis value of the item was -1.189, and the Skewness of it was found to be 2.256. The number twelve, "I know how to use mobile technologies (e.g. tablet computing, smart phones)." had 4.82 M and .39 SD. Its Skewness was -1.691, and Kurtosis was .878. As the item number thirteen that is "I know how to use authorware (customisable software that allows users to generate their own content by integrating different types of media such as graphic and text, e.g. hot potatoes)." it was observed that its M was 3.98, SD was 1.03. The Skewness of the item was -.707 and the Kurtosis was -.155. "I know how to use web 2.0 technologies (e.g. blogs, social networks, and wikis)." was the fourteenth item and the results of its analysis showed that it had 4.56 M and .67 SD. Its Skewness was found to be -2.061 and Kurtosis was 6.926. "I know about basic computer hardware (i.e. CD-ROM, mother-board, RAM) and their functions." Item had 4.02 as its M and 1.1 as its SD. Its Skewness value was noted to be -.707, and its Kurtosis was found to be -.697. "I know how to save data into/from a digital device (i.e. flash disk, USB stick, CD)." "I know how to use generic office applications (i.e. Word, PowerPoint, and Excel)." Was the sixteenth item of the questionnaire and it was found that its M was 4.63 and SD was .53. The Skewness value of it was found to be -.969, and its Kurtosis was -.197. The "I know how to play audio and video files on my computer." item had 4.74 M and .44 SD. Its Skewness was found to be -1.111 and Kurtosis was found to be -.782. "I know how to record audio files (i.e. using a Dictaphone)." as the nineteenth item of the questionnaire had 4.60 M and .67 SD. Its Skewness was -1.837 and Kurtosis was found to be 3.574. "I know how to record video files (i.e. using a video camera)." had 4.67 M and .62 SD. It was also found that its Skewness was found to be -1.965 and Kurtosis was 3.754. The twenty first item of the questionnaire within TK section was "I know how to create images on my computer (i.e. using Windows Paint)." Its M was found to be 4.51 and SD was noted to be .73. The Skewness value of the item was -1.457, and the Kurtosis of it was 1.643. "I know how to

edit images on my computer (i.e. using Photoshop).” was the last item of the TK section of the questionnaire and its M was found to be 4.24 and SD was 1.01. The Skewness of it was -1.230 and the Kurtosis was noted to be .631.

After the results of the TK section of the self-assessment survey, it is time to mention the results of the Pedagogical Knowledge (PK) section of it. Overall, this section had 4.14 M and .48 SD. Its Skewness was found to be .155 and Kurtosis was -.429. Its first item “I know how to maintain classroom management.” Had 4.06 M and .71 SD. The Skewness value of it was found to be 4.06 and its Kurtosis was found to be 1.894. The second item of the section “I can facilitate learning by creating a comfortable environment in which learners are willing to take risks.” had 4.06 mean score and .71 standard deviation value. Its Skewness was found to be -.608 and Kurtosis was found to be .747. “I can react supportively to learners’ interaction.” was the third item of the PK section, and it was noted that it had a mean score of 4.32 and a standard deviation value of .62. The Skewness value of it was -.592, and its Kurtosis was .822. “I can manage activities for individual, partner, group and whole class work.” item had 4.12 mean score and .74 standard deviation value. Its Skewness was noted to be -.650, and its Kurtosis was found to be .428. “I can create opportunities for individual, partner, group and whole class work.” Item had 4.19 mean score and .69 standard deviation value. Its Skewness was found to be -.457, and Kurtosis was -.106. When the “I can adapt my teaching style to different learners.” item was analyzed, it was observed that it had 4.11 M and .74 SD. Its Skewness was -.336 and Kurtosis was -.591. The “I can adapt my teaching based upon what students do not understand.” item was the seventh in the PK section of the questionnaire and its M was found to be 4.14 and SD was .74. The Skewness of it was -.374, and the Kurtosis of it was found to be .097. The eighth item of the PK section, “I can use a wide range of teaching approaches in a classroom setting.” had a mean score of 4.00 and a standard deviation of .75. Its Skewness was found to be -.727 and Kurtosis was .798. “I can select teaching materials appropriate to the needs of learners.” Item had 4.12 M and .62 SD. As far as Skewness and Kurtosis was concerned, it was observed that Skewness of it was -.596, and as for its Kurtosis, it was 1.675. “I am familiar with common student understandings and misconceptions.” was the tenth item within the PK section of the questionnaire and its M value was found to be 4.12. Its SD value was noted to be .79. When it comes to its Skewness and Kurtosis values, its Skewness was found to be -1.378, and Kurtosis was 3.734. “I can assess student learning in multiple ways.” was the eleventh item in the PK section of the questionnaire and it had 4.20 mean score and .57 standard deviation value. Its Skewness was found to be -.010 and Kurtosis was noted to be -.193. “I can keep students on task.” Item had 4.24 M and .62 SD, in addition, its

Skewness was seen to be $-.469$, and Kurtosis was found to be $.714$. "I can understand curriculum requirements." Item had 4.23 M value and $.65$ SD value. As far as its Skewness was concerned, it was found that it had $-.716$ Skewness value and when it comes to its Kurtosis value, it was observed to be 1.439 . "I can recognize the organizational constraints and resource limitations existent at my school." item had 4.34 M and $.64$ SD. Its Skewness was found to be $-.441$, and Kurtosis was found to be $-.661$. "I can draw on relevant research findings to guide my teaching." item was found to have 3.93 mean score and $.91$ standard deviation value. In addition, it had -1.241 Skewness and 2.020 Kurtosis values. "I can facilitate learning through creating opportunities for individual, partner, group and whole class work." Was the last item of the PK section of the questionnaire and it was observed that it had 4.10 M and $.69$ SD, and its Skewness was -1.645 , and Kurtosis was 6.909 .

The third section of the questionnaire was Content Knowledge (CK), and its overall mean score was found to be 4.33 . When it comes to its standard deviation value, it was noted to be $.50$. The Skewness of this section in general was found to be $-.054$, and the Kurtosis was -1.018 . The first item of the CK section of the questionnaire was "I can explain the grammatical features of the English language." and the results demonstrated that it had 4.38 M and $.66$ SD values. Its Skewness was found to be -1.453 , and Kurtosis was found to be 5.373 . "I can describe the phonological features of the English language." Item was the second item of the CK section of the questionnaire and it was seen that it had 4.08 mean score and $.79$ standard deviation value. Its Skewness was noted to be $-.523$, and Kurtosis was $-.200$. "I am familiar with the differences between spoken and written English." Item was the third item of the questionnaire and it was observed to have a mean score of 4.39 and $.55$ standard deviation value. Its Skewness was $-.112$, Kurtosis was $-.926$. The fourth item of this part of the questionnaire that was "I can maintain the use of English in the classroom." had 4.24 mean score and $.70$ standard deviation value. As far as its Skewness was concerned, it was found to be $-.913$. When it comes to its Kurtosis, it was observed to be 1.513 . "I can comprehend English texts accurately." Item had 4.47 M and $.54$ SD. Its Skewness value was found to be $-.271$, and Kurtosis was -1.130 . The "I can comprehend English speech accurately." item was found to have a mean value of 4.37 . Its standard deviation value was observed to be $.68$. The Skewness value of the item was -1.410 , and the Kurtosis value of it was found to be 4.828 . The "I can monitor my own writing for accuracy." was the seventh item of the questionnaire and its mean score was found to be 4.34 . As far as its standard deviation value was concerned, it was found to be $.59$. In addition, the Skewness of the item as found to be $-.256$, and its Kurtosis was found to be $-.585$. "I can monitor my own speech for accuracy."

item was found to have a mean score of 4.25, and its standard deviation was noted to be .74. Moreover, it was found to have a value of -.893 for its Skewness and .827 for its Kurtosis. The final item of the CK section of the self-assessment questionnaire was "I am familiar with the culture(s) of target language communities." As a result of the analysis, it was observed to have 4.45 M and .72 SD. Its Skewness was found to be -1.759 and Kurtosis was found to be 5.155.

The overall result of the Technological Content Knowledge (TCK) section of the questionnaire was as the following; it was observed that TCK section had an overall M of 4.13, and a SD of .61. The section's Skewness was -.721, and Kurtosis was found to be 1.286. The first item of the TCK section that is "I know about technologies that I can use to teach listening in English." was found to have a mean score of 4.11, and its standard deviation value was seen that it was .65. The Skewness of the item was -.561, and the Kurtosis of it was 1.154. The second item, "I know about technologies that I can use to teach speaking in English." was seen to have M value of 3.97, and a SD value of .87. Its Skewness was -.881, and Kurtosis was .878. The third item was "I know about technologies that I can use to teach reading in English." And it was observed that its mean score was 4.15, and standard deviation was .64. The Skewness of it was -.612, and the Kurtosis of it was 1.395. "I know about technologies that I can use to teach writing in English." was the fourth item of the section with a mean score of 4.04, and a standard deviation of .79. The Skewness of it was found to be -.447, and the Kurtosis of it was -.320. The fifth item of the section, "I know about technologies that I can use to teach English language grammar.", had a mean score of 4.18 and its SD was .74. The Skewness related to it was -.605 and the Kurtosis was .016. The "I know about technologies that I can use to teach English vocabulary." Item had a mean score of 4.31, and a standard deviation of .69. Its Skewness was found to be -.873 and Kurtosis was noted to be 1.007. The "I know about technologies that I can use to teach pronunciation of English words." Item of the section had 4.26 M and .76 SD. Its Skewness was seen to be -1.041, and Kurtosis was 1.225. "I know about technologies that I can use to teach spelling of English words." Item had a mean score of 4.18 and a standard deviation of .80. Its Skewness was found to be -1.072, and Kurtosis was 1.273. The last item of the TCK section was "I know about the technologies that I can use to teach about the differences between cultures." with a mean score of 3.96, and a standard deviation of .88. Its Skewness was found to be -.659, and Kurtosis was -.086.

The overall results of the Pedagogical Content Knowledge (PCK) section demonstrated that the section had a mean score of 4.09 and a standard deviation of .50. It was found that the section had a Skewness of -.056, and a Kurtosis of 1.108. The first

item of the section was “I can critically analyse my teaching in relation to theoretical principles.” and it was observed that it had 3.97 mean score and .77 standard deviation. Its Skewness was found to be -.757, and Kurtosis was .745. “I can give appropriate feedback on learner language.” Item’s mean score was found to be 4.17 and its standard deviation value was estimated to be .53. The Skewness of the item was seen to be -.261, and its Kurtosis was shown to be 2.317. “I can provide target language input at an appropriate level of difficulty.” was the third item of the section, and it had a mean score of 4.10 and a standard deviation of .63. Its Skewness was estimated to be -.575, and Kurtosis was 1.552. The “I can select authentic English language resources to suit student needs (e.g. news, magazines...)” item was seen to have 4.08 M and .66 SD. Its Skewness was shown to be -.301, and Kurtosis was .098. PCK section’s fifth item was “I can select activities which enhance the learners’ intercultural awareness.” And it was found that it had a mean score of 4.04 and a standard deviation of .79. The Skewness of it was found to be -.823, and the Kurtosis was noted to be .750. The “I can choose an appropriate approach to teach learners (i.e. communicative approach, direct method).” was the sixth item of this section of the questionnaire and it was seen that it had a mean score of 4.00 and a standard deviation of .74. The Skewness of the item was found to be -1.075, and the Kurtosis of it was 2.751. “I can plan when and how to use the target language, including metalanguage I may need in the classroom.” Item was found to have 3.97 M and .67 SD. As for its Skewness and Kurtosis, it was observed that it had a Skewness of -.572 and a Kurtosis of 1.012. “I can identify linguistic problems experienced by learners (i.e. phonological, lexical or grammatical problems).” was the sixth item of the PCK section of the questionnaire and it was found to have 4.27 M and .53 SD. The Skewness of the item was found to be .180 and the Kurtosis of it was observed to be -.414. The “I can design language courses around the requirements of the curriculum.” Item of this section was seen to have 4.08 M, and .69 SD. The item’s Skewness was seen to be -1.041, and its Kurtosis was observed to be 3.513. “I am aware of the contextual factors that could inhibit/promote English teaching.” item was the tenth item in this section, its mean score was 4.18 and standard deviation was .52. The Skewness of the item was found to be .208 and Kurtosis was .225. “I am aware of current research in the field of language teaching.” Item had 3.89 M and .83 SD. The Skewness of it was -.991 and the Kurtosis was 1.395. The last item of the PCK section of the questionnaire was “I am willing to experiment with different methods of language teaching.” The mean score of the item was 4.09, and its standard deviation was found to be .50. The Skewness value of it was -.056 and the Kurtosis of it was 1.108. Overall results of the Technological Pedagogical Knowledge (TPK) section of the questionnaire was observed to be as the following; The section’s mean score was seen to be 4.02, its standard deviation was found

to be .61, the Skewness of it was noted to be $-.289$, and the Kurtosis was $.393$. The first item of this section of the survey was "I can evaluate the appropriateness of a technology for teaching a lesson." In this item, it was observed that its M was 4.05 , SD was $.78$. As far as the item's Skewness and Kurtosis was concerned, it was seen that the Skewness of it was -1.246 , and the Kurtosis of it was 3.397 . "I can choose technologies that enhance the teaching approaches for a lesson." was the second item of the questionnaire with a mean score of 4.12 and a standard deviation of $.66$. The Skewness of it was found to be $-.360$, and the Kurtosis was seen to be $.150$. "I can choose technologies that enhance students' learning for a lesson." Item had a mean score of 4.13 . Its standard deviation was observed to be $.65$. The Skewness of the item was $-.357$, and its Kurtosis was found to be $.336$. "I am thinking critically about how to use technology in my classroom." Was the fourth item of the TPK section, and it was seen that its mean score was 3.89 . The standard deviation of it was 3.89 . The Skewness of the item was $-.457$, and the Kurtosis of it was $-.368$. "I can adapt the use of the technologies that I am learning about to different teaching activities." was the fifth item of the questionnaire. This questionnaire was found to have 4.05 M and $.67$ SD. Its Skewness was seen to be $-.262$, and Kurtosis was $-.053$. The "I can design relevant learning experiences to promote student learning using technology. Of the TPK section was observed to have 3.93 mean score, and $.73$ standard deviation value. Its Skewness was seen to be $-.692$, and Kurtosis was $.882$. The "I can choose technologies to be used in assessment." item was observed to have 3.94 M, $.84$ SD, $-.610$ value of Skewness, and $.030$ value of Kurtosis. The last item of the TPK section was "I can engage students in solving authentic problems using digital technologies and resources." with a mean score 4.01 and a standard deviation value of $.80$. Its Skewness was seen to be $-.627$, and its Kurtosis was observed to be $.199$.

The overall results of the last section of the questionnaire that is Technological Pedagogical and Content Knowledge (TPACK) demonstrated that, this section had a mean score of 3.89 and a standard deviation of $.62$. The Skewness of the section was seen to be $-.666$, and the Kurtosis of it was observed to be $.946$. The first item of this section of the questionnaire was "I can teach lessons that appropriately combine English linguistic concepts, technologies, and teaching approaches." The analysis result of this item demonstrated that it had a mean score of 3.86 and a standard deviation value of $.77$. The Skewness of it was observed to be $-.582$ and its Kurtosis was $.371$. "I can select appropriate technologies that combine English culture, technologies, and teaching approaches." item of the section had a mean score of 3.95 and a standard deviation of $.76$. Its Skewness was found to be $-.796$, and Kurtosis was $.878$. The third item of the section was "I can select technologies to use in my classrooms that enhance what I teach,

how I teach, and what students learn.” The item’s M was seen to be 3.98, and its SD value was noted to be .79. As far as the Skewness and Kurtosis of it were concerned, it was observed that the item had -.839 as a Skewness value and .815 as a Kurtosis value. The fourth item of the TPACK section of the questionnaire was “I can use technology effectively to communicate relevant information to students and peers.” and within this item it was observed that the item had a mean score of 4.07, and a standard deviation value of .78. The Skewness of the item was estimated to be -.771, and its Kurtosis was found to be .619. “I can use a range of technologies to help students pursue their individual curiosities.” as the fifth item of the section was noted to have 3.87 mean score, and .79 value of standard deviation. The Skewness of the item was seen to be -.521, and as for its Kurtosis, it was observed to be .818. “I can use a range of technologies that enable students to become active participants.” item had a mean score of 3.99 and a standard deviation value of .79. Its Skewness was observed to be -1.005, and Kurtosis was noted to be 1.971. The seventh item of the section was “I can provide equitable access to digital language learning tools and resources.” and its M value was 3.37. As for its SD value, it was observed to be 1.00. The Skewness of the item was reported to be -.311, and Kurtosis of it was seen to be -.252. “I can facilitate intercultural understanding by using technology to engage students with different cultures.” Item was observed to have 3.6* mean score and .90 standard deviation. The Skewness of it was observed to be -.392, and its Kurtosis was seen to be .202. “I can participate in digital learning communities to explore creative applications of technology to improve student learning.” was the last item of the TPACK section of the questionnaire and it was seen to have a mean score of 4.30, and a standard deviation of .75. Its Skewness was observed to be -.702, and Kurtosis was -.335.

As a result of the analysis of the trends within sections, the following was observed; In Technology Knowledge (TK) section, it was observed that the item with the highest mean score was “I know how to play audio and video files on my computer.” (M[Mean]=4.74, SD=.44). In contrast to that finding, there were two items that had equal “Mean” value as far as the items with the lowest mean scores were concerned. The items with the lowest mean scores were found to be “I know how to use authorware (customizable software that allows users to generate their own content by integrating different types of media such as graphic and text, e.g. hot potatoes).” (M=3.98, SD=1.03), and “I frequently play around new technologies.” (M=3.98, SD=.95). When mean scores of all of the items are considered, it was seen that all of them were above 3.40, which meant that final year EFL pre-service teachers evaluated their Technology Knowledge (TK) at a

high level. The Skewness and Kurtosis values of the Technology Knowledge (TK) scale were found to be between ± 1.5 .

The analysis of Pedagogy Knowledge (PK) scale demonstrated that the item with the highest mean score was found to be "I can react supportively to learners' interaction." (M=4.32, SD=.62). As far as the item with the lowest mean score value was concerned, "I can draw on relevant research findings to guide my teaching." (M=3.93, SD=.91) item had the lowest mean score value among all of the other items in Pedagogy Knowledge (PK) section. The general mean score of the items of Pedagogy Knowledge (PK) scale was over 3.40, so it could be interpreted that final year EFL pre-service teachers rated their Pedagogy Knowledge at a high level. The Pedagogy Knowledge (PK) scale's Skewness and Kurtosis values were within the range of ± 1.5 values.

Content Knowledge (CK) section had "I can comprehend English texts accurately." (M=4.47, SD=.54) as the item that had the highest mean score value among all of the other items within this section of the scale. The lowest mean score item among all of the other items in this section of the scale was "I can describe phonological features of the English language." (M=4.08, SD=.79). The general mean score of Content Knowledge (CK) section was observed to be 4.33 (SD=.50). Both the mean scores of the items of the scales and the Content Knowledge (CK) section in general were found to be higher than 3.40, therefore it was seen that final year EFL pre-service teachers rated their Content Knowledge (CK) level as high. The general Skewness and Kurtosis values of the scale were noted to be between ± 1.5 ranges.

As a result of the analysis of Technological Content Knowledge (TCK) section of the scale, it was found that the item with the highest mean score was "I know about technologies that I can use to teach English vocabulary." (M=4.31, SD=.69). The item with the lowest mean score among all of the other items within Technological Content Knowledge (TCK) was noted to be "I know about the technologies that I can use to teach about the differences between cultures." (M=3.96, SD=.88). The general mean score of the Technological Content Knowledge (TCK) scale was 4.13 (SD=.61). Both the mean scores of each of the items of this section and the general mean score of Technological Content Knowledge (TCK) was over 3.40, indicating that final year EFL pre-service teachers had high level of Technological Content Knowledge (TCK). The Skewness and Kurtosis values of this section of the scale were noted to be ± 1.5 .

As far as the analysis of Pedagogical Content Knowledge (PCK) section of the scale was concerned, the item with the highest mean score among all of the other ones was found to be "I am willing to experiment with different methods of language teaching."

($M=4.36$, $SD=.52$). In addition, the item with the lowest mean score was noted to be “I am aware of the contextual factors that could inhibit/promote English teaching.” ($M=3.89$, $SD=.83$). The general mean score of the scale was found to be 4.09 ($SD=.50$). Mean scores of both each of the items of this section of the scale and the section itself were seen to be over 3.40, indicating that Pedagogical Content Knowledge (PCK) of the final year EFL pre-service teachers were at a high level. The Skewness and Kurtosis values of the scale were noted to be within ± 1.5 ranges.

Among the Technological Pedagogical Knowledge (TPK) items of this section of the scale, there were two items with the highest amount of mean score ($M=4.13$) and they were “I can choose technologies that enhance the teaching approaches for a lesson.” ($SD=.66$) and “I can choose technologies that enhance students’ learning for a lesson.” ($SD=.65$). The item with the lowest mean score was found to be “I am thinking critically about how to use technology in my classroom.” ($M=3.89$, $SD=.86$). The general mean score value of this section of the scale was noted to be 4.02 ($SD=.61$). General mean scores of this section of the item and each of its items were noted to be over 3.40, an indication of last year EFL pre-service teachers having a high level of Technological Pedagogical Knowledge (TPK). The Skewness and Kurtosis of this section of the scale was found to be between ± 1.5 ranges.

As a result of the analysis of Technological Pedagogical and Content Knowledge section of the scale, it was found that the item with the highest mean score was “I can participate in digital learning communities to explore creative applications of technology to improve student learning.” ($M=4.30$, $SD=.75$). The item with the lowest mean score among all of the other ones within this section was found to be “I can provide equitable access to digital learning tools and resources.” ($M=3.37$, $SD=1.00$). The general mean score of the scale was noted to be 3.89 ($SD=.62$). Both the mean scores of each of its items and the general mean scores of Technological Pedagogical and Content Knowledge section of the scale was found to be over 3.40, indicating that Technological Pedagogical and Content Knowledge level of final year EFL pre-service teachers was high. The Skewness and Kurtosis values of this section of the scale were noted to be between ± 1.5 values.

4.2.2. Findings Related to the Research Question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Gender?”

The following process was carried out to answer “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service

Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Gender?"; In order to determine whether self-efficacy level of EFL pre-service teachers related to the use of technology in Turkey show difference in relation to gender, Independent Sample t Test Analysis was conducted. When variances were homogeneous, equal variances assumed was considered. When they were not homogeneous, equal variance not assumed was taken into account in terms of degree of freedom including t value associated with both of them.

Table 5 Independent Sample t Test for Gender

Scale	Gender	N	M	SD	Levene's Test for Equality of Variance		t	Df	P	Cohen d
					F	p				
TK	Female	56	4.36	.55	8.532	.004*	-3.538	97.663	.001*	.68
	Male	44	4.69	.41						
PK	Female	56	4.16	.49	.388	.535	.294	98	.769	-
	Male	44	4.13	.47						
CK	Female	56	4.29	.53	1.807	.182	-.728	98	.469	-
	Male	44	4.37	.46						
TCK	Female	56	4.02	.49	4.158	.044*	-1.996	73.743	.050	-
	Male	44	4.27	.71						
PCK	Female	56	4.08	.43	3.612	.060	-.345	98	.731	-
	Male	44	4.11	.58						
TPK	Female	56	3.92	.49	7.224	.008*	-1.834	74.439	.071	-
	Male	44	4.15	.70						
TPACK	Female	56	3.80	.47	8.060	.006*	-1.584	68.822	.118	-
	Male	44	4.00	.75						

*p<.05

The results demonstrated that in the Technology Knowledge (TK) section of the scale, it was observed that the female participants had a mean score of 4.36, and a standard deviation score of .55. As far as the male participants were concerned, they were seen to have 4.69 mean score and .41 standard deviation value. As a result of the Levene's Test for Equality of Variance, it was seen that the TK section had an F value of 8.532 and a p value of .004*. The t value of the section was found to be -3.538 and the Df value of was found to be 97.663. The P of the section was found to be .001* and lastly its Cohen d was observed to be .68. The Pedagogy Knowledge (PK) statistics of the genders were as the following; it was seen that the female participants were found to have 4.16 mean score and .49 standard deviation value. As for the male participants they were found to have 4.13 mean score and .47 standard deviation. Within the PK section, it was observed that the results of Levene's Test for Equality of Variance showed F as .388 and P as .535. The t value of the section was seen to be .294, and its Df value was noted to

be .294. Lastly the section had a P value of .769. The Content Knowledge (CK) section demonstrated that the female participants had a mean score of 4.29, and they were noted to have a .53 standard deviation value. The male participants in the same section were found to have 4.37 mean score, and .46 standard deviation score. The CK section was found to have an F value of 1.807 and a p value of .182 as a result of the Levene's Test for Equality of Variance. The t value of the section was found to be -.728, the Df was found to be 98 and lastly the P value was seen to be .469. Technological Content Knowledge (TCK) section demonstrated that the female participants had 4.02 mean score and .49 standard deviation score. The male participants within the same section were seen to have 4.27 mean score and .71 standard deviation value. The results of Levene's Test for Equality of Variance showed that TCK section had 4.158 as its F value and .044* as its p value. The t value of the section was seen to be -.1996, Df value of 73.743 and a P value of .050. Pedagogical Content Knowledge (PCK) section of the results yielded the following results; the female participants were observed to have 4.08 mean score and .43 standard deviation value. The male participants were noted to have 4.11 mean score and .58 standard deviation score. Within the PCK section, it was observed that the Levene's Test for Equality of Variance results showed the section's F value as 3.612 and p value as .060. The t value of the section was seen to be -.345, the Df value of it was noted to be 98 and lastly, its P value was observed to be .731. The sixth section of the questionnaire that is Technological Pedagogical Knowledge (TPK) was seen to have 3.92 mean score and .49 standard deviation score for the female participants. The male participants within the same category were observed to have 4.15 mean score and .70 standard deviation rate. In the TPK section, it was noted that the Levene's Test for Equality of Variance showed 7.224 as its F value and .008* as its p value. The t value of the section was found to be -1.834 and the Df value of it was seen to be 74.439. Lastly, its P value was observed to be .071. The last section of the survey was Technological Pedagogical and Content Knowledge (TPACK), and it was observed to have 3.80 mean score and .47 standard deviation value for the female participants. The male participants within the same category were observed to have 4.00 mean score and a standard deviation of .75. This last section of the self-assessment instrument was seen to have an F value of 8.060 and a p value of .006* as a result of the Levene's Test for Equality of Variance. The t value of the section was found to be -1.584, the Df value of it was observed to be 68.822 and lastly, its P value was noted to be .118.

As a result of the analysis of Technology Knowledge (TK), there was a statistically significant difference ($t=-3.414$, $p<.05$) between the mean scores of female EFL pre-service teachers ($M=4.36$, $SD=.55$) and male EFL pre-service teachers ($M=4.69$, $SD=.41$).

This is an indication that TK self-efficacy of male EFL pre-service teachers was higher than the female ones. To assess the significance of the difference, Power Test was conducted and its .68 Cohen d value showed that this difference was at a medium level indicating the difference is worth taking into consideration. As far as Pedagogy Knowledge (PK), Content Knowledge (CK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical and Content Knowledge (TPACK) were considered, there wasn't any statistically significant difference. To conclude, besides TK, TPACK self-efficacy of EFL pre-service teachers didn't show any difference.

4.2.3. Findings Related to the Research Question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Age?”

In order to answer the research question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Age?” the following steps were followed while carrying out the analysis of the data related to that question; Before conducting ANOVA, in order to find out whether TPACK self-efficacy of EFL pre-service teachers related to the use of technology in Turkey Show difference in relation to age or not, Descriptive Analysis and Test for Homogeneity of Variance were conducted. The findings of the results of the Descriptive Analysis and Test for Homogeneity of Variance were demonstrated in Table 6 (Table 6).

Table 6 Results of Descriptive Analysis and Test for Homogeneity of Variance

Scale	Age	N	M	SD	Levene's Test for Equality of Variance	
					F _(3, 96)	P
TK	a) 21 or younger	21	4.42	.52	.526	.666*
	b) 22	42	4.55	.49		
	c) 23	24	4.54	.49		
	d) 24 or older	13	4.46	.66		
PK	a) 21 or younger	21	4.05	.41	2.134	.101*
	b) 22	42	4.09	.41		
	c) 23	24	4.12	.58		
	d) 24 or older	13	4.50	.51		
CK	a) 21 or younger	21	4.19	.50	1.149	.333*
	b) 22	42	4.37	.46		
	c) 23	24	4.33	.55		

	d) 24 or older	13	4.42	.49		
TCK	a) 21 or younger	21	4.19	.72	.932	.429*
	b) 22	42	4.07	.52		
	c) 23	24	4.24	.58		
	d) 24 or older	13	4.01	.78		
PCK	a) 21 or younger	21	4.02	.59	.493	.688*
	b) 22	42	4.05	.43		
	c) 23	24	4.12	.53		
	d) 24 or older	13	4.28	.48		
TPK	a) 21 or younger	21	4.16	.70	1.460	.230*
	b) 22	42	3.97	.50		
	c) 23	24	3.98	.61		
	d) 24 or older	13	4.01	.76		
TPACK	a) 21 or younger	21	4.02	.63	1.005	.390*
	b) 22	42	3.82	.54		
	c) 23	24	3.86	.67		
	d) 24 or older	13	3.96	.75		

*p>.05

The results demonstrated that the number of participants that were 21 or younger was 21, the participants who were 22 was 42 at total, the participants who were 23 was observed to be 24, and lastly, the participants who were 24 or older were 13 in total. In the Technology Knowledge (TK) section of the survey, the participants who were 21 or younger had a mean score of 4.42 and a standard deviation of .52. The ones who were 22 years old had a mean score of 4.55 and a standard deviation value of .49 within the TK section. As for the 23 years old participants, they were observed to have a mean score of 4.54 and a standard deviation value of .49. Lastly, 24 or older participants had a mean score of 4.46 and a standard deviation of .66. The Levene's Test for Equality of Variance results showed that the $F_{(3, 96)}$ value of the TK section was .526 and its P value was observed to be .666*.

In the Pedagogical Knowledge (PK) section of the questionnaire, it was observed that 21 or younger participants had a mean score of 4.05. The standard deviation of the same participants was also found to be .41. Participants, who were 22 years old, had a mean score of 4.09. Their standard deviation was also found to be .41 as well. 23 years old participants within PK section was observed to have a mean score of 4.12. In addition, their standard deviation was noted to be .58. Lastly, 24 or older participants was found to have 4.50 mean score and a standard deviation value of .51. The Levene's Test for Equality of Variance results showed that the PK section had an $F_{(3, 96)}$ value of 2.134 and a P value of .101*

Within the Content Knowledge (CK) section of the results, it was observed that 21 or younger participants had a mean score of 4.19. As far as the standard deviation of the participants was concerned, it was found to be .50. The participants who were 22 years old were found to have 4.37 mean score. In addition, their standard deviation score was noted to be .46. Furthermore, the participants who reported to be 23 years old had a mean score of 4.33. Their standard deviation score was also observed to be .55. Lastly, the participants who were 24 or older were observed to have a mean score of 4.42 and a standard deviation value of .49. The $F_{(3, 96)}$ value of the CK section was found to be 1.149 and the P value of it was seen to be .333* as a result of the Levene's Test for Equality of Variance.

Technological Content Knowledge (TCK) section results demonstrated that the participants who were 21 or younger had 4.19 as its mean score and .72 as its standard deviation value. The participants that are 22 years old was reported to have 4.07 mean score and .52 standard deviation value. 23 years old participants was seen to have a mean score of 4.24 and a standard deviation rate of .58. Lastly, the participants who were reported to be 24 or older were seen to have 4.01 as a mean score and .78 as a standard deviation score. $F_{(3, 96)}$ value was noted to be .932 and the P value of the TCK section was observed to be .429* as a result of the Levene's Test for Equality of Variance.

The results of the Pedagogical Content Knowledge (PCK) section of the questionnaire reported that the participants, who were 21 or younger, had a mean score of 4.02 within that section. As for its standard deviation value of them, it was found to be .59. 22 years old participants were seen to have a 4.05 mean score value and .43 standard deviation rate. The participants, who reported to be 23 years was observed to have a mean score of 4.12 and a standard deviation of .53. 24 or older participants, as the last age group of the study, was found to have a mean score value of 4.28 and a standard deviation rate of .48. Within the PCK section, it was observed that $F_{(3, 96)}$ value was .493 and the P value was .688* as far as the results of Levene's Test for Equality of Variance was concerned.

In the Technological Pedagogical Knowledge (TPK) section of the study, it was observed that 21 or younger participants had 4.16 as a mean score and .70 as a standard deviation value. Moreover, 22 years old participants were seen to have 3.97 mean score and .50 standard deviation. The participants who reported to be 23 were seen to have a mean score of 3.98 and .61 within the TPK section of the questionnaire. The final age group of the study that was 24 or older was found to have a mean score of 4.01 and a standard deviation rate of .76. The $F_{(3, 96)}$ value of the TPK section was found to be 1.460

and the P value of it was found to be .230* as far as the results of Levene's Test for Equality of Variance was concerned.

The final section of the study that is Technological Pedagogical and Content Knowledge (TPACK) demonstrated that 21 or younger participants were observed to have a mean score of 4.02 and a standard deviation score of .63. The participants who reported to be 22 years old were seen to have a mean score of 3.82 and a standard deviation value of .54. 23 years old age group was seen to have a mean score value of 3.86 and a standard deviation rate of .67. The final age group of the study that was 24 or older ones were noted to have 3.96 as their mean score and .75 as their standard deviation score. This section had a $F_{(3, 96)}$ value of 1.005 and a P value of .390* as a result of the Levene's Test for Equality of Variance.

As a result of Descriptive Analysis, the highest mean score belonged to 22 years old ($M=4.55$, $SD=.49$) EFL pre-service teachers within Technology Knowledge (TK) and the lowest mean score belonged to the 21 years old or younger ones ($M=4.42$, $SD=.52$). In addition, 24 years old or older participants were found to have the highest mean score ($M=4.50$, $SD=.51$) in Pedagogy Knowledge (PK) section while 21 or younger participants had the lowest mean score ($M=4.05$, $SD=.41$). In Content Knowledge (CK), 24 or older participants had the highest mean score ($M=4.42$, $SD=.49$) and the age group with the lowest mean score was 21 or younger ones ($M=4.19$, $SD=.50$).

The analysis of Technological Content Knowledge (TCK) demonstrated that 23 years old participants had the highest mean score ($M=4.24$, $SD=.58$) while 24 or older ones had the lowest mean score ($M=4.01$, $SD=.78$) in that section. In Pedagogical Content Knowledge (PCK) section, 24 or older participants had the highest ($M=4.28$, $SD=.48$), and 21 or younger ones had the lowest mean scores ($M=4.02$, $SD=.59$). As for Technological Pedagogical Knowledge (TPK), 21 or younger had the highest mean score ($M=4.16$, $SD=.70$), and the lowest one belonged to 22 years old participants ($M=3.97$, $SD=.50$). Lastly, Technological Pedagogical and Content Knowledge (TPACK) section had 21 or younger participants as the highest ($M=4.02$, $SD=.63$), and 22 years old ones as the lowest ($M=3.82$, $SD=.54$).

In relation to Levene's Test, Test for Equality of Variance yielded no statistically significant results for each of the sections of the questionnaire ($p>.05$). Since distributions were found to be normal and variances were homogenous, One Way Analysis of Variance (ANOVA) was conducted to figure out whether there was any difference between age and TPACK self-efficacy of the participants. As variances were found to be homogenous, when a difference was detected Tukey Test was conducted to find out the source of the

group that caused that difference. The result of the analysis was shown in Table 7 (Table 7).

Table 7 *One Way Analysis of Variance (ANOVA) for Age*

Scale	Sources Variance	of	Sum of Squares	df	Mean Square	F	P	Tukey	F
TK	Between Groups		.284	3	.095	.349	.790		
	Within Groups		26.081	96	.272				
	Total		26.365	99					
PK	Between Groups		1.992	3	.664	3.026	.033*	d>a and b	.14
	Within Groups		21.068	96	.219				
	Total		23.060	99					
CK	Between Groups		.544	3	.181	.733	.535		
	Within Groups		23.737	96	.247				
	Total		24.281	99					
TCK	Between Groups		.707	3	.236	.622	.603		
	Within Groups		36.373	96	.379				
	Total		37.080	99					
PCK	Between Groups		.660	3	.220	.885	.452		
	Within Groups		23.854	96	.248				
	Total		24.514	99					
TPK	Between Groups		.573	3	.191	.514	.674		
	Within Groups		35.667	96	.372				
	Total		36.239	99					
TPAC K	Between Groups		.622	3	.207	.539	.657		
	Within Groups		36.943	96	.385				
	Total		37.565	99					

*p<.05

Technology Knowledge (TK) section of the self-assessment instrument had .284 as Sum of Squares value, 3 as df value, .095 as Mean Square, .349 as F and, lastly, .790 as its p value in Between Groups as far as Sources Variance was concerned. When it comes to Within Groups in Sources Variance, it was seen that this category had 26.081 as Sum of Squares value, 96 as df value, and .272 as Mean Square rate. In total, the TK section was found to have 26.365 as Sum of Squares and 99 as df value.

The Pedagogy Knowledge (PK) of the self-assessment instrument had 1.992 Sum of Squares, 3 df, .664 Mean Square, 3.026 F, and .33* p values. The Tukey Analysis results demonstrated the result of “d>a and b” and the F was found to be .14. When Within Groups section was checked within the PK section, it was seen that it had 21.068 Sum of Squares 96 df, and .219 Mean Square. In total, the PK section was observed to have 23.060 Sum of Squares and 99 df values.

When the Content Knowledge (CK) of the section was checked, it was observed that Between Groups category of it had .544 as Sum of Squares, 3 as df value, .181 as Mean Square, .733 as its F rate, and lastly .535 as its p value. When Within Groups section was checked, it was observed that 23.737 was the Sum of Squares value, 96 was df value and lastly, .247 was the Mean Square value. In total, Sum of Squares was found to be 24.281, and df was noted to be 99 for the CK section.

The Technological Content Knowledge (TCK) section was observed to have .707 Sums of Squares, 3 df, .236 Mean Square, .622 F, and lastly .603 as its p value in the Between Groups category. As far as the Within Groups category was checked in the Sources of Variance section, it was observed that the category had 36.373 as Sum of Squares, 96 df, and lastly, .379 as a Mean Square value. In total, it was observed that the section had 37.080 Sum of Squares and 99 Mean Square.

Pedagogical Content Knowledge (PCK) section was noted to have .660 Sums of Squares, 3 df, .220 Mean Square, .885 F, and .452 as p values in the Between Groups section. When Within Groups was observed, it was seen that the group had 23.854 as Sum of Squares, 96 as df, and lastly .248 as Mean Square value. In total, Sum of Squares was found to have 24.514 as its value and df was found to be 99.

Technological Pedagogical Knowledge (TPK) section of the self-assessment instrument was analyzed and the results showed that in its Between Groups category, it had .573 as Sum of Squares, 3 as its df value, .191 as its Mean Square value, .514 as its F value, and lastly, .674 as its p value. When a closer look was taken towards its Within Groups section, it was observed that 35.667 was its Sum of Squares, 96 was its df, and lastly .372 was its Mean Square. In total, it was observed that 36.239 was the total Sum of Squares of the section, and 99 was the total df of the section.

Lastly, Technological Pedagogical and Content Knowledge (TPACK) section of the self-assessment instrument was found to have .622 as Sum of Squares, 3 as df, .207 as Mean Square, .539 as F and .657 as its p value in its Between Groups section. Within Groups section had 36.943 as its Sum of Squares value, .96 as its df rate, and lastly, .385

as its F value. In total, the section was found to have 37.565 Sum of Squares, and 99 Mean Square value.

As a result of the analysis of Pedagogy Knowledge (PK) section in relation to age, a statistically significant difference was found. However, in the rest of the sections of the questionnaire there was no additional statistically significant difference in relation to age. To uncover the source of the difference, Tukey Analysis was conducted, and it was found that participants who were in the group of 24 or older ($M=4.50$, $SD=.51$) had higher mean score in PK than 22 ($M=4.09$, $SD=.41$), and 21 or younger ($M=4.05$, $SD=.41$) ones ($F=3.026$, $p<.05$). However, the result of the Power Test indicated that ($f=.14$) there was low effect size. In short, despite low effect size, it was found that participants who were older had higher PK than the younger ones.

4.2.4. Findings Related to the Research Question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Daily Internet Use?”

To determine whether TPACK self-efficacy of EFL pre-service teachers related to the use of technology in Turkey show difference in relation to daily internet use, before ANOVA, a Descriptive Analysis and a Test for Equality of Variance were conducted. The results were represented in Table 8 (Table 8).

Table 8 Results of Descriptive Analysis and Test for Equality of Variance for Daily Internet Use

Scale	Daily Internet Use	N	M	SD	Levene' Test for Equality of Variance	
					F _(3, 96)	P
TK	a) 1-3	23	4.12	.50	1.408	.250
	b) 4-5	50	4.55	.47		
	c) 6+	27	4.78	.40		
PK	a) 1-3	23	4.03	.46	.323	.725
	b) 4-5	50	4.25	.48		
	c) 6+	27	4.05	.48		
CK	a) 1-3	23	4.05	.41	3.169	.046*
	b) 4-5	50	4.46	.47		
	c) 6+	27	4.33	.52		
TCK	a) 1-3	23	4.01	.49	3.589	.031*
	b) 4-5	50	4.16	.52		

	c) 6+	27	4.18	.83		
PCK	a) 1-3	23	3.93	.37	1.705	.187
	b) 4-5	50	4.18	.48		
	c) 6+	27	4.07	.59		
TPK	a) 1-3	50	4.05	.48	4.266	.017*
	b) 4-5	27	4.05	.81		
	c) 6+	23	3.79	.45		
TPACK	a) 1-3	50	3.91	.55	3.747	.027*
	b) 4-5	27	3.93	.83		
	c) 6+	23	4.12	.50		

*p<.05

In terms of the number of the participants, the overall results demonstrated that 23 participants chose 1-3 hours as their daily internet use, 50 participants chose 4-5 hours as their daily internet use and lastly, 27 participants chose 6+ hours as their daily internet use. As far as the result of this section of the survey was concerned, it was seen that within the Technology Knowledge (TK) section of the self-assessment instrument, the mean score of the participants that chose their daily internet use as 1-3 was 4.12. In addition, their standard deviation value was seen to be .50. The participants that chose 4-5 as their daily internet use within that section had a mean score of 4.55 and a standard deviation value of .47. Lastly, the participants with a 6+ hours of daily internet use had 4.78 mean score and .40 standard deviation value within the TK section. As a result of the Levene's Test for Equality of Variance, it was observed that the section had 1.1408 $F_{(3, 96)}$ value and .250 P value.

The Pedagogy Knowledge (PK) section of the questionnaire showed that the participants that chose 1-3 hours as their daily internet use in the PK section had a mean score of 4.25 and a standard deviation value of .46. The ones who chose 4-5 hours of daily internet use in response to the survey's question had 4.25 mean score, and .48 standard deviation rate. The last category of the participants with 6+ hours of daily internet use had 4.05 mean score and .48 standard deviation value. The PK section of the self-assessment instrument was observed to have .323 $F_{(3, 96)}$ value and .725 P value in Levene's Test for Equality of Variance.

Within the Content Knowledge (CK) section of the self-assessment survey instrument, it was seen that the participants that had 1-3 daily internet use had 4.05 mean score and .41 standard deviation value. The participants with 4-5 hours of daily internet use had 4.46 mean score and a standard deviation rate of .47. The last group of participants with 6+ hours of daily internet use had a mean score of 4.05 and a standard

deviation value of .48. This section of the study had $F_{(3, 96)}$ value of 3.169 and P value of .046* as a result of Levene's Test for Equality of Variance.

The Technological Content Knowledge (TCK) section of the study demonstrated that the participants with 1-3 hours of daily internet use had 4.01 mean score in that section. As far as their standard deviation value was concerned, it was seen to be .49. The participants that had 4-5 daily internet use had 4.16 as their mean score value and .52 as their standard deviation rate. The ones with 6+ hours had 4.18 mean score and .83 standard deviation value. The TCK section of the study was seen to have $F_{(3, 96)}$ value of 3.589 and P value of .31* as a result of the Levene's Test for Equality of Variance.

Pedagogical Content Knowledge (PCK) side of the self-assessment survey yielded the following results; the 1-3 hours of daily internet use group had a mean score of 3.93 and a standard deviation value of .37. The ones with 4-5 hours of daily internet use had a mean score of 4.18 and a standard deviation value of .48. The participants with 6+ hours had 4.07 as their mean score within that section and .59 as their standard deviation value. The Pedagogical Content Knowledge of the section was observed to have 1.705 $F_{(3, 96)}$ value and .187 P value in the results of Levene's Test for Equality of Variance.

In the Technological Pedagogical Knowledge (TPK), it was seen that the participants had 4.05 mean score and .48 standard deviation value with their 1-3 hours of daily internet use. As far as the group with 4-5 hours of daily internet use was concerned, it was seen that they had a mean score of 4.05 and a standard deviation value of .81. The last group of the TPK section of the self-assessment survey had 3.79 as a mean score and .45 as a standard deviation value. Technological Pedagogical Knowledge section had 4.266 $F_{(3, 96)}$ value and .017* O value in the Levene's Test for Equality of Variance.

The last group of that section of the study was Technological Pedagogical and Content Knowledge (TPACK). In this section it was observed that the participants with 1-3 hours of daily internet use had a mean score of 3.91 and a standard deviation value of .55. As far as the numbers of the ones with 4-5 hours of daily internet use was concerned, it was observed that they had a mean score of 3.93, and a standard deviation of .83. The last group of the last section of the self-assessment survey instrument demonstrated that they had a mean score of 4.12 and a standard deviation rate of .50. As a result of the Levene's Test for Equality of Variance, it was observed that the TPACK section of the study had 3.747 $F_{(3, 96)}$ value and .027* P value.

As a result of the analysis of Technology Knowledge (TK) section of the scale in terms of daily internet use, it was found that 6+ hours of daily internet use had the highest amount of mean score ($M=4.78$, $SD=.40$) within that section. As far as the lowest amount

of daily internet use is concerned in TK section, it was observed that 1-3 hours of daily internet use had the least mean score ($M=4.12$, $SD=.50$). In Pedagogy Knowledge (PK), it was observed that 4-5 hours of daily internet use had the highest mean score ($M=4.25$, $SD=.48$). The lowest daily internet use in PK section was 1-3 hours ($M=4.03$, $SD=.46$). After analyzing Content Knowledge (CK), it was noted that 4-5 hours of daily internet use had the highest mean score ($M=4.46$, $SD=.47$). The lowest mean score was found to be 1-3 hours of daily internet use ($M=4.05$, $SD=.41$). Technological Content Knowledge (TCK) section of the scale had 6+ hours of daily internet use ($M=4.18$, $SD=.83$) as the highest and 1-3 hours of daily internet use as the lowest mean score ($M=4.01$, $SD=.49$). Analyzing Pedagogical Content Knowledge (PCK) yielded the result that 4-5 hours of daily internet use was the highest ($M=4.18$, $SD=.48$) among all of the other ones within that section. As far as the lowest one is concerned, it was noted that 1-3 hours of daily internet use had the lowest mean score ($M=3.93$, $SD=.37$). In Technological Pedagogical Knowledge (TPK) section of the scale, both 1-3 hours ($SD=.48$) and 4-5 hours ($SD=.81$) of daily internet use was found to be the highest ones in terms of mean score ($M=4.05$) and 6+ hours as the lowest one ($M=3.79$, $SD=.45$). An analysis of Technological Pedagogical and Content Knowledge (TPACK) showed that 6+ hours of daily internet use had the highest mean score ($M=4.12$, $SD=.50$) and 1-3 hours of daily internet use as the lowest mean score ($M=3.91$, $SD=.55$).

As a result of Test of Equality of Variance, it was observed that TK, PK, and PCK sections of the scale weren't positive in terms of Levene's Test. In other words, variances were found to be homogeneous. In these sections of the scale, in case of a difference in the results of ANOVA, Tukey Test was conducted to determine the source of the difference. Variances in the sections of CK, TCK, TPK, and TPACK were noted to be not homogeneous. In case of the occurrence of a difference as a result of ANOVA, to find the source of that difference, Games-Howell Analysis was conducted. Results of the analysis were shown in Table 9 (Table 9).

Table 9 One Way Analysis of Variance (ANOVA) for Daily Internet Use

Scale	Sources of Variance	Sum of Squares	Df	Mean Square	F	Sig.	Tukey and Games-Howell	F
TK	Between Groups	5.503	2	2.752	12.795	.000	c and b>a	.24 (Tukey)
	Within Groups	20.862	97	.215				
	Total	26.365	99					
PK	Between Groups	1.088	2	.544	2.402	.096	-	

	Within Groups	21.972	97	.227				
	Total	23.060	99					
CK	Between Groups	2.662	2	1.331	5.973	.004	b>a	.16
	Within Groups	21.618	97	.223			(Games-Howell)	
	Total	24.281	99					
TCK	Between Groups	.465	2	.232	.616	.542	-	
	Within Groups	36.615	97	.377				
	Total	37.080	99					
PCK	Between Groups	1.058	2	.529	2.188	.118	-	
	Within Groups	23.455	97	.242				
	Total	24.514	99					
TPK	Between Groups	.389	2	.194	.526	.593	-	
	Within Groups	35.850	97	.370				
	Total	36.239	99					
TPACK	Between Groups	.279	2	.139	.362	.697	-	
	Within Groups	37.286	97	.384				
	Total	37.565	99					

*p<.05

The results that were found were as the following; In the Technology Knowledge (TK) section of the self-assessment instrument, it was observed that the Between Groups category in Sources of Variance had a 5.503 as its Sum of Squares, 2 as its Df value, 2.752 as its Mean Square value, 12.795 F rate, .000 Sig. value, and .24 *f* as its values. The Tukey and Games-Howell demonstrated that the TK section of the self-assessment instrument was found to be “c and b>a (Tukey)”. The Within Groups of the TK section’s Sources of Variance showed that the group’s Sum of Squares was 20.862, Df value was 97, and Mean Square value was .215. In total, it was observed that the TK part of the scale had 26.363 Sum of Squares, and 99 Df values.

The Pedagogy Knowledge (PK) section of the self-assessment instrument was noted to have 1.088 Sums of Squares, 2 as its Df, .544 as its Mean Square, 2.402 as its F rate, and .096 as its Sig. value within its Between Groups category in Sources of Variance. As far as its Within Groups category was concerned, it was noted to have 21.972 Sum of Squares, 97 Df, and .227 F values. In total, the PK section was seen to have a total of 23.060 Sums of Squares, and 99 Df values.

Within the Content Knowledge (CK) section of the instrument, it was observed that this part of the section had 2.662 Sum of Squares, 2 Df, 1.331 Mean Square, 5.973 F, .004 Sig., and .16 *f* values in the Between Groups section of the Sources of Variance. The Tukey and Games-Howell results demonstrated that the CK section had “b>a (Games-Howell).” Within Groups section of the CK in Sources of Variance had 21.618 as its Sum of Squares, 97 as its Df and .223 as its F value. In total, the CK section was observed to have a Sum of Squares value of 24.281, and Df value of 99.

The Technological Content Knowledge (TCK) section of the scale had .465 Sum of Squares, 2 Df, .232 Mean Square, .616 F value, and lastly, .542 Sig. values. The Within Groups section had 36.615 Sum of Squares, 97 Df, and .377 Mean Square values. In total, it was observed that the Sum of Squares of the section was 37.080, and the Df value of it was found to be 99.

In the Pedagogical Content Knowledge (PCK) section, it was observed that the Between Groups of Sources of Variance had 1.058 Sum of Squares, 2 Df, .529 Mean Square, 2.188 F, and lastly, .118 Sig. values. Within Groups section of the Sources of Variance in the PCK section had a Sum of Squares value of 23.455, 97 as its Df value, and .242 Mean Square value. In total, 24.514 was seen to be the Sum of Squares value of the section, and lastly, the Df of the overall section was seen to be 99.

The Technological Pedagogical Knowledge (TPK)'s Between Groups category in Sources Variance section of the scale had .389 as its Sum of Squares value, 2 as its Df value, .194 as its Mean Square, .526 as the F value, and lastly, .593 as the Sig. value. Within Groups in Sources Variance had 35.850 as the Sum of Squares, 97 as the Df value, .370 as its Mean Square values. In total, Sum of Squares in the TPK section was 36.239, and Mean Square was 99.

Lastly, the Technological Pedagogical Content Knowledge (TPACK) section of the scale had .279 Sum of Squares, 2 Df, .139 Mean Square, .362 F, and lastly, .697 Sig. values in the Between Groups of the Sources Variance. Within Groups category had 37.286 Sum of Squares, 97 Df, .384 Mean Square values. In total, the TPACK section was observed to have 37.565 Sum of Squares, and 99 Df values.

As a result of the analysis within TK section of the scale, a statistically significant difference was observed in terms of daily internet use ($F=12.795$, $p<.05$). Since variances were found to be homogeneous, in order to figure out the source of this significance, Tukey Test was conducted. It was found that the mean scores of participants whose daily use of internet were 6 hours ($M=4.78$, $SD=.40$), and between 3 to 5 hours (4.55 , $SD=.47$) were higher than the ones that used internet for 1 to 3 hours ($M=4.12$, $SD=.50$). To

understand the meaningfulness of the significance, a Power Test was conducted and the results showed that the significance was at a considerably important level ($f=.24$). Another significance was at the section of CK ($F=5.973$, $p<.05$). Within CK, as variances were not homogeneous, the source of the significance was analyzed through Games-Howell Test. As a result, it was found that the mean scores of the participants that used internet 3 to 5 hours daily ($M=4.46$, $SD=.47$) were higher than the ones with 1 to 3 hours of use ($M=4.05$, $SD=.41$). By taking into account these findings, it can be said that as the daily internet use of a participant increases, their TK also increases. In addition, CK of participants is high when their daily internet use is at a medium level. In both TK and CK, effect size was significant enough to take these conclusions into consideration. However, PK, TCK, PCK, TPK, and TPACK sections of the questionnaire didn't have any statistically significant difference. In short, daily internet use of EFL pre-service teachers wasn't impactful on PK, TCK, PCK, TPK, and TPACK of the participants.

4.2.5. Findings Related to the Research Question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Reason for Department Choice?”

In order to find out whether Technological Pedagogical and Content Knowledge (TPACK) self-efficacy of EFL pre-service teachers related to the use of technology in Turkey show difference in relation to their reasons for choosing ELT department, Kruskal Wallis-H Test was applied. The result of the analysis was presented in Table 10 (Table 10).

Table 10 *The Result of Kruskal Wallis-H Test in Relation to Reason for Department Choice*

Scale	Choosing Department	N	Mean Rank	Chi-Square (Kruskal Wallis-H)	P	Sources of difference
TK	a- Compulsorily	8	42.50	1.258	.533	
	b- Coincidentally	12	57.04			
	c- Willingly	80	50.32			
	Total	100				
PK	a- Compulsorily	8	21.94	9.013	.011*	c, b>a
	b- Coincidentally	12	58.75			
	c- Willingly	80	52.12			
	Total	100				
CK	a- Compulsorily	8	33.38	3.094	.213	

	b- Coincidentally	12	53.08		
	c- Willingly	80	51.83		
	Total	100			
TCK	a- Compulsorily	8	42.88	1.143	.565
	b- Coincidentally	12	56.83		
	c- Willingly	80	50.31		
	Total	100			
PCK	a- Compulsorily	8	40.31	3.379	.151
	b- Coincidentally	12	64.13		
	c- Willingly	80	49.48		
	Total	100			
TPK	a- Compulsorily	8	41.94	.774	.679
	b- Coincidentally	12	51.38		
	c- Willingly	80	51.23		
	Total	100			
TPAK	a- Compulsorily	8	44.19	1.094	.579
	b- Coincidentally	12	57.46		
	c- Willingly	80	50.09		
	Total	100			

*p<.05

The results demonstrated that the number of the participants that chose their department “Compulsorily” was found to be 8. When it comes to the participants that chose their department “Coincidentally”, the number was noted to be 12. Lastly, as far as the participants that chose their department “Willingly” were concerned, their numbers were observed to be 80. All in all, the most chosen option was “Willingly”, followed by “Coincidentally”, then “Compulsorily.”

The Technology Knowledge (TK) section of the scale’s “Compulsorily” option was observed to have a Mean Rank of 42.50. The Chi-Square (Kruskal Wallis-H) of it was seen to be 1.258. Lastly, the P value of this part was observed to be .533. As far as the “Coincidentally” option was concerned, in the TK section it had a Mean Rank of 57.04. When it comes to “Willingly”, it was noted that it had a Mean Rank of 50.32.

Within the Pedagogy Knowledge (PK) section of the self-assessment instrument, it was seen that the “Compulsorily” option had a Mean Rank of 21.94, a Chi-Square (Kruskal Wallis-H) value of 9.013, and a P value of .011*. The Sources of Difference of the PK section’s “Compulsorily” category was observed to be “c, b>a.” When it comes to the “Coincidentally” option, it was seen that the option had a Mean Rank of 58.75. Lastly, the “Willingly” option was seen to have 52.12 as its Mean Rank.

In the Content Knowledge (CK) section of the scale, it was demonstrated that the “Compulsorily” option had a Mean Rank of 33.38, Chi-Square (Kruskal Wallis-H) value of 3.094, and lastly, the P value of .213. The “Coincidentally” option of the scale was also found to have a Mean Rank of 53.08. Lastly, the “Willingly” option had a Mean Rank of 51.83.

Within the Technological Content Knowledge (TCK) part of the self-assessment survey, it was observed that the “Compulsorily” section of the options within the department choice category had a Mean Rank of 42.88, and a P value of .565. The Chi-Square (Kruskal Wallis-H) result of the “Compulsorily” option was also found to be 1.143. When it comes to the “Coincidentally” option, it was observed that the option had a Mean Rank of 56.83. Lastly, the “Willingly” part of the scale had a Mean Rank of 50.31.

The results of the Pedagogical Content Knowledge (PCK) demonstrated that the “Compulsorily” option was found to have a Mean Rank of 40.31, and its P value was noted to be .151. The Chi-Square (Kruskal Wallis-H) of the option was seen to be the value of 3.379. The “Coincidentally” option of the scale was also found to have a Mean Rank of 64.13. When it comes to the option of “Willingly” it was observed that this option had 49.48 as its Mean Rank.

Technological Pedagogical Knowledge (TPK)’s section within the scale had 41.94 as its Mean Rank in the category of “Compulsorily.” In addition, it was found to have a P value of .679. Furthermore, the Chi-Square (Kruskal Wallis-H) value of the option was found to be .774. “Coincidentally” option of the TPK scale was found to have a Mean Rank of 51.38. Lastly, the “Willingly” option of this part of the scale had 51.23 as its Mean Rank.

Finally, the Technological Pedagogical and Content Knowledge (TPACK) section of the self-assessment instrument results showed that the “Compulsorily” option of that section had a Mean Rank of 44.19, and a P value of .579. The Chi-Square (Kruskal Wallis-H) of the option also noted to be 1.094. When it comes to the “Coincidentally” option, it was observed that it had a Mean Rank of 57.46. Lastly, the “Willingly” option was found to be 50.09.

Analysis of Pedagogy Knowledge (PK) section of the questionnaire resulted in the finding of statistically significant difference ($X^2=9.013$). In the rest of the sections no such finding was found. To better understand the source of difference in PK section a Kruskal Wallis-H Analysis was conducted and it was found that participants who chose their department compulsorily had lower mean rank (Mean Rank=21.94) than the ones that chose their department coincidentally (Mean Rank=58.75) and willingly (Mean

Rank=52.12). In conclusion, participants who chose their department compulsorily had lower PK compared to the ones that chose their department coincidentally and willingly.

4.2.6. Findings Related to the Research Question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Have Any Relationship with Grade Point Average (GPA) or Perceived Level of Confidence Related to the Use of ICT (PLC-ICT)?”

In order to answer the question of “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Have Any Relationship with Grade Point Average (GPA) or Perceived Level of Confidence Related to the Use of ICT (PLC-ICT)?” and understand whether there is a meaningful relationship among EFL pre-service teachers’ Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical and Content Knowledge (TPACK), Grade Point Average (GPA), and Perceived Level of Confidence Related to the Use of ICT (PLC-ICT), a Correlational Analysis was conducted. The results of the Correlational Analysis were given in Table 11 (Table 11).

Table 11 Correlation Analysis Results

	PLC-ICT	GPA	TK	PK	CK	TCK	PCK	TPK
GPA	.117	1						
TK	.540**	.217*	1					
PK	.140	.543**	.265**	1				
CK	.210*	.418**	.511**	.539**	1			
TCK	.304**	.188	.469**	.438**	.437**	1		
PCK	.166	.420**	.355**	.723**	.627**	.633**	1	
TPK	.241*	.217*	.456**	.421**	.382**	.800**	.650*	1
TPACK	.187	.162	.390**	.490**	.449**	.753**	.699*	.856**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The Correlation Analysis results demonstrated that Perceived Level of Confidence Related to the Use of ICT (PLC-ICT) had a relationship of ($r=.117$) Grade Point Average (GPA), ($r=.540$) Technology Knowledge (TK), ($r=.140$) Pedagogy Knowledge (PK), ($r=.210$) Content Knowledge (CK), ($r=.304$) Technological Content Knowledge (TCK), ($r=.166$) Pedagogical Content Knowledge (PCK), ($r=.241$) Technological Pedagogical

Knowledge (TPK), ($r=.187$) Technological Pedagogical and Content Knowledge (TPACK). In addition, Grade Point Average (GPA) was also found to have the following relationship levels; ($r=.217$) Technology Knowledge (TK), ($r=.543$) Pedagogy Knowledge (PK), ($r=.418$) Content Knowledge (CK), ($r=.188$) Technological Content Knowledge (TCK), ($r=.420$) Pedagogical Content Knowledge (PCK), ($r=.217$) Technological Pedagogical Knowledge (TPK), and ($r=.162$) Technological Pedagogical and Content Knowledge (TPACK).

As far as the Correlation Analysis results of Technology Knowledge (TK) was concerned, the following results were observed; ($r=.265$) Pedagogy Knowledge (PK), ($r=.511$) Content Knowledge (CK), ($r=.469$) Technological Content Knowledge (TCK), ($r=.355$) Pedagogical Content Knowledge (PCK), ($r=.456$) Technological Pedagogy Knowledge (TPK), ($r=.390$) Technological Pedagogical and Content Knowledge (TPACK). In the category of Pedagogy Knowledge (PK), it was seen that it had the following relationships; ($r=.539$) Content Knowledge (CK), ($r=.438$) Technological Content Knowledge (TCK), ($r=.723$) Pedagogical Content Knowledge (PCK), ($r=.421$) Technological Pedagogical Knowledge (TPK), ($r=.490$) Technological Pedagogical and Content Knowledge (TPACK). In the Content Knowledge (CK) section, by looking at the results it was seen that it had a relationship of ($r=.437$) Technological Content Knowledge (TCK), ($r=.627$) Pedagogical Content Knowledge (PCK), ($r=.382$) Technological Pedagogical Knowledge (TPK), ($r=.449$) Technological Pedagogical and Content Knowledge (TPACK).

When it comes to Technological Content Knowledge (TCK), it was noted that it had the relationship level of ($r=.633$) Pedagogical Content Knowledge (PCK), ($r=.800$) Technological Pedagogical Knowledge (TPK), and ($r=.753$) Technological Pedagogical and Content Knowledge (TPACK). The Pedagogical Content Knowledge (PCK) results demonstrated that this section had ($r=.650$) Technological Pedagogical Knowledge (TPK), and ($r=.699$) Technological Pedagogical and Content Knowledge (TPACK). Finally, Technological Pedagogy Knowledge (TPK) had a relationship value of ($r=.856$) with Technological Pedagogical and Content Knowledge (TPACK).

By taking a look at these findings, the following points can be pointed out; As a result of the Correlational Analysis, PLC-ICT of EFL pre-service teachers were found to have no meaningful relationship with their GPA ($r=.117$), PK ($r=.140$), PCK ($r=.166$), and TPACK ($r=.187$). In addition, there was no worth mentioning relationship between GPA and TCK ($r=.188$), and TPACK ($r=.162$). The results of the relationship of PLC-ICT with the other variables were found to be at medium level and were listed from the highest to the lowest as the following; TK ($r=.540$), TCK ($r=.304$), TPK ($r=.241$), CK ($r=.210$).

As for GPA, its relationship with the other variables were also found to be at medium level with the following relationship order from the highest to the lowest; PK ($r=.543$), PCK ($r=.420$), CK ($r=.418$), TK ($r=.217$), TPK ($r=.217$).

TK's relationship with the other variables was also at medium level with the following order; CK ($r=.511$), TCK ($r=.469$), TPK ($r=.456$), TPACK ($r=.390$), PCK ($r=.355$), PK ($r=.265$). As for PK the order is as the following; PCK ($r=.723$), CK ($r=.539$), TPACK ($r=.490$), TCK ($r=.438$), TPK ($r=.421$). In the same way, CK's relationship order was found to be PCK ($r=.627$), TPACK ($r=.449$), TCK ($r=.437$), TPK ($r=.382$). Similarly, TCK found to have TPK ($r=.800$), TPACK ($r=.753$), and PCK ($r=.633$), however, its relationship level was found to be high. PCK was found to have medium level relationship with TPACK ($r=.699$), and TPK ($r=.650$).

Lastly, TPK and TPACK was found to have a relationship value of $r=.856$. To sum up, the result of the Correlational Analysis demonstrated that the highest two relationship level was with TPK and TPACK ($r=.856$), and the second highest was with TCK, and TPK ($r=.800$).

Chapter 5

Conclusion, Discussion and Suggestions

The findings related to the research questions of the study that is aimed to assess TPACK level of final year EFL pre-service teachers and its relationship with a variety of variables were discussed in the following parts.

Research Question 1: What is Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey?

The findings related to the first research question of the study that is “What is Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey?” was analyzed and it was found that both TPACK level of EFL pre-service teachers in general and their level of individual TPACK sub-constructs were high. This finding also coincides with the findings of the other studies that are similar to this one, which were conducted with similar demographic characteristics (Ekrem & Recep, 2014; Öz, 2015; Atar et al., 2019).

Judging by the high TPACK level of EFL pre-service teachers related to technology use, we can assume that the teacher training programs were not insufficient in training EFL pre-service teachers with the use of ICT tools. However, things can always change for the better, and the high level of EFL pre-service teachers in general shouldn't make it sound otherwise. As it was recurrently mentioned, ICT tools are developed at a rapid pace, and to keep up with this development pace, it is advised for teacher training programs to continuously update their ways of educating EFL pre-service teachers to keep their TPACK level related to technology use at a high level.

When taken a closer look to the answers of the participants, some worth considering implications related to TPACK and its sub-constructs were found. In TK it was found that majority of the participants knew how to carry out simple tasks such as using video and audio files. This finding is in line with the answers of the participants about their PLC-ICT. When asked about their PLC-ICT, none of the participants chose “Not Confident Enough”, and “Slightly Confident” options, and majority of them were found to select, from the highest to the lowest, “Fairly Confident”, “Somewhat Confident”, and “Completely Confident” options. In short, majority of EFL pre-service teachers think that they can use computers to carry out simple tasks. This is also evident in the high TPACK level of EFL pre-service teachers about the use of technology. However, this might not come out as a surprise to some as ICT tools are too integrated into our lives in that it is almost

impossible to navigate in life without having the ability of carrying out simple tasks in such tools.

In contrast to the finding, it was noted that EFL pre-service teachers didn't feel as confident in the area that was about being able to use educational software and trying out new technological tools, which further demonstrates that majority of EFL pre-service teachers' ICT capability beliefs about themselves don't go further than being able to use ICT for simple tasks. As it was mentioned earlier, despite the TPACK level of EFL pre-service teachers in relation to their ICT use was found to be high, the teacher training programs can always optimize their training programs about ICT use to better educate their EFL pre-service teachers in utilizing ICT tools in more specialized ways. This might be an impactful development since having particular specialized knowledge about ICT tools might help the EFL pre-service teachers in their careers with many essential things such as preparing materials, resolving technological issues that might hinder the continuity of their lessons, carrying out tasks with appropriate ICT tools efficiently, etc.

In PK section, majority of the EFL pre-service teachers were found to have a supportive viewpoint towards their students, however, they were also found to have deficiency in using research to support their teaching. In the light of this finding, EFL pre-service teachers' having a supportive view can be considered as a positive outcome of their training, however, to further support them in their career, they can be further assisted in making use of research to improve their teaching. In addition, ICT tools develop at a quick rate, so it is essential for the EFL pre-service teachers to gain the ability of being autonomous in their development after they graduate from their universities' teacher training programs. This is also one of the essential skills that they can gain related to the profession they are in, so helping EFL pre-service teachers getting better at using research to improve their teaching should be one of the priorities of the teacher education programs.

In terms of CK, majority of the participants assessed themselves as being capable of using basics of English, however, phonology was the one with the lowest score among the other items within that section. This situation can be explicated with the interpretation that phonology of English may not be one of the parts of English that is prioritized by educational institutions such as primary schools or high schools and because of this participants may have been introduced to it later in their university years. Having such an outcome given these circumstances might be understandable; however, this finding signifies the importance of the inclusion of phonology lessons in teacher training programs for EFL pre-service teachers to become example users of the language.

By taking a closer look into TK, it was noted that majority of EFL pre-service teachers were largely aware of technologies that they can use to teach four basic skills of English. However, as far as teaching about cultures was concerned, teachers expressed lesser confidence related to it. It might be feasible to focus on this situation as culture is one of the important components of foreign language education (Qu, 2010). One worth mentioning situation that might also be giving way to this outcome would also be the lack of cultural knowledge of the EFL pre-service teachers about English. Unfortunately, teaching about the culture of the target language is not one of the widely adopted practices in educational institutions while teaching a language, so this might not be carrying as much significance as teaching about the four basic language skills for them. One simple thing that might be done by the teacher training programs would be attracting the attention of the EFL pre-service teachers to the importance of that situation.

In PCK, it was seen that the interest of EFL pre-service teachers towards different language teaching methods was high but it was also noted that they felt less confident in detecting factors that may hinder or improve language learning processes of their students. This situation may be seen as a natural outcome as EFL pre-service teachers lack professional experience in teaching.

Outcomes related to TPK demonstrated that EFL pre-service teachers were highly supportive of using technology in education; however, they felt lesser confidence in thinking critically about using them. This situation may support the criticism towards teacher education programs that they aren't successful at making pre-service teachers gain a critical viewpoint towards technology use in education (Kessler, 2018; Aşık et al., 2020). If this situation is not focused on, pre-service teachers may continue their careers without thinking critically about their technology use in education, which may continue the cycle of teachers using technology superficially (Tseng et al., 2020). It is also important to repeat that the high TPACK level of EFL pre-service teachers related to their ICT use should not deceive the teacher training programs, as it was recurrently mentioned, making use of ICT tools in language education is not as plain as just bringing them into the classroom. The teachers need to have a purpose to make use of a particular ICT tool in the classroom to provide new educational opportunities for their students that are not available in traditional settings. So, devising better ways of making EFL pre-service teachers gain the ability to critically think about their choices in ICT tools will certainly lead the teacher training programs to a better path.

Lastly, in TPACK section, it was noted that EFL pre-service teachers were willing to participate in digital learning communities to assist teacher students' learning. This situation coincides with the finding in PK that they have a supportive viewpoint towards

their students. The part that EFL pre-service teachers felt the least confidence compared to the other items in that section was about providing students equal access to digital tools. As shouldering such a situation alone as a teacher might be an underwhelming undertaking for the teachers, so they may need the support of their institutions. In this case, focusing on the development of technological infrastructure of educational institutions and educating pre-service teachers on how to help their students in accessing this support might be a useful idea.

Research Question 2: Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Gender, Age, Daily Internet Use, and Reason for Department Choice?

The findings related to the second research question of the study that is “Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Show Difference in Relation to Gender, Age, Daily Internet Use, and Reason for Department Choice?” were discussed under the sub-titles that belong to the variables analyzed in relation to this part of the research question.

Gender

As a result of the analysis, it was found that the male participants had higher TK than the female participants. There are few studies that reported a similar result within the literature (Lin et al., 2013; Antonio & Tuffley, 2014; Öz, 2015; Cheng, 2017). In addition, it was observed that the participants who reported high daily internet use also had high TK. It was also found that the number of the males who reported that they were using internet at high hours were higher than the females, which supports that finding of the study. One explanation found within the literature related to this finding is that males were found to have more tendencies towards using technology, such as playing games (Antonio & Tufflet, 2014; Hsu et al., 2017).

Having high knowledge about technology as a result of having high amount of hours on the internet might be considered natural. However, it is also important to consider what kinds of activities people spend their time on the internet. As it was mentioned earlier, males were found to be investing more time into using technological tools to play games, which explains the high amount of internet use on their part. However, how this might be affecting their knowledge about technology is a question that needs further evidence. So, one avenue that might be further explored related to this finding is that what it is about games that affect the technology knowledge of males. The

answer to that question might assist us in utilizing these activities while efficiently developing technology knowledge of the EFL pre-service teachers. Another finding that was reported by the previous studies related to the gender was that females having higher PK than males (Proctor et al., 2010; Lin et al., 2013; Ekrem & Recep, 2014; Öz, 2015), which was not observed in this study.

Age

When TPACK Self-Efficacy of EFL pre-service teachers was analyzed in relation to age, it was observed that the older participants had higher PK than the younger ones. What can be inferred from this finding is that EFL pre-service teachers who were older than 22 years old, which is an average age of being in that stage of education, might have had a professional experience before joining the university or they may also have been working as a teacher while also continuing their education in their universities to support themselves. If we consider the fact that increase in Pedagogy Knowledge has a relationship with EFL pre-service teachers' prior experience in language teaching profession, this further adds value to the professional development course that EFL pre-service teachers take at their final year in their universities. If that is the case, additional considerations in improving this part of the training of the EFL pre-service teachers might be prioritized by the teacher training programs.

Daily Internet Use

In terms of daily internet use, the lowest amount of time reported by the participants was 1 hour 10 minutes and the highest was 10 hours. The most frequently reported time was 4 hours and the average of the reported hours was found to be 4 hours 37 minutes. As a result of the findings, it was found that participants with high daily internet use had also high TK. As mentioned earlier, this is further supported by the finding that the males, who were found to have higher daily internet use than the females, had higher TK than the female participants. One thing to note is that TPK and TPACK don't have the same relationship with daily internet use as TK, so this may be a sign of the participants' not using internet for pedagogical purposes. One additional thing that was observed was that CK of the participants whose daily internet use was at a moderate level was found to be high. In contrast to the ones that use internet moderately, participants, who use internet for high amount of times, may be wasting time surfing on the internet and getting distracted from the tasks they are supposed to do. Considering the relationship between daily internet use of the males and TK, it may be assumed that a similar relationship may be found between CK and daily internet use of the females as the female

participants were found to be using internet moderately, however, nothing that might hint a relationship towards this direction was found.

Reason for Department Choice

When participants' reasons for choosing their department was analyzed, it was observed that majority of the participants chose their department willingly, and few of them, coincidentally. The ones who chose their department compulsorily was the group with the least amount of participants. In the light of these findings, participants who chose their department compulsorily had lower PK than the ones who chose their department willingly and coincidentally. This finding may hint towards the interpretation that choosing department compulsorily leads to being disinterested towards the field. Fortunately, the number of participants who chose that option was too minor to be considered a problem. One thing that might be adopted by the teacher training programs is that, EFL pre-service teachers might be tracked better depending on their choice in their initial years within their programs. This way, the support these particular EFL pre-service teachers may need in overcoming the challenges their choice brings might be provided to assist them. This can lessen the negative effects on them or possibly make them reconsider their choice, which might benefit both the teacher training program and the student in the future.

Research Question 3: Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Have any Relationship with GPA and PLC-ICT?

Results of the third and the last research question of the study that is "Does Technological Pedagogical and Content Knowledge (TPACK) Self-Efficacy Level of Final Year EFL Pre-Service Teachers Related to the Use of Technology in Turkey Have any Relationship with GPA and PLC-ICT?" demonstrated that there weren't any relationship between TPACK Self-Efficacy, GPA, and PLC-ICT, however, some relationships between TPACK sub-constructs were observed. There are mixed findings related to the relationship of academic achievement with TPACK as one study was found to report that it doesn't have a relationship with TPACK (Ekrem & Recep, 2014) while another one was found to state that it had a slight connection with it (Öz, 2015).

When the relationship of TPACK sub-constructs among each other was analyzed, it was found that TPK had a relationship with TPACK. This finding may hint that developing TPK of the EFL pre-service teachers may positively impact their TPACK. However, a similar relationship wasn't found between TCK and TPACK. One possibility that can explicate this situation might be the assumption that the participants couldn't differentiate TPK from TCK and vice versa. This might support the criticisms towards

TPACK that the definitions of its sub constructs are tough to tell apart, its definitions, especially the ones related to technology needs further elaboration, and that it is hard to put into practice (Angeli & Valanides, 2009; Cox & Graham, 2009; Archambault & Barnett, 2010; Graham, 2011; Olofson et al., 2016). This confusion may also stem from the fact that since teachers in general were found to be focusing on what to do with a particular item (TPK) without considering whether it is appropriate for the subject matter they want to teach or not (TCK), TCK may not have been considered as an essential component by the participants (Tseng et al., 2020). One last thing to note here is that, no additional relationship was found among the remaining TPACK sub-constructs, so this might further support the criticisms towards TPACK.

In conclusion, this study was set out to analyze TPACK level of EFL pre-service teachers related to their ICT use, who were final year students in 2021 and 2022 academic years in relation to gender, age, daily internet use, and reason for department choice variables. As a result of the study, it was found that TPACK level of the participants were high. This finding was similar with the studies that were conducted with the participants that had similar demographic characteristics. However, one thing that needs to be further focused on in teacher education programs is that making pre-service students gain a critical view towards the use of technology in education. In terms of the variables; gender, age, daily internet use, and reason for department choice were found to have an impact on the TPACK sub-constructs. In addition, relationships among particular TPACK sub-constructs were found. The implications of these relationships were discussed under their own sections. Hopefully, the findings of the study will support further research into technology use in language education and provide an additional source to teacher education programs and induction programs for the healthier design of EFL pre-service programs. Moreover, the findings of the study will also benefit policymakers in improving and further developing educational processes, which may positively impact educational system in English language teaching in Turkey in general.

Suggestions for Further Research

This quantitative study attempted to evaluate TPACK self-efficacy level of EFL pre-service teachers in relation to a variety of variables using survey research. Due to the nature of the study, it had some limitations. The instrument of the study was a self-assessment self-efficacy survey instrument, so the data collected was limited to the judgment of the participants on their own capabilities. Although there has been research that demonstrated the commonalities among the self-efficacy of the pre-service teachers and their behaviors, the limit still exists. In addition, the design of the study was quantitative as a result of this some of the findings about the variables of the study

couldn't be further elaborated with examples, which created few complications that would have benefitted from further elaboration. To go one step further from these limitations, future studies could follow a similar route to that of this study's with a qualitative or a mixed method approach to overcome the limitations of the study and provide more insight into the findings of it.

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APPENDIX-A: Research Instrument**Part 1**

- **Gender:** () Male () Female
- **Age:** () 20, () 21, () 22, () 23, () 24, () 25+
- **Grade Point Average (GPA):**
- **Daily Internet Use (In terms of hours):**
- **Perceived Level of Confidence Related to the Use of ICT (PLC-ICT) (Only choose 1 option):**

Not confident enough ()

Slightly Confident ()

Somewhat Confident ()

Fairly Confident ()

Completely Confident ()

- **How did you choose English Language Teaching Department (Only choose 1 option):**

() Compulsorily

() Coincidentally

() Willingly

Part 2

		5 = Strongly Agree	4 = Agree	3 = Neither Agree Nor Disagree	2 = Disagree	1 = Strongly Disagree
A) Technology Knowledge						
1	I know how to solve my own technical problems					
2	I can learn how to use technology easily					
3	I keep up with new technologies					
4	I frequently play around with technology					
5	I know how to use computer mediated communication (CMC) technologies (e.g. email, chat)					
6	I know how to use concordancers					
7	I know how to use off the shelf courseware (educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer)					
8	I know how to use multimedia (e.g. graphics, texts, audio, and video)					
9	I know how to use online learning environments (e.g. Moodle, Blackboard, and VLE)					
10	I know how to use online dictionaries					
11	I know how to use an interactive white board (IWB)					
12	I know how to use mobile technologies (e.g. tablet computing, smart phones)					
13	I know how to use authorware (customisable software that allows users to generate their own content by integrating different types of media such as graphic and text, e.g. hot potatoes)					
14	I know how to use web 2.0 technologies (e.g. blogs, social networks, and wikis)					
15	I know about basic computer hardware (i.e. CD-ROM, mother-board, RAM) and their functions					
16	I know how to save data into/from a digital device (i.e. flash disk, USB stick, CD)					
17	I know how to use generic office applications (i.e. Word, PowerPoint, and Excel)					
18	I know how to play audio and video files on my computer					
19	I know how to record audio files (i.e. using a Dictaphone)					
20	I know how to record video files (i.e. using a video camera)					
21	I know how to create images on my computer (i.e. using Windows Paint)					
22	I know how to edit images on my computer (i.e. using Photoshop)					

		5 = Strongly Agree	4 = Agree	3 = Neither Agree Nor Disagree	2 = Disagree	1 = Strongly Disagree
B) Pedagogy Knowledge						
23	I know how to maintain classroom management					
24	I can facilitate learning by creating a comfortable environment in which learners are willing to take risks					
25	I can react supportively to learners' interaction					
26	I can manage activities for individual, partner, group and whole class work					
27	I can create opportunities for individual, partner, group and whole class work					
28	I can adapt my teaching style to different learners					
29	I can adapt my teaching based upon what students do not understand					
30	I can use a wide range of teaching approaches in a classroom setting					
31	I can select teaching materials appropriate to the needs of learners					
32	I am familiar with common student understandings and misconceptions					
33	I can assess student learning in multiple ways					
34	I can keep students on task					
35	I can understand curriculum requirements					
36	I can recognize the organizational constraints and resource limitations existent at my school					
37	I can draw on relevant research findings to guide my teaching					
38	I can facilitate learning through creating opportunities for individual, partner, group and whole class work					
C) Content Knowledge						
39	I can explain the grammatical features of the English language					
40	I can describe the phonological features of the English language					
41	I am familiar with the differences between spoken and written English					
42	I can maintain the use of English in the classroom					
43	I can comprehend English texts accurately					
44	I can comprehend English speech accurately					
45	I can monitor my own writing for accuracy					
46	I can monitor my own speech for accuracy					
47	I am familiar with the culture(s) of target language communities					
D) Technological Content Knowledge						
48	I know about technologies that I can use to teach listening in English					
49	I know about technologies that I can use to teach speaking in English					
50	I know about technologies that I can use to teach reading in English					
51	I know about technologies that I can use to teach writing in English					
52	I know about technologies that I can use to teach English language grammar					

		5 = Strongly Agree	4 = Agree	3 = Neither Agree Nor Disagree	2 = Disagree	1 = Strongly Disagree
53	I know about technologies that I can use to teach English vocabulary					
54	I know about technologies that I can use to teach pronunciation of English words					
55	I know about technologies that I can use to teach spelling of English words					
56	I know about the technologies that I can use to teach about the differences between cultures					
E) Pedagogical Content Knowledge						
57	I can critically analyse my teaching in relation to theoretical principles					
58	I can give appropriate feedback on learner language					
59	I can provide target language input at an appropriate level of difficulty					
60	I can select authentic English language resources to suit student needs (e.g. news, magazines...)					
61	I can select activities which enhance the learners' intercultural awareness					
62	I can choose an appropriate approach to teach learners (i.e. communicative approach, direct method)					
63	I can plan when and how to use the target language, including meta-language I may need in the classroom					
64	I can identify linguistic problems experienced by learners (i.e. phonological, lexical or grammatical problems)					
65	I can design language courses around the requirements of the curriculum					
66	I am aware of the contextual factors that could inhibit/ promote English teaching					
67	I am aware of current research in the field of language teaching					
68	I am willing to experiment with different methods of language teaching					
F) Technological Pedagogical Knowledge						
69	I can evaluate the appropriateness of a technology for teaching a lesson					
70	I can choose technologies that enhance the teaching approaches for a lesson					
71	I can choose technologies that enhance students' learning for a lesson					
72	I am thinking critically about how to use technology in my classroom					
73	I can adapt the use of the technologies that I am learning about to different teaching activities					
74	I can design relevant learning experiences to promote student learning, using technology					
75	I can choose technologies to be used in assessment					

76	I can engage students in solving authentic problems using digital technologies and resources					
		5 = Strongly Agree	4 = Agree	3 = Neither Agree Nor Disagree	2 = Disagree	1 = Strongly Disagree
G) Technological Pedagogical and Content Knowledge						
77	I can teach lessons that appropriately combine English linguistic concepts, technologies, and teaching approaches					
78	I can select appropriate technologies that combine English culture, technologies, and teaching approaches					
79	I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn					
80	I can use technology effectively to communicate relevant information to students and peers					
81	I can use a range of technologies to help students pursue their individual curiosities					
82	I can use a range of technologies that enable students to become active participants					
83	I can provide equitable access to digital language learning tools and resources					
84	I can facilitate intercultural understanding by using technology to engage students with different cultures					
85	I can participate in digital learning communities to explore creative applications of technology to improve student learning					

APPENDIX-B: Ethics Committee Approval

Tarih: 14/01/2022
Sayı: E-35853172-300-00001977044
00001977044



T.C.
HACETTEPE ÜNİVERSİTESİ REKTÖRLÜĞÜ
Rektörlük

Sayı : E-35853172-300-00001977044
Konu : Emirhan ULUDAĞ (Etik Komisyon İzni)

14.01.2022

EĞİTİM BİLİMLERİ ENSTİTÜSÜ MÜDÜRLÜĞÜNE

İlgi : 24.12.2021 tarihli ve E-51944218-300-00001934124 sayılı yazı.

Enstitünüz Yabancı Diller Eğitimi Anabilim Dalı İngiliz Dili Eğitimi Yüksek lisans Programı öğrencilerinden Emirhan ULUDAĞ'ın Prof. Dr. İsmail Hakkı MİRİCİ danışmanlığında yürüttüğü "İngilizceyi Yabancı Dil Olarak Kullanan Öğretmen Adaylarının Teknolojik Pedagojik İçerik Bilgilerinin Değerlendirilmesi" başlıklı tez çalışması Üniversitemiz Senatosu Etik Komisyonunun 11 Ocak 2022 tarihinde yapmış olduğu toplantıda incelenmiş olup, etik açıdan uygun bulunmuştur.

Bilgilerinizi ve gereğini rica ederim.

Prof. Dr. Vural GÖKMEN
Rektör Yardımcısı

Bu belge güvenli elektronik imza ile imzalanmıştır.

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APPENDIX C: Declaration of Ethical Conduct

I hereby declare that...

- I have prepared this thesis in accordance with the thesis writing guidelines of the Graduate School of Educational Sciences of Hacettepe University;
- all information and documents in the thesis/dissertation have been obtained in accordance with academic regulations;
- all audio visual and written information and results have been presented in compliance with scientific and ethical standards;
- in case of using other people's work, related studies have been cited in accordance with scientific and ethical standards;
- all cited studies have been fully and decently referenced and included in the list of References;
- I did not do any distortion and/or manipulation on the data set,
- and **NO** part of this work was presented as a part of any other thesis study at this or any other university.

12 /09/2022

(Signature)
Emirhan Uludağ

APPENDIX-D: Thesis Originality Report

12/09/2022

HACETTEPE UNIVERSITY
Graduate School of Educational Sciences
To The Department of Foreign Languages Education

Thesis Title: EVALUATION OF EFL PRE-SERVICE TEACHERS' TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK)

The whole thesis that includes the *title page, introduction, main chapters, conclusions and bibliography section* is checked by using **Turnitin** plagiarism detection software take into the consideration requested filtering options. According to the originality report obtained data are as below.

Time Submitted	Page Count	Character Count	Date of Thesis Defence	Similarity Index	Submission ID
18/08/2022	96	163040	22/08/2022	%14	1883887315

Filtering options applied:

1. Bibliography excluded
2. Quotes included
3. Match size up to 5 words excluded

I declare that I have carefully read Hacettepe University Graduate School of Educational Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge.

I respectfully submit this for approval.

Name Last name: Emirhan Uludağ

Student No.: N20136535

Department: Department of Foreign Language Education

Program: English Language Teaching Program

Status: Masters Ph.D. Integrated Ph.D.

Signature

ADVISOR APPROVAL

APPROVED
(Prof. Dr. İsmail Hakkı Mirici, Signature)

APPENDIX-E: Yayınlama ve Fikrî Mülkiyet Hakları Beyanı

Enstitü tarafından onaylanan lisansüstü tezimin/raporumun tamamını veya herhangi bir kısmını, basılı (kâğıt) ve elektronik formatta arşivleme ve aşağıda verilen koşullarla kullanıma açma iznini Hacettepe Üniversitesine verdiğimi bildiririm. Bu izinle Üniversiteye verilen kullanım hakları dışındaki tüm fikri mülkiyet haklarım bende kalacak, tezimin tamamının ya da bir bölümünün gelecekteki çalışmalarda (makale, kitap, lisans ve patent vb.) kullanım hakları bana ait olacaktır.

Tezin kendi orijinal çalışmam olduğunu, başkalarının haklarını ihlal etmediğimi ve tezimin tek yetkili sahibi olduğumu beyan ve taahhüt ederim. Tezimde yer alan telif hakkı bulunan ve sahiplerinden yazılı izin alınarak kullanılması zorunlu metinlerin yazılı izin alınarak kullandığımı ve istenildiğinde suretlerini Üniversiteye teslim etmeyi taahhüt ederim.

Yükseköğretim Kurulu tarafından yayınlanan "**Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge**" kapsamında tezim aşağıda belirtilen koşullar haricince YÖK Ulusal Tez Merkezi / H.Ü. Kütüphaneleri Açık Erişim Sisteminde erişime açılır.

- o Enstitü/Fakülte yönetim kurulu kararı ile tezimin erişime açılması mezuniyet tarihinden itibaren 2 yıl ertelenmiştir. ⁽¹⁾
- o Enstitü/Fakülte yönetim kurulunun gerekçeli kararı ile tezimin erişime açılması mezuniyet tarihimden itibaren ... ay ertelenmiştir. ⁽²⁾
- o Tezimle ilgili gizlilik kararı verilmiştir. ⁽³⁾

12/09/2022

(imza)

Emirhan ULUDAĞ

"Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge"

- (1) Madde 6. 1. Lisansüstü teze ilgili patent başvurusu yapılması veya patent alma sürecinin devam etmesi durumunda, tez danışmanının önerisi ve enstitü anabilim dalının uygun görüşü üzerine enstitü veya fakülte yönetim kurulu iki yıl süre ile tezin erişime açılmasının ertelenmesine karar verebilir.
- (2) Madde 6.2. Yeni teknik, materyal ve metodların kullanıldığı, henüz makaleye dönüşmemiş veya patent gibi yöntemlerle korunmamış ve internetten paylaşılması durumunda 3. şahıslara veya kurumlara haksız kazanç; imkânı oluşturabilecek bilgi ve bulguları içeren tezler hakkında tez danışmanının önerisi ve enstitü anabilim dalının uygun görüşü üzerine enstitü veya fakülte yönetim kurulunun gerekçeli kararı ile altı ayı aşmamak üzere tezin erişime açılması engellenebilir.
- (3) Madde 7. 1. Ulusal çıkarları veya güvenliği ilgilendiren, emniyet, istihbarat, savunma ve güvenlik, sağlık vb. konulara ilişkin lisansüstü tezlerle ilgili gizlilik kararı, tezin yapıldığı kurum tarafından verilir*. Kurum ve kuruluşlarla yapılan işbirliği protokolü çerçevesinde hazırlanan lisansüstü tezlere ilişkin gizlilik kararı ise, ilgili kurum ve kuruluşun önerisi ile enstitü veya fakültenin uygun görüşü üzerine üniversite yönetim kurulu tarafından verilir. Gizlilik kararı verilen tezler Yükseköğretim Kuruluna bildirilir.
- Madde 7.2. Gizlilik kararı verilen tezler gizlilik süresince enstitü veya fakülte tarafından gizlilik kuralları çerçevesinde muhafaza edilir, gizlilik kararının kaldırılması halinde Tez Otomasyon Sistemine yüklenir

* Tez danışmanının önerisi ve enstitü anabilim dalının uygun görüşü üzerine enstitü veya fakülte yönetim kurulu tarafından karar verilir.