AN INVESTIGATION OF

PRE-SERVICE ENGLISH TEACHERS' DIGITAL NATIVITY,

TECHNOLOGY ACCEPTANCE, AND ATTITUDES

ABOUT TECHNOLOGY USE IN THE CLASSROOM

Yüksek Lisans Tezi

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Eskişehir 2021

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June 2021

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ÖZET

İNGİLİZCE ÖĞRETMENİ ADAYLARININ DİJİTAL YERLİLİK, TEKNOLOJİ KABULÜ VE SINIFTA TEKNOLOJİ KULLANIMINA İLİŞKİN TUTUMLARININ ARAŞTIRILMASI

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Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, 2021
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Bu çalışma, İngilizce öğretmen adaylarının dijital yerliliklerini, teknoloji kabullerini ve dil öğretimi ve öğrenme süreçlerinde teknoloji kullanımına karşı tutumlarını araştırmayı ve dijital yerlilik ile teknoloji kabulü arasındaki olası ilişkiyi incelemeyi amaçlamaktadır. Dijital yerlilik ve teknoloji kabulü Teo'nun (2013) Dijital Yerlilik Değerlendirme Ölçeği (DNAS) ve Teo'nun (2010) Hizmet Öncesi Öğretmenler için Teknoloji Kabul Önlemi (TAMPST) kullanılarak değerlendirilmiştir. Çalışmanın sonuçları, katılımcı öğretmen adaylarının çoğunun dijital yerli olduğunu ve teknolojiyi kabul ettikleri ile gelecekteki dil öğretmenleri olarak teknolojiyi meslek hayatlarına dahil etmeye istekli olduklarını keşfetmiştir. Pearson Korelasyon Katsayısı'nın hesaplanması, dijital yerlilik ve teknoloji kabulü arasındaki ilişkinin olumlu ve orta seviyede olduğunu göstermiştir. Öğretmen adaylarının tutumları yarı yapılandırılmış mülakatlarla incelenmiştir. Nitel verilerin analizi, öğretmen adaylarının teknolojiyi hem kişisel hem de eğitim amaçlı aktif kullandıklarını, dil öğrenme sürecinde teknoloji kullanımına başvurduklarını, ilginç içerik ile eğlenceli ve oyun benzeri öğrenme deneyimi gibi avantajlar nedeniyle de teknolojinin dil öğretimi ve öğreniminin bir parçası olması gerektiğini düşündüklerini göstermiştir. Bununla birlikte, öğretmen adayları teknolojinin dezavantajları olabileceğini ve kullanımının sınırsız olmaması gerektiğini düşünmektedir.

Anahtar Kelimeler: İngilizce öğretmenliği, Hizmet öncesi öğretmenler, Dijital yerlilik, Teknoloji kabulü, Dil eğitiminde teknoloji

ABSTRACT

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This study aimed at investigating prospective English teachers' digital nativity, technology acceptance, and attitudes towards technology use in the language teaching and learning processes as well as uniquely examining the possible relationship between digital nativity and technology acceptance. Digital nativity and technology acceptance were measured using Teo's (2013) Digital Nativity Assessment Scale (DNAS) and Teo's (2010) Technology Acceptance Measure for Pre-service Teachers (TAMPST). The results of the study showed that the majority of participating prospective teachers are digital natives, and that they are accepting of technology, indicating that prospective teachers are eager to incorporate technology in their professional lives as future language teachers. The calculation of Pearson's Correlation Coefficient showed that the relationship between digital nativity and technology acceptance is positive and moderate. Prospective teachers' attitudes were examined through semi-structured interviews. The analysis of qualitative data indicated that teacher candidates are active users of technology for both personal and educational purposes, that they used technology during their language learning process, and that prospective teachers think that technology should be a part of language teaching and learning because of its advantages, such as interesting content, and fun and game-like learning experience. However, prospective teachers also think that technology can have its disadvantages and that its use should not be unlimited.

Keywords: English language teaching, Pre-service teachers, Digital nativity, Technology acceptance, Technology in language education.

ACKNOWLEDGMENTS

25/05/2021

ETİK İLKE VE KURALLARA UYGUNLUK BEYANNAMESİ

Bu tezin bana ait, özgün bir çalışma olduğunu; çalışmamın hazırlık, veri toplama, analiz ve bilgilerin sunumu olmak üzere tüm aşamalarında bilimsel etik ilke ve kurallara uygun davrandığımı; bu çalışma kapsamında elde edilen tüm veri ve bilgiler için kaynak gösterdiğimi ve bu kaynaklara kaynakçada yer verdiğimi; bu çalışmanın Anadolu Üniversitesi tarafından kullanılan "bilimsel intihal tespit programı"yla tarandığını ve hiçbir şekilde "intihal içermediğini" beyan ederim. Herhangi bir zamanda, çalışmamla ilgili yaptığım bu beyana aykırı bir durumun saptanması durumunda, ortaya çıkacak tüm ahlaki ve hukuki sonuçları kabul ettiğimi bildiririm.

Hilal TUNÇKOL

25/05/2021

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES AND RULES

I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program" used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

Hilal TUNÇKOL

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ABBREVIATIONS

DNAS   : Digital Natives Assessment Scale

EFL   : English as a Foreign Language

ELT   : English Language Teaching

ICT   : Information and Communication Technologies

IWB   : Interactive White Board

L1   : Native Language

L2   : Second Language/Foreign Language

M   : Mean

S.D.   : Standard Deviation

TAMPST : Technology Acceptance Measure for Pre-service Teachers

CHAPTER 1

1. INTRODUCTION

This chapter reveals the background of the present study. The problem that inspired this study is also presented in this chapter. The research questions to be followed in order to conduct the study are written and the purpose as well as the significance of the study are explained. Finally, terms that will numerously be mentioned throughout this thesis that might lead to ambiguity or confusion in meaning are defined at the end of this chapter.

1.1. Background to the Study

Technology has become an inseparable part of everyday life and its rapid change is undeniable. In fact, it has evolved much more significantly in this century than it ever did before. At the very beginning of the 21st century, Ray Kurzweil (2001) correctly foresaw this rapid development as he stated, "We won't experience 100 years of progress in the 21st century — it will be more like 20,000 years of progress (at today's rate)." Kurzweil proceeded his prediction claiming that seeing the technological advancements, people will naturally expect even bigger improvements; and today, we have the chance to observe these bigger improvements all around the world as technology evolves and develops every single day and people do their best to reach up to its speed and keep pace with it.

Likewise, Turkish society is changing as Turkish people incorporate technology more into their everyday lives. Statistics clearly reveal that the Turkish society is becoming more prone to technology use by the year. A recent piece of Information Technologies research by TÜİK showed a visible change in the percentage of people who actively use the Internet and the rate of houses that have Internet connection (TÜİK, 2020). According to these statistics, 75,3 % of people between the ages of 14 and 74 used the Internet in 2019 and this rate increased to 79 % in 2020. The rate of houses with an Internet connection was 88,3 % in 2019, and this rate became 90,7 % in 2020. This report was published on August 25th, 2020, approximately five months after the first COVID-19 case in Turkey was officially announced and these findings could be due to the restrictions and lockdown. Nonetheless, whatever the reason might be, it was clearly shown that more Turkish people became active technology users in the past year.

The statistics provided above reveal the general state of the Turkish society regarding their technology use. However, the case of children is not different when it

comes to using the Internet and technological devices because today's children, above all else, are born in a world full of technology. Their entire lives are surrounded by technology and they use "computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001a). Hence, they start using these technologies and devices from a very early age. In 2013, data was collected specifically from children between the ages of 6 and 15 regarding the technological devices they owned and their Internet use, as well as why they use the Internet. The data pointed out that 24,4 % of children owned a personal computer and 13,1 % of them had a smart phone of their own. Moreover, even though the percentages differed based on the age group, almost half of all participating children admitted being active users of computers and the Internet. The children also reported using the Internet and computers for a number of different purposes, including using social media (53,5 %), searching for information (56,7 %), and playing games (79,5 %). Nevertheless, the data showed that the Turkish children used the Internet the most for educational purposes, since 84,8 % of all children indicated that they made use of computers and the Internet to do their homework and to learn new things (TÜİK, 2013). These statistics prove that Turkish children depend on technology for their educational needs and they prefer using technology when they need assistance with their schoolwork.

Being aware of the children's preferences and tendencies with their educational needs, the Turkish Ministry of Education has taken certain precautions in order to include technologies that provide access to information through telecommunications such as the Internet, wireless networks, cell phones, and other communication mediums (techterms.com, 2010) also known as Information and Communication Technologies or ICTs, yet their effectiveness has been a topic of discussion. Some attempts made by the Ministry of Education include providing the classrooms with overhead projectors and designing course books that come with a CD for foreign language education, sparing enough budget for schools to purchase computers and bringing Internet connection to school areas. The most recent attempt to incorporate technology into the Turkish educational system is the FATIH project. The FATIH project can be referred to as "the most extensive big budget educational project" (Ekici & Yılmaz, 2013). As a part of this project, Interactive White Boards (IWB), also known as smartboards, were placed in classrooms. Smart board is an interactive display in the format of a whiteboard that reacts to user input either directly or through other devices (Rouse & Haughn, 2017) In addition

to the smart boards, tablet PCs were distributed to both teachers and students. Even though they were welcomed into the classrooms with great excitement and expectations, the results could not match the initial thoughts. Recently, the former Minister of Education Nabi Avcı had to admit that technology skills of our teachers were inadequate to properly make use of the smart boards. He reported that the teachers had to get help from students to perform even the simplest tasks, which in return, resulted in wasting time during the lesson, authority and management problems, and even the overall abandonment of the smart boards (Sputniknews, 2019; Yeni Asya, 2019). A study conducted with high-school teachers about their thoughts related to the FATIH project, teachers' incompetence was mentioned, indicating that some teachers did not even know how to turn on and turn off a computer (Çiftçi, Taşkaya & Alemdar, 2013). Another study investigated the problems faced by the teachers as they tried to incorporate the smart boards and tablet PCs. The problems reported by the teachers included "anxiety of difficulty in classroom management", "teachers' lack of technical knowledge" and "limited understanding of how to use technology in teaching," (Pamuk, Çakır, Ergun, Yılmaz & Ayas, 2013). Kayaduman, Sırakaya and Seferoğlu (2011) highlighted that the FATIH project is not a particularly successful project and they listed many teacher-related reasons to this problem. The list included the negative attitudes the teachers had towards technology and computers in general, lack of information and technology education, lack of experience with computers and inadequate in-service training. These findings of the study emphasized the importance of regular use of technology. Teachers' beliefs and attitudes towards technology and the effect these beliefs and attitudes have on teachers' decision to use technology in their classrooms is also listed as a problem that hindered the success of the FATIH project (Kayaduman, Sırakaya & Seferoğlu, 2011).

In addition to on-going technology-related projects, distant education has become a necessity in the past year, not only in Turkey but in the entire world. The world has been battling with the COVID-19 outbreak for more than a year. In Turkey, the first positive case was confirmed March 11th, 2020. After the confirmation, it was announced on March 16th that the schools would close for a week (Milliyet.com.tr, 2020). However, the number of the active cases increased rapidly and the majority of governments worldwide including Turkey asked the students and the educational staff to stay home instead of going to school (Reimers & Schleicher, 2020); in order to slow down the spread of the disease and help assist health care professionals (Gianni & Lewis, 2020). Hence, the

2019-2020 academic year was completed through distant education. The 2020-2021 academic year also started with distant education. As the result of the decrease observed in the number of cases and patients, it was decided that the schools would gradually re-opened. Nevertheless, with the second wave of the pandemic, all schools were closed once again. Because of these events, millions of students were unable to go to schools and universities (Can, 2020). Throughout this pandemic, all educational processes were conducted via the Internet, with the help of modern technologies. The teachers and students used computers, tablet PCs, and smart phones to communicate and conduct lessons. The teachers were expected to use technological devices to interact with their students, they had to either digitalize their existing materials as well as they could or create online materials to use in their online classes. These drastic changes in education showed how teachers struggles with technology and this situation left teachers with the need and necessity to be supported and motivated, but they could not get enough support (Arık, 2020).

The existent literature tends to group people based on how accustomed they are to using technology and how comfortable they are using it. Some of these classifications are Net Generation (Tapscott, 1998), Millenials (Oblinger & Oblinger, 2005), and Generation Y (Weiler, 2005). These terms basically refer to the individuals who were born into a world full of technology, and therefore, are presumably able to use technology effectively and successfully. The most well-known classification, however, was made by Prensky (2001 a). He coined the term "digital native" and defined digital natives as "the native speakers of the digital language of computers, video games and the Internet". Prensky referred to the rest of the people as "digital immigrant" who, unlike digital natives, were not born into a world full of technology, and have to spend time and effort in order to learn how to use technology. He further claimed that the way digital natives think differs from the way digital immigrants think as their brains operate differently and that the cognitive differences of the digital natives cry out for new approaches to education with a better "fit". Recent studies also argue that the digital natives are indeed different in terms of how they search and obtain information, as well as how they learn:

> "reaching a series of new technologies, carrying out multiple tasks and processes simultaneously, using technologies without any difficulty, using the Internet as the primary source for accessing the necessary information, reaching the information quickly via more than one multimedia source, and using the Internet for learning as in other activities." (Teo, Kabakçı Yurdakul & Ursavaş, 2016).

The controversial nature of digital nativity and the need to decide whether people are digital natives made the emergence of certain measures necessary. Digital Natives Assessment Scale (DNAS) is a well-known self-report measure designed by Teo (2013) in order to determine digital nativity. DNAS was initially formed with the participation of 1018 secondary-school students and once it was proven to be reliable and valid; it was to measure digital nativity of different groups of people in a variety of contexts, such as pre-university students in Malaysia (Yong & Gates, 2014), secondary educators in the United States (Lewandowski, 2019), and pre-service teachers in Turkey (Teo, Kabakçı Yurdakul & Ursavaş, 2016; Şahin Kızıl, 2017; Kabakçı Yurdakul, 2018).

Predicting one's behavior has been a topic of investigation that interested many researchers for many years. The desire to predict behavior before it takes place has led to a number of theories such as Theory of Reasoned Action proposed by Fishbein and Ajzen (1975) and the Theory of Planned Behavior (Ajzen, 1991). Fishbein (1979) explains the theory of reasoned action as a sequence of beliefs, attitudes, intentions, and behavior and discusses that attitude toward the behavior is to be emphasized in predicting future actions. Personality traits and values are considered external to the theory. According to Ajzen theory of planned behavior, on the other hand, "attitude toward the behavior", "subjective norm" and "perceived behavioral control" come together to form "intention" which, later, leads to behavior itself.

Davis (1989), however, aimed to predict behavior related specifically to technology use. The theory he introduced for this purpose is called "Technology Acceptance Model" (TAM). Davis based TAM on two main indicators: perceived usefulness and perceived ease of use (1989). In other words, he claimed that the more a person believes a certain technology is useful and the easier he believes that technology to use, the more he tends to actually use it. These theories guided studies and they were widely reported to be effective in foreseeing technology acceptance among the active users of technology in non-educational settings (Teo, 2015). As technology became a bigger part of the educational settings, however, researchers began searching for ways to predict technology acceptance of students, teachers and teacher candidates. For instance, a scale (Technology Acceptance Measure for Pre-service Teachers or TAMPST) which aimed to predict the technology acceptance of specifically pre-service teachers was developed by Teo (2010a). The scale was constructed with the participation of 171 teacher candidates in Singapore. Proven to be a valid and reliable measure with the participation of 193

Malaysian prospective teachers (Teo, 2010b); when this scale was given to pre-service teachers in Thailand, it successfully predicted their technology acceptance level as "above-average" (Teo, Khlaisang, Thammetar, Ruangrit, Satiman & Sunphakitjumnong, 2014). In the Turkish context, adaptations of this scale were employed, and it was proved that the Technology Acceptance Model was efficient enough to predict Turkish teacher candidates' technology acceptance (Teo, Ursavaş & Bahçekapılı, 2011; Teo, Ursavaş & Bahçekapılı, 2012).

Perceptions, beliefs and attitudes hold an important place in the process of whether one chooses to use technology. It is clearly seen that Davis' TAM that aims to predict future technology use was initially based on perceptions. Likewise, attitudes are thought to have either direct or an indirect effect on technology use (Şahin-Kızıl, 2011). Başöz (2016) discusses that by investigating teacher candidates' attitudes towards technology use, it would be possible to understand the strengths and the weaknesses of technology-enhanced language teaching and learning processes; and such an understanding would serve as a guide in both assisting teachers to choose proper teaching tools and directing scholars to a fruitful area of research in need of further investigation.

Technology has been used in language classes aiming at an efficient language instruction since it is believed that the use of technology for teaching languages can make language learning fun, meaningful, and memorable. It can also help with learners' autonomy and raise their motivation (Ahmed, 2012). Research points out that it is possible to use technology to teach both language areas (grammar, vocabulary, and pronunciation) and language skills (speaking, listening, reading, and writing) (Amiri, 2000; Rahimi &Yadollahi, 2011). It was also proven that the use of technology can enhance foreign and second language instruction (Vandewaeterea & Desmet, 2009).

1.2. Statement of the Problem

"Digital nativity" is a controversial issue. The majority of today's teacher candidates are, according to some scholars, supposed to be digital natives. The father of the concept "digital nativity" Prensky, claimed that the individuals who were born after 1980 can be considered digital natives, which makes all today's teacher candidates digital natives; since a simple calculation shows that the majority of upcoming graduates of 2021 must have been born between 1998 and 2000. However, more recent studies (Bennett, Maton & Kervin, 2008; Helsper & Eynon, 2010) argued that digital nativity should be a

matter of ability and competence, not a matter of age. Because of these controversial opinions on the issue, the matter of "digital nativity" is in need of further research.

It is made clear previously that the times are changing, and so are people. Since they are not only exposed to but in fact born into this new and improved world, children and students are affected by these changes drastically. Today's students do not think the way their predecessors do; the way they think also shapes the way they process the information they obtain (Prensky, 2001b), and this causes the need to make radical changes in education. Yet, making changes would not mean anything unless teachers can effectively bring new ways of education to life.

In 2011, a study conducted by Johnson Controls investigated adult digital natives in workplaces. It was reported that most digital natives were satisfied with the current state of their work environment, even though the workplace was mostly traditional. Yet, it was revealed that the digital natives had certain needs such as "increased access to technology" and "cloud computing for idea sharing and collaboration" (Puybaraud, n.d.). Therefore, data showed that regardless of "digital nativity", people's technology-related needs and their expectations from their professional environment can vary. Similarly, Helsper and Enyon (2009) argued that while it is true that the younger people use technology more on a daily basis, this does not guarantee technology aptitude. It is suggested that aptitude with technology depends on factors like "breadth of technology use", "experience with technology", "self-efficacy", and "education" (Helsper & Enyon, 2009).

The conflict explained above shows that being a digital native does not guarantee unconditional technology acceptance, because "technology acceptance refers to the adoption and use of technologies in the way they were designed for" (Teo et al., 2014) and expectations, experiences, and environments among other factors might influence technology acceptance. As for prospective teachers, they are already considered to be digital natives and proving that they are digital natives will show how competent technology users they are and how comfortable they are around technology. Still, prospective teachers might not be as comfortable using technology when they are asked to do so for teaching activities in their classes since the classroom context presents a completely different environment. At this point, knowing about how accepting the pre-service teachers are of technology in a professional setting would be useful, as it would enlighten the teacher educators and education designers regarding where the future

teachers stand about using technology for teaching purposes. In addition, teacher perceptions and beliefs about technology and their attitudes towards it need to be investigated, since perceptions, beliefs and attitudes would help explaining both acceptance and the factors affecting it; considering the Technology Acceptance Model itself is based on such perceptions and beliefs. If this information can be obtained while teacher candidates are still in training, it would be possible for teacher trainers to know whether they are educating teachers who can meet the expectations of modern education, which calls for a more individual and flexible educational model with the integration of available technologies and needs of students.

This issue becomes even more significant in language teacher training. It is suggested that drastic changes have been observed in the area of language learning the most striking ones are "the advent of new technologies" and "tech-savvy learners" (Ko, 2017), and it has previously been proven by research that language teaching and learning processes can benefit immensely from proper and effective use of technology; whether the teacher uses technology in the classroom or he inspires the students to use technology on their own (Lai & Gu, 2011; Altun, 2015; Wigglesworth & Harvor, 2018). Moreover, technology inevitably affects language use by shaping how people use language in particular instances. For example, writing is an essential means of communication and traditionally, a pen and a paper is used to write. However, today, paper-based texts are replaced by computer-based texts and not only writers but also readers prefer online texts, reshaping the reading habits. As student experiences change, their expectations of education differ and they start expecting the inclusion of technology in every step of the language learning process, from language practice to assessment (Chun, Kern & Smith, 2016). In short, the current literature clearly proves the necessity and importance of training digitally competent language teachers.

1.3. Purpose of the Study

This study is designed to investigate pre-service English teachers' digital nativity and their technology acceptance. Current literature suggest that the prospective teachers are indeed supposed to be digital natives because of the technology era they were born into and because of the fact that they grew up surrounded by technology. This study aims to contribute to the literature by providing insight regarding digital nativity of Turkish English teacher candidates. This study also aims at investigating the technology

acceptance level of student teachers in order to make an educated guess about their intended use of technology once they start their career, because as it was stated earlier, the teacher candidates will be expected to use technology when they become teachers. This study uniquely investigates the possible relationship between digital nativity and technology acceptance, asking whether being a digital native affects the tendency to accept and use technology. Another purpose of this study is to discover future teachers 'attitudes towards using technology for learning and teaching a foreign language for a better understanding of their digital nativity and their level of technology acceptance.

1.4. Research Questions

1. Are the pre-service English teachers at Anadolu University digital natives?
2. What is the technology acceptance level of the pre-service English teachers at Anadolu University?
3. Is there a relationship between digital nativity and technology acceptance?
4. What are the attitudes of the pre-service English teachers at Anadolu University towards technology use in the language classroom?

1.5. Significance of Study

This study uniquely combines digital nativity and technology acceptance and uses valid and reliable measures to do so. Digital Nativity Assessment Scale (DNAS) aims to investigate whether the recipients of the scale (pre-service English teachers at Anadolu University) grew up with technology, whether they are comfortable with multitasking, whether they rely on graphics for communication and whether they thrive on instant gratifications and rewards. The analysis of these factors will show if the prospective English teachers are truly digital natives as they are assumed to be, giving their educators an idea about their needs as teacher trainees and their technological orientations as future teachers.

As effective a measure as DNAS might be, it was not designed to make predictions about future behavior. Technology Acceptance Measure for Pre-service Teachers (TAMPST), on the other hand, is meant to measure perceived usefulness, perceived ease of use, attitude toward computer use, facilitating conditions and subjective norm in order to predict technology acceptance level of prospective teachers. By qualitatively investigating teacher candidates' attitudes towards technology use, this study can help

understand the factors affecting technology acceptance and today's prospective English teachers in general. The outcomes of the study would also give teacher trainers and program designers an idea regarding who the teacher candidates really are, allowing them to evaluate the effectiveness of the current teacher training in preparing the English teachers for the expectations and challenges of their profession in the modern age.

CHAPTER 2

2. REVIEW OF LITERATURE

2.1. Introduction

This chapter investigates and summarizes the relevant literature as to how today's learners are different from the learners in the past, and how educational technologies changed and evolved to meet the expectations of modern-day learners. What technology is has been defined and its relationship with education has been explained. The changes that the educational technologies went through have been briefly summarized. Technology Assisted Language Learning (TALL) has been examined under two sub-categories; being Computer Assisted Language Learning (CALL), and Mobile Assisted Language Learning (MALL). A brief history of CALL has also been explained since it is much older than the latter. The definition as well as the benefits of Information and Communication Technologies (ICT) have been explored. Effective technology use has been highlighted with the help of the outcomes of recent experimental studies. These studies have been briefly revisited in summative tables. Next, the theories that inspired the formation of the scales that have been employed as data collection tools; namely The Theory of Reasoned Action (TRA), The Theory of Planned Behavior (TPB), and Technology Acceptance Model (TAM) have been described and briefly explained. Lastly, empirical studies that were conducted with the data collection tools of the present study have been examined. Studies that were conducted in both the Turkish context and the other contexts have been included. The empirical studies have been revisited in summative tables.

2.2. Theoretical background

2.2.1 Education and technology

Educational systems have been evolving educational systems kept evolving in order to keep up with the changes in the world and to meet the expectations of new and different learners; and education being as closely related as it is to the needs and the evolution of the society, it is not surprising to see that anything that affects the society has some sort of an influence on education, as well. Hence, when technology started

taking over the society and the people's lives, it was only a matter of time it also took over the educational system. In fact, it has been discussed that because of the "intimate integration" of ICTs in daily life, these technologies attract more attention than they ever did (Thorne & Smith, 2011).

The word "technology" comes from the Greek word "techne", which can be translated into English as art, craft or skill. It is also possible to define "techne" as the systematic use of knowledge. Today, however, technology means so much more than a skill or knowing how to use information, because just like everything technology-related, the definition of technology has also changed over the course of years. According to Read Bain's definition (1937), for example, "Technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them." (p.860). More recently, Internet entrepreneur Peter Thiel also defined technology in his book Zero to One: Notes on How to Build the Future (2014) and said that "Properly understood, any new and better way of doing things is technology." (p. 2)

2.2.1.1 *Changes in learners*

Human beings are naturally affected by the environment and the era they are born into. People's characteristics are affected by their surroundings (Baker, n.d.) and as a result, the way they learn is shaped. Expectedly, being born in a world that is full of technology and innovations, today's learners are different from the previous ones in terms of how they obtain and retain information, in that, they fall into what is often referred to as Generation Z (Scheninger & Murray, 2010). As Docherty (2018, p. 1030) states, Generation Z can be defined as: "Children born from the mid-1990s onwards who have grown up in a society where instant access to information is a given and have". Because of such differences, today's learners have been given a number of names by the scholars other than "Generation Z". One of the oldest names is "Millennials", given by Howe and Strauss (1991), developed and enriched by Oblinger (2003). Millennials are defined as "optimistic, team oriented, and high-achieving rule-followers" (Howe & Strauss, 2003). A few years later, Tapscott (1998) identified the learners in questions as "exceptionally curious, self-reliant, contrarian, smart, focused, able to adapt, high in self-esteem, and have a global orientation...there has been a change in the way children gather, accept and retain information.", and called them "The Net Generation". In his later book (2009)

Tapscott also claimed that the Internet was the ultimate interactive environment, and he highlighted the necessity of acquiring a more learner-centered approach to learning. One of the most well-known learner classifications was made by Marc Prensky in 2001 (2001a, 2001b). He suggested that the people who were born after the 1980s should be called "Digital Natives", and even claimed that the brains of Digital Natives were physically different from the rest. He also identified the rest as "Digital Immigrants", because unlike Digital Natives, they were not born into a world of technology, but they had to acquire the necessary skills to survive in the modern world later in life. Other less popular names given to the same group of leaners can be listed as the "IM Generation" – IM referring to Instant Message – (Lenhart, Rainie & Levis, 2001), the "Gamer Generation" (Carstens & Beck, 2005), which refers to video game playing habits of the new generation, and "Homo Zapiens" (Veen, 2003); as well as the i-Generation (Rosen, 2010).

No matter what we might call them, it is obvious that these learners are not what or who they used to be, and they keep changing. They are surrounded by a different world, and because of this reason they learn differently, understand differently, and expect differently. To be able to keep up with these rapid changes and evolvements, therefore, educational technologies are forced to grow, modify and offer variety.

2.2.1.2 *Changes in technology integration in education*

It is not possible to stop or get in the way of technological innovations and development. What can be done, however, is adopting and adapting new technologies as necessary and as appropriate not to fall behind. Due to this reason, over the past century, there have been a number of "key" technologies introduced (including digital technologies) into education (Howard & Mozejko, 2015). The use of learning devices such as desktop computers, notebook PCs, tablet PCs, and smartphones has gradually increased and online and offline education have now been integrated (Ko, 2017). Since technology integration has taken centuries so far, and it will not stop going further in the future either, Saettler (2004, p.4) discusses that "the historical function of educational technology is a process rather than a product". In addition to defining technology integration as a process, he also argues that "Educational technology, as a process, emerged out of the early technological tradition when a kind of knowledge began to be systematically applied to instruction", (p. 4) and says that the invention of the printing

press was an early and important innovation in terms of integrating technology into education. (Seattler, 2004). Howard and Mozejko (2015), on the other hand, begin their educational technology examination with later developments. According to their classification, educational technologies can be group under three main headings, namely:

- Pre-digital (1890s to 1970s),
- Digital Technologies (1970s), and
- Connected Digital Technologies (1990s)

The classification in question suggests that film, radio, and television belong into the pre-digital era, since the first introduction of films into educational settings dates back to the late 1890s, whereas radio was introduced in the 1920s. The introduction of television, however, took 30 more years and can be traced back to the 1950s. The integration of these technologies aroused a great deal of excitement in students', teachers', and administrators'; because they thought the newest additions to the educational environments would provide the educators and the students with innovative teaching and learning possibilities and opportunities (Cuban, 1986). Unfortunately, films, radio, and television were not as revolutionary as the authorities thought. They were not used as much as anticipated because of a number of reasons, being expensive prices of the new technological tools, lack of logistics, and teachers' lack of knowledge and confidence to efficiently use them (Cuban, 1986).

The failure the educational system experienced with films, radio, and television led to the second era, which Howard and Mozejko (2015) call "Digital technologies: Personal Computers". This era involves the 1970s and 1980s. When desktop computers became more affordable in these years, schools started purchasing them to establish computer labs for use of teachers and students. The public was yet again rather excited regarding the availability of computers in educational settings, and they were convinced that the educational revolution they had been waiting for could be achieved with the computers. The changes elicited by the computers were not as ground-breaking, because teachers were experiencing adaptation problems yet again. They felt like they should be making changes, but they were not sure how to make them (Cuban, 2001), the computers were still remarkably influential. The more the students used computers for their studies and succeeded at it, the more teachers and administrators came to realize that the students brought their previous learning experiences with them, increasing the interest in individualization in education.

The last era of Howard and Mozejko's classification (2015) is named "Connected Digital Technologies: The Internet". In the 1990s, the Internet connected the computers as well as people, offering brand-new opportunities for educators. Even when the Internet was static, people were able to access a variety of materials and resources, and the Internet became dynamic in the 2000s, enabling people to also create their own content. Web sites affected the form of information available, while e-mail, online chat, blogs, and forums influenced the way people communicate. Such rapid developments quickened the transition into what is called the "Information Age" (Voogt & Knezek, 2008).

2.2.1.3. *Technology integration in language teaching*

Language education was expectedly not resilient to the evolution of educational technology. Although it is possible to use the general term "TALL", referring to "Technology Assisted Language Learning" (Ko, 2017) to talk about the language teaching and learning process with the help of technology, TALL is often divided into two categories, being CALL and MALL, meaning "Computer Assisted Language Learning" and "Mobile Assisted Language Learning", respectively. Out of the two, CALL has a relatively longer history as among the different technologies, computers probably have the longest history of use as learning tools (Ko, 2017). The history of CALL can be traced back to the 1950s and 60s, when computers were expensively priced, and the computers used for language learning were only available at university campus research facilities. As a result, having access to a computer was rather problematic for language learners. However, computer integration into language learning was not named CALL in such early ages. The term "CALL" was coined in the 1980s, when having access to computers became relatively easier at university laboratories and commercial institutions (Beatty, 2010). Around that time, new technologies have also started to be utilized, the most well-known of which was videodiscs. The videodiscs attracted attention and became favorable because of their storage capacity and speed. CALL continued developing in the 1990s, and it faced many changes and challenges towards the beginning of the 21st century. For instance, web browsing and e-mailing became more popular and easier to use, and the CD-ROMs and DVD were replaced by USB drives. Consequently, CALL's presence in second and foreign language teaching increased (Hubbard, 2008). "Today, videoconferencing, email, chat rooms, online forums, social networking sites, massively multiplayer online games, collaborative writing and editing, and multimodal

production tools provide new kinds of social encounters, new kinds of communities, and new prospects for learning" (Kern, 2014, p. 340).

As the twenty-first century progressed, mobile technologies began to emerge, and CALL literature gradually turned its attention to mobile-assisted language learning (MALL) (Ko, 2017), it was observed that mobile phones -and smart phones- and tablet PC's can facilitate many task because they are smaller, portable and more practical and they also have internet access. (West & Vosloo, 2013), and it was not long before that educators realized language teaching and learning could be one of those tasks. Mobile applications (commonly referred to as apps) can be installed on these devices, and they offer a big number of options of educational resources and materials in many different educational areas, one of those areas being language teaching and learning (Rosell-Aguilar, 2018). MALL is a relatively newer concept compared to CALL, and hence, what we know regarding how effective it can be and the proper ways of incorporating it into the language teaching and learning process is still limited. With that being said, Godwin-Jones (2011) does suggest that MALL and mobile apps can effectively support learner autonomy and interest in learning a language. Rosell-Aguilar (2017) supports this idea and claims that apps can also provide regular practice for language learners who are no longer formally studying a language but wish to keep practicing it. These advancements led to more discoveries in the field of technology-integrated language instruction. Recent studies evidently exhibited the interest in using Web 2.0 tools (Çakır, Yükseltürk & Top, 2015) and social media such as Facebook (Tiryakioğlu & Erzurum, 2011; Başöz, 2016), and online language learning platforms (İstifçi, 2016).

2.2.2. Predicting behavior and technology acceptance

Allport (1968) discusses that attitude is "the most distinctive and indispensable concept". Being as complex and confusing as it is, attitude and making educated guesses about it has inspired scholars and researchers and many theories regarding attitudes, opinions, intentions and behavior and predicting these before they take place have emerged.

2.2.2.1. *The theory of reasoned action (TRA)*

The Theory of Reasoned Behavior or TRA was formed by Martin Fishbein and Icek Ajzen (1975). Fishbein (1967) states that the reason for developing TRA was to understand relationships between attitude, intention, and behavior.
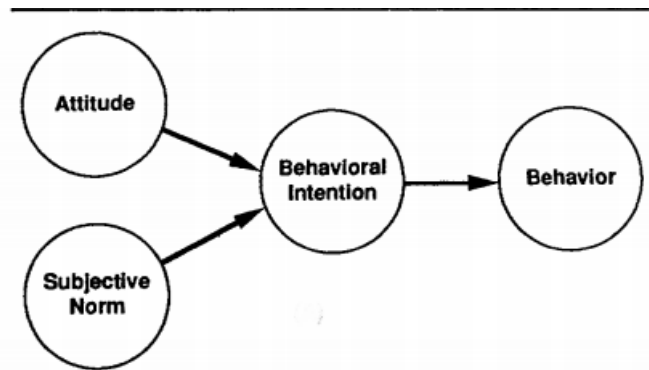
Figure 2.2.2.1.1. *The Theory of Reasoned Action*

In TRA, behavioral beliefs and evaluations of behavioral outcomes come together to shape attitude. At the same time, it is claimed that normative beliefs and motivation to comply are related to subjective norm. Hence, attitude and subjective norm are the main components that shape intention to perform certain behavior, which later, becomes behavior itself; showing that TRA assumes intention to perform behavior as the most direct determinant of behavior (Montano & Kasprzyk, 2008). Yet, years later, Ajzen (1991) claimed that TRA had limitations and it needed modification.

2.2.2.2. *The theory of planned behavior (TPB)*

The Theory of Reasoned Action lacked components that dealt with incomplete volitional control over behavior and making some changes in the original model was necessary. Therefore, The Theory of Planned Behavior (TPB) was developed by Ajzen (1991) and it "offers one of the most robust set of predictors of human behavior" (LaCaille, 2013).
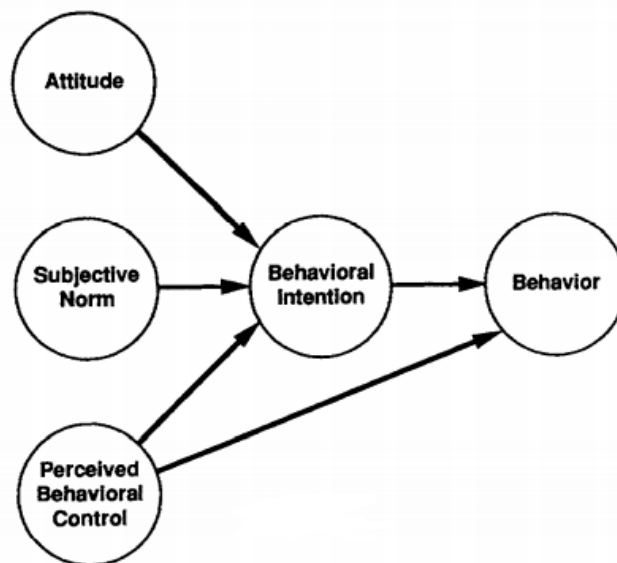
Figure 2.2.2.2.1. *The Theory of Planned Behavior*

TPB, like TRA, accepts attitude and subjective norm as indicators of behavioral intention, but it also takes into account control beliefs and perceived power (Montano & Kasprzyk, 2008). As a result, TPB argues that there are not two but three main determinants of intention to perform behavior: attitude, subjective norm, and perceived behavioral control (Madden, Ellen & Ajzen, 1992). External factors that theories cannot completely account for such as personality traits, demographic variables, attitudes towards targets and other individual differences that were excluded from TRA were also taken into consideration in the formation of TPB.

2.2.2.3. *Technology acceptance model (TAM)*

Technology Acceptance Model or TAM is a theory that was suggested by Fred Davis (1989) as an attempt to predict user acceptance of technology. TAM was developed out of the need to predict and explain technology use better and the very first version of TAM was based on two theoretical constructs. The first construct is the perceived usefulness. Davis (1989) argues that when people decide whether to use technology, a certain device or application, their consideration is whether it is going to help them perform their job better. The more useful people believe technology is, the more tendency they show to actively use it. The second factor that affects technology acceptance according to TAM is perceived ease of use.

Davis defines perceived ease of use as "to "the degree to which a person believes that using a particular system would be free of effort". In other words, it is claimed that as useful a system might be, if it is too hard to operate, the users deviate from using it.
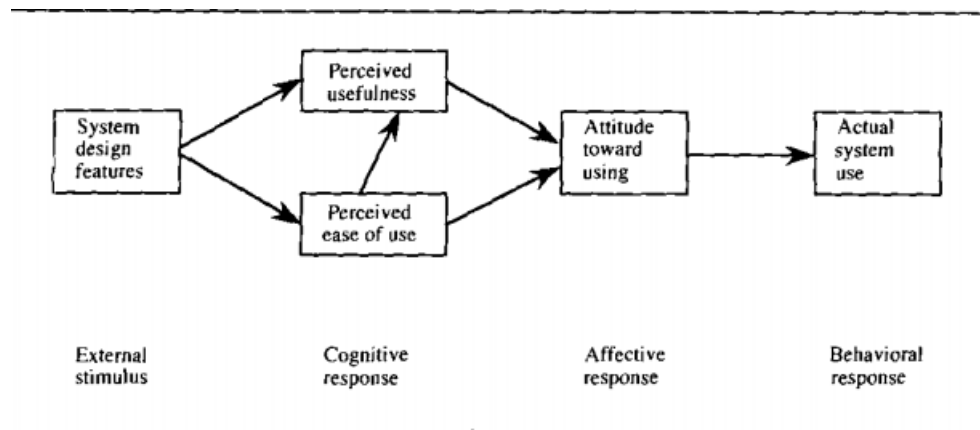
Figure 2.2.2.3.1. *Technology Acceptance Model*

In a 1993 paper, influenced by Fishbein and Ajzen's TRA, Davis suggests additions to TAM. In his paper, Davis named system design features as external stimulus, which leads to cognitive response. In TAM's case, cognitive response is the two theoretical constructs, perceived usefulness, and perceived ease of use. In this newer model, cognitive response causes affective response, and it is defined as attitude toward using the system. Finally, the affective response leads to behavioral response, which is the actual system use (Davis, 1993).

Technology Acceptance Model – combined with TRA and TPB - has inspired many studies and the development of numerous measures in different scientific fields, one of which being education. As technology became a bigger component of education, it became a need to assess attitudes, intentions and technology acceptance of the people who are involved in the educational systems.

1.3. Perceptions, Beliefs and Attitudes towards Technology Use

"Attitudes or concerns have a significant influence on the use of computers in the classroom" (Mollaei & Riasati, 2013, p.13). Scholars have shown an interest in perceptions, beliefs and attitudes when it was thought that future behavior could be

predicted before it takes place. Predicting future behavior regarding technology integration into classroom is also bound to the understanding of attitudes; since attitudes are considered to be the biggest predictor of future behavior regarding the integration of technology (Şahin-Kızıl, 2011). Hence, it is of utmost importance that researchers and teacher educators not only examine whether the prospective teachers are digitally native and accepting of technology; but discover more about what their perceptions, beliefs and attitudes are. Because, when it comes to using technology; digital nativity is still discussed whether it is a question of year of birth or environment and past experiences. Technology acceptance is obviously affected by perceptions and attitudes since both the Theory of Reasoned Action and the Theory of Planned Behavior consider attitude as a major concept in determining behavior. In addition, Technology Acceptance Model puts both perceptions and attitudes into use. By investigating perceptions, beliefs and attitudes it would be possible to clearly see the roots of digital nativity and technology acceptance matters and gather detailed information regarding the pre-service teachers' future intentions of using technology in their lessons.

1.3. Using Technology to Teach \ Learn Languages

Being one of the language areas, grammar was the main focus of learning and teaching languages for a very long time and due to this reason, earliest language teaching methods such as Grammar Translation Method, and Audio-Lingual Method (ALM) revolved around the importance of learning the grammar correctly in order to perform language skills better (Kong, 2011). Even though the entire language education does not revolve around grammar any longer, it still is a crucial component of language learning, and today, the ways of learning grammar also vary, thanks to ICT. Bodnar, Cucchiarini, Penning de Vries, Strik, and van Hout (2017), for instance, argue that oral grammar practiced paired with corrective feedback can make grammar learning more influential. In their study where they worked with 31 Dutch learners who had been living in Netherlands for a year on average, and who had been studying Dutch for an average of six months, they developed a CALL system called GREET, which allowed learners to practice grammar orally. At the end of the study, they observed that the CALL system, with the help of corrective feedback, increased learners' enjoyment and willingness to learn and use the language, and it helped learners produce more spoken utterances. Tseng (2017), on the other hand, designed a study where the main focus was one Taiwanese

English teacher, who was supposed to use an online tool named Cool English, as she taught grammar and vocabulary to her students through stimulated inter-personal interactions. The data collection that took place at the end of the semester revealed that the stimulated interactions led to input enhancement, and input enhancement led to an effective grammar – and vocabulary – learning by the students. Lastly, Ali (2018) designed a study in the Saudi Arabian context to examine the effect of using ICT on English grammar teaching, and to compare it to the traditional teacher driven instruction. 68 EFL learners were randomly assigned to pilot, experimental, and control groups and the pre-test results indicated that their grammar knowledge was not significantly different form one another's. Both groups studied the same subject – modal verbs -, but the CALL group used a software called Hot Potatoes to do that. When the grammar instruction was over, the groups were given two post-tests: one being immediate, and the other delayed. The comparison of the test results clearly showed that the CALL group outperformed the teacher driven instruction group significantly, indicating that the students both learned and retained the information better with the assistance of ICT and CALL.

Knowledge of vocabulary is crucial to language learning and use. Wilkins (1972) emphasizes this importance by saying "without grammar very little can be conveyed, without vocabulary nothing at all can be conveyed" (p. 111). The importance given to vocabulary can also be seen in empirical studies, in that, out of three language areas, vocabulary and how to effectively teach it with the assistance of ICT is the most studied topic in the last 5 years. (Chen, Chen & Yang, 2019; Chen, Liu & Huang, 2019; Katemba, 2019; Arndt & Woore, 2018; Montero Perez, Peters & Desmet, 2018; Li, Cummins & Deng, 2017; Dilenschneider, 2017). In one of those studies, Arndt and Woore (2018) investigate whether watching videos on YouTube or reading blogs in the target language has an influence on vocabulary learning. 79 EFL students between the ages of 14 and 25 with different native languages and at least 5 years of English learning experience participate in the study, where they were assigned to either video and blog groups and given pseudo-words words to study. After analyzing their data, the researchers came to the conclusion that both watching videos and reading blogs are suitable ways of providing input. The video group gained slightly more vocabulary, but the orthographic gains of the blog group were more than the video group's, since they saw the written forms of the words. The two different vocabulary learning techniques also had a medium-sized effect on meaning recognition and a small effect on grammatical function and meaning skills of

the learners. Either way, using the online tools in question (YouTube videos and blogs) proved useful for vocabulary learning. Chen, Liu & Huang (2019) designed and conducted a similar study in the Taiwanese context, where they examined the possible advantages of making use of game-based learning to learn English vocabulary. The app utilized for the purpose was called PHONE Words App. The study was mixed in design and data – log files, interviews, perception questionnaire - was collected from 20 sophomore students who were divided into two groups being the experimental group and the control group. The results of the study indicated that, even though the groups did not differ from one another in terms of how much they improved their vocabulary, the retention rate of the experimental group was significantly higher than that of control group. As for the students' perceptions of the app, and learning vocabulary by using it, they had noticeably positive attitudes toward the efficacy of the app. A different research design was presented by Katemba (2019). She conducted a study where she compared the efficiency of CALL and MALL on vocabulary learning. Out of 68 10th grade Indonesian students learning English, 33 students were in the CALL group, whereas the remaining 35 were assigned to the MALL group. The CALL group studied vocabulary with a software called "Tell Me More", while the MALL group students were sent SMS texts with the target vocabulary. Her study underlined that technology – whether it is computers and or? smart phones – is a valuable asset in language learning process, as both groups enhanced their vocabulary significantly, yet no remarkable difference was detected between the groups.

Pronunciation is the last language area, and it is rather a difficult competence for the learners to acquire because of its challenging nature and the lack of time devoted to pronunciation instruction during language lessons (Fouz-Gonzalez, 2017). Luckily, it was realized that technology can help speed up the process, as well as support pronunciation training outside the class, so that the lack of time is no longer a major problem. Technology integration into pronunciation training inspired a number of experimental studies in the recent years. Fouz – Gonzalez (2017) attempted to teach Spanish learners of English how to correctly pronounce English words that were particularly challenging for Spanish-speaking individuals. The learners were provided a 22-day pronunciation training via the Social Media app, Twitter. Data analysis indicated that, at the end of the online instruction, the learners did not only improve their English pronunciation, but also maintained the positive change. The study proved Twitter as a useful language learning

tool. Fouz- Gonzalez also showed that podcasts can be beneficial tools for improving pronunciation by improving how the learners perceive and produce sounds (2019).

As for language skills (reading, listening, writing, and speaking), receptive skills (reading and listening) have not been widely investigated in the recent years. The focus is mostly on the productive skills (writing and speaking) since those skills require the students to create and produce. Yet, in one of the few receptive skill studies, Hayati and Mohmedi (2011) investigated the effect subtitles on listening skills in a pre-test post-test design study in Iran. The study was conducted with 90 EFL students who were chosen based on their proficiency level. The chosen participants were divided into three groups and even though they all watched six episodes of a DVD, one group watched it with English subtitles whereas another group watched it with Persian subtitles and the last group had no subtitles. The results of the listening test that was given to the students after they watched all episodes showed that subtitles had a considerable effect on listening skills of the students; because Persian subtitles group performed better than the no subtitle group and the English subtitle group outperformed all two groups. A similar study in the same Iranian context was conducted by Rokni and Ataee (2014). 45 intermediate EFL learners were separated into two groups and were shown an English movie. One group watched the movie with English subtitles while the other group has no subtitles. The study once again proved the significant impact of English subtitles on listening competency. In addition to the improvement in listening skills; Yüksel and Tanrıverdi (2009) proved that watching English movie clips with English subtitles to accompany them also had a noticeable impact on vocabulary development.

Wang and Smith (2013) focused on the use of technology and reading skills. In their study that they conducted with Japanese EFL learners, they asked 10 advanced students to write essays in a variety of topics and the texts written by the advanced students were sent to the participants to be read through mobile phones. The study revealed that the students had positive experiences with reading texts from their mobile phones; indicated that the process was appropriately monitored yet it provided them with space and privacy, and they felt secure. Moreover, the study did not only improve the students' reading skills; their grammar knowledge was also tested and improvements in the grammar knowledge was observed. Ko (2017) also proved that students chose to use technology for reading. Almost half of 167 Korean EFL students reported preferring mobile phones for reading since the phones are portable and faster. The other half chose

computers over mobile phones; saying computer are easier to use and they have a bigger screen. In a different study, Yeh, Hung and Chiang (2016) discovered that using online annotations in a collaborative learning environment significantly improved reading comprehension of Taiwanese EFL learners.

In a piece of research, Chen (2016) used VIRTATLANTIS to improve the learners' oral skills. VIRTATLANTIS is a Multi-user Virtual Environment (MUVE) where the users have avatars, and they perform real life-like activities. Apart from some technical issues related to effective use of different devices, the learners found the multilingual and multicultural environment to be beneficial and they reported that the overall experience was fun and rewarding. In addition to virtual environments, online games could also be incorporated into the language teaching and learning process. Reinders and Wattana (2014) showed that Thai students became better English speakers after using an online game called Ragnarok to interact in the target language (English). They indicated that spoken interaction during game play made them more confident and less anxious users of the English language.

In a study conducted by Yu (2018), Taiwanese learners of English were asked to use the Facebook page created for the study to share their writings and receive feedback and comments. This way, they aimed to establish a healthy student – student and student – teacher interaction. At the end of the 18-week semester, the students reported an improvement not only in their writing but their critical thinking skills. They also said that the using Facebook as a part of their writing process helped them become more autonomous and motivated language learners.

The competence to perform productive skills and the way to make this performance better have also been investigated in the Turkish context. Balbay and Kilis (2017) designed a YouTube channel for an Academic Speaking course at Middle East Technical University. It was seen that even though the use of YouTube is not very popular in the educational settings, the students were already familiar with the website and they were comfortable using it. They reacted positively to the use of YouTube saying it was relaxing and enjoyable. YouTube also allowed students to have efficient discussions online and study outside the classroom. Özkul and Ortaçtepe (2017) gave online video feedback through YouTube to the students in an English preparatory class of a private university in Istanbul. The feedback videos addressed both structural and organizational problems. Video feedback let the students make more corrections in their written pieces. The

students also developed a positive attitude toward receiving feedback through video. Ayan and Seferoğlu (2017) designed online courses using the online tool "Moodle". The first-year English learners participated in online courses and during these courses they were able to learn from their peers by chatting with them online and examine correctly constructed English sentences as examples to improve their writing skills.

Table 2.4.1. *Summative table of experimental studies regarding using ICTs to teach*

\ learn languages

Author(s) & Year	Main purpose	Context	Main findings
Bodnar, S., Cucchiarini, C., Penning de Vries, B., Strik, H. & van Hout. (2017)	To investigate learners' affective states as they practice grammar with computers.	31 Dutch L2 learners who lived in Netherlands for a year on average and who have been learning Dutch for at least 6 months.	Learners enjoyed the process, and they were more willing and attentive. Students produced more utterances when they received corrective feedback.
Tseng, J.J. (2017)	To investigate how an L2 teacher enhance the lesson with technology and how the students would react to it.	One Taiwanese English teacher with 4 years of experience and her 24 students aged 13-14.	Both grammar and vocabulary development were observed. Input enhancement took place and learning became easier.
Ali, M.A. (2018)	To compare the effectiveness of Computer Assisted Language Learning (CALL) and Teacher-Driven Instruction (TDI) in grammar instruction.	68 EFL (8 students for pilot study, 30 students in CALL group, 30 in TDI group) students in Saudi Arabian context.	The groups had similar scores in the pre-test. CALL group significantly outperformed the TDI group in both immediate and delayed post-test.
Arndt, H.L., Woore, R. (2018)	To compare different online media types to see if they have ab effect on vocabulary learning.	79 EFL learners ages between 14 and 25 with different L1s and with at least 5 years of experience.	Watching videos and reading blog posts in the target language both proved to be effective vocabulary learning techniques.
Chen, C.M., Liu, H., Huang, H.B. (2019)	To investigate the effectiveness of a novel English vocabulary learning app (PHONE Words App).	20 sophomore students in Taiwanese context. Students were assigned to two group (game functions and no game functions) randomly.	No significant different was detected between the groups in terms of vocabulary learning. Experimental group outperformed the control group in terms of retention and they developed more positive attitudes.
Katemba, C.V. (2019)	To compare the effectiveness of CALL and MALL for vocabulary learning.	68 10th grade students (33 students in the CALL group, 35 students in the MALL group) ages between 15-17 in Indonesia.	No significant difference was detected between groups. MALL group could text the teacher and they received extra attention.
Fouz-Gonzalez, J. (2017).	To investigate the effect of a Twitter-based approach to improve EFL learners' pronunciation.	121 Spanish-speaking EFL learners (43 students in control group, 78 students in experimental group) at B1 level according to CEFR.	The instruction had a positive influence on learners' pronunciation of 75 words with difficult pronunciations. The improvement was in line with participant engagement.
Fouz-Gonzalez, J. (2019)	To investigate the effect of a podcast-based approach to improve EFL learners' pronunciation.	47 Spanish-speaking EFL learners at B2 level assigned into control and experimental groups randomly.	Training had a positive impact on participants' perception and production of target sounds. No significant difference was detected between groups.

Table 2.4.1. (Continued) *Summative table of experimental studies regarding using ICTs to teach*

\ *learn language*

Author(s) & Year	Main purpose	Context	Main findings
Hayati, A., Mohmedi, F. (2011)	To investigate the effect of subtitles in the native and target language on listening skills.	90 Iranian EFL students were chosen after a proficiency test and were divided into three groups: the "English subtitle" group, the "Persian subtitle" group and the "no subtitle" group.	Watching films with subtitles in Persian is more effective than watching without subtitles. Watching films with English subtitles is the most effective option to improve listening skills.
Rokni, S.J.A., Ataee, A.J. (2014).	To investigate the effect of subtitles in the target language on listening skills.	45 Iranian intermediate level English learners were divided into two groups: the "English subtitle" group and the "no subtitle" group.	The "English subtitle" group significantly outperformed the "no subtitle" group on the listening post-test.
Yükseş, D., Tanrıverdi, B. (2009)	To investigate the effects of watching captioned films on EFL learners' vocabulary.	120 college students studying at preparatory class were divided into two groups: "movie clips with captions" and "movie clips without captions".	Post-test results indicated that the "movie clips with captions" group significantly outperformed the other group but both groups improved their vocabulary knowledge.
Wang, S., Smith, S. (2013)	To investigate the effect of using mobile phones for improving reading skills and grammar learning.	10 advanced EFL learners wrote essays and the essays were sent to 208 participants via e-mail.	Reading through phones gave the students space, privacy and a sense of security and it improved their grammar knowledge.
Ko, M.H. (2017)	To compare the efficiency of different digital devices in reading in English.	167 Korean attended online reading courses and practiced reading online.	Half of the participants preferred using computers because they are easier to use and have bigger screen. The other half favored smartphones since they are faster and portable.
Yeh, H.C., Hung, H.T., Chiang, Y.H. (2016)	To examine students' improvement in reading comprehension when they use online annotations.	54 Taiwanese EFL learners at a university.	A significant improvement was observed in the students' reading comprehension. Even the students who made little progress were significantly better than they were before the experiment.
Chen, J.C.C. (2016)	To investigate if "Second Life" can be used as a language teaching tool.	9 adult EFL learners were given tasks to perform in a Second Life app called VIRTATLANTIS.	The participants reacted positively to the use of SL. They found it fun, rewarding and easier since they performed real life-like tasks.
Reinders, H., Wattana, S. (2014)	To investigate if playing online games affect learners' willingness to communicate in English.	30 Thai EFL learners with different proficiency levels, studying at a university.	Students were more confident and less anxious. They interacted in English more because they were more willing in the online game environment.

Table 2.4.1. (Continued) *Summative table of experimental studies regarding using ICTs to teach \ learn languages*

Author(s) & Year	Main purpose	Context	Main findings
Yu, L.T. (2018)	To investigate the effect of using Facebook to assist writing in the target language process.	16 Taiwanese university students used a Facebook page for their 18-week long writing course.	The students enjoyed collaborative work and they reported becoming more autonomous and motivated. They developed critical thinking skills.
Balbay, S., Kilis, S. (2017)	To assess the students' perceptions about using a YouTube channel to for academic speaking course.	70 students taking an academic speaking course at Middle East Technical University.	The students were familiar with YouTube and it gave them a chance to practice outside the class. YouTube added to the variety of course materials.
Özkul, S., Ortaçtepe, D. (2017)	To investigate the impact of video feedback on EFL learners' writing skills.	47 participants at an English preparatory class of a private university who were assigned in control and experimental groups.	Experimental group who received video feedback did significantly better in the majority of assignments. They made more corrections and developed a positive attitude towards video feedback.
Ayan, E., Seferoğlu, S.S. (2017)	To investigate the effectiveness of EtherPad in collaborative writing.	45 Turkish first-year EFL learners at a vocational school.	The students mostly used Turkish to chat but they tried to learn unknown vocabulary and make corrections to improve their writing. They learned from one another.

As it can clearly be seen from the examples above, integrating technology into the language classroom became more and more important in the recent years and it was proven to be useful and effective provided that it is used correctly. Therefore, this study discusses that being a digital native can help teachers use technology better. In addition, it is claimed in the literature that the more accepting they are of technology, the more likely they will be to use technology (Teo 2010a, 2010b).

2.5. Digital Natives Assessment Scale (DNAS)

The Digital Natives Assessment Scale (DNAS) was developed by Teo (2013). It is a self-report measure that aims to address the gap in literature regarding the complexity of deciding who can be considered a "digital native". The initial development and validation of DNAS was performed with the participation of 1018 secondary-school students and at the end of this process, the 21-item 7-point Likert scale DNAS was formed. Ever since, it was employed in many empirical studies in different contexts. Yong

and Gates (2014), for instance, used DNAS to show that pre-university students in Malaysia are digital natives with the study they conducted with 135 both local and international students. Doğusoy and İmer (2019) worked with 769 secondary school students from 3 different schools, all located in Mersin. They showed that the students had access to technologies and digital tools and that they can be considered digital natives. The study also indicated that gender did not affect digital nativity, whereas experience with technology and class level were significantly related to whether students were digital natives. Hang, Teo, and He (2019) tested DNAS in Chinese context with 502 university teachers. The study showed that DNAS was a reliable measure that can be employed in the Chinese context. Another finding of the study was that even though some teachers were old enough to be called "digital immigrants", the university teachers positively responded to almost all DNAS items. The study indicated that being a digital native might not necessarily be about the year of birth. A different study was designed to determine whether digital nativity was linked to computer self-efficacy (Lewandowski, 2019). The study conducted with 88 secondary educators indicated that when the participants regarded themselves as digital natives, they also reported to be highly efficient computer users.

The validity of DNAS in the Turkish context was tested with 557 pre-service teachers studying at a public university in the Middle West of Turkey (Teo, Kabakçı Yurdakul & Ursavaş, 2016). The study showed both that DNAS is a valid measure in the Turkish context, and that Turkish pre-service teachers regarded themselves as digital natives. Şahin Kızıl (2017) investigated the digital nativity of 1163 EFL students studying at the School of Foreign Languages in Fırat University and it was seen that the participants were moderately digital natives. Kabakçı Yurdakul (2018) adopted the DNAS once again to investigate digital nativity of 1493 Turkish pre-service teaches from different institutions to prove again that Turkish pre-service teachers are self-reported high-level digital natives.

Table 2.5.1. *Summative table of DNAS studies*

Author(s) & Year	Main purpose	Context	Main findings
Teo, T. (2013)	To develop and test for validation a scale to determine whether individuals can be referred to as "digital native" (DNAS).	1018 secondary-school students were given the 21-item 7-point Likert DNAS to validate the scale.	DNAS is valid and reliable measure for self-reporting digital nativity.
Yong, S.T. &Gates, P. (2014)	To investigate whether pre-university students can be classified as digital natives.	135 local and international students in Malaysia were given DNAS.	Although there are slight gender differences, the pre-university students see themselves as digital natives.
Doğusoy, B. &İmer, G (2019)	To investigate digital nativity of secondary school students.	769 students from 3 different schools in Mersin answered DNAS.	The students have access to technology, and they can be classified as digital natives.
Huang, F., Teo, T., He, J. (2019)	To measure the validity and reliability of DNAS in the Chinese contest and to assess digital nativity of Chinese university teachers.	502 university teachers working at 11 universities.	Some teachers are too old to be considered digital natives, but they all agreed with DNAS items on high levels.
Lewandowski, N.M. (2019)	To investigate the possible relationship between digital nativity and computer self-efficacy.	88 secondary educators took both DNAS and a computer self-efficacy questionnaire.	The participants regard themselves to be digital natives and highly efficient computer users.
Teo, T., Kabakçı Yurdakul, I & Ursavaş, Ö.F (2016)	To investigate digital nativity of pre-service teachers and to investigate the validity of DNAS in the Turkish context.	557 pre-service teachers studying at a public university in Middle East of Turkey were sent DNAS.	DNAS is a valid measure that can be employed in the Turkish context and the participating pre-service teachers are digital natives.
Şahin Kızıl, A. (2017)	To investigate digital nativity of EFL students.	1163 EFL students at School of Foreign Languages in Fırat University were given DNAS.	The EFL students reported themselves to be moderately digitally native.
Kabakçı Yurdakul, I. (2018)	To investigate digital nativity of pre-service teachers.	1493 Turkish pre-service teachers from different institutions answered DNAS.	It was proven once again that Turkish teacher candidates are high-level digital natives.

As stated above, a few researchers preferred to focus on digital nativity of EFL teacher candidates in Turkey. Although these studies yielded promising results, showing that Turkish EFL prospective teachers considered themselves to be highly digitally native, more studies are needed in this area to have a more comprehensible understanding of teacher candidates' digital nativity and to draw more generalizable conclusions.

2.6. Technology Acceptance Measure for Pre-service Teachers (TAMPST)

Technology Acceptance Measure for Pre-service Teachers (TAMPST) is a scale created by Teo (2010a) in order to help determine how accepting of technology the teachers of the future are. The measure was developed after three studies and a total of 759 pre-service teachers who provided data for those studies. The studies were conducted in Singapore and the 16-item 7-point Likert scale TAMPST was formed. Once the initial development and validation of TAMPST were completed, it was tested for cross-cultural validation (Teo, 2010b). This study proved that TAMPST is a reliable and valid measure available to be used in contexts other than it was developed in. For instance, the same measure showed that the pre-service teachers were highly accepting of technology when it was applied to 969 teacher candidates from five different universities in Thailand (Teo, et.al., 2014).

Technology Acceptance Measure for Pre-service Teachers was also tested in the Turkish context in order to see whether TAMPST is a valid measure to explain technology acceptance and the intention to use technology of Turkish pre-service teachers. For this purpose, TAMPST was given to 197 prospective primary education teachers studying at Rize University (Teo, Ursavaş & Bahçekapılı, 2011). When the data was analyzed, it was argued that TAMPST is a well-tested model which yield valid results in the Turkish context. It was also discovered that the participating teacher candidates were moderately accepting of technology. In another piece of research designed with TAMPST in Turkey was conducted with a larger sample. The researchers worked with 487 pre-service teachers "to examine the pre-service teachers' self-reported future behavioral intentions to computer use" (Teo, Ursavaş & Bahçekapılı, 2012). They were all studying teacher training at Rize University. The study found that the effect of perceived usefulness, attitudes toward computer use and computer self-efficacy was significant and direct. It was also seen that perceived ease of use, technological complexity and facilitating conditions affected technology acceptance indirectly. Finally, the results yielded by the study indicated that the strongest determinant of intention to use technology was perceived usefulness.

Table 2.6.1. *Summative table of TAMPST studies*

Author(s) & Year	Main purpose	Context	Main findings
Teo, T. (2010a)	To develop a measure to help determine how accepting the pre-service teachers are of technology.	759 pre-service teachers provided data for the 16-item 7-point Likert TAMPST	TAMPST as a measure to investigate technology acceptance of pre-service teachers was developed.
Teo, T. (2010b)	To validate TAMPST as a reliable data collection tool.	135 local and international students in Malaysia were given DNAS.	Although there are slight gender differences, the pre-university students see themselves as digital natives.
Teo, T., Khlaisang, J., Thammetar, T., Ruamgrit, N., Satiman, A., Sunphakitjum nong, K. (2014)	To investigate the technology acceptance levels of pre-service teachers.	969 teacher candidates from five different universities in Thailand participated.	The Taiwanese teacher candidates are highly accepting of technology.
Teo, T., Ursavaş, Ö.F. & Bahçekapılı, E (2011)	To investigate the validity and reliability of TAMPST in the Turkish context.	197 prospective primary school teachers at Rize University.	TAMPST is a well-constructed and well-tested measure that yields valid results in the Turkish context.
Teo, T., Ursavaş, Ö.F. & Bahçekapılı, E. (2012)	To investigate the self-reported future behavioral intentions to computer use of teacher candidates.	487 prospective teachers at Rize University were given the TAMPST.	Technology acceptance is affected by numerous factors. The most direct effect on intention is made by perceived usefulness.

2.7. Attitudes towards Technology Integration

Perceptions and attitudes regarding technology use in education has been one of the most demanded areas of research among scholars in the last decade. Studies in many different contexts have been conducted. İstifçi (2016) focused on EFL learners' perceptions about online language learning platforms. 167 EFL students studying at Anadolu University School of Foreign Languages participated in the study. The majority of participants admitted preferring a "blended" course format that combines face-to-face instruction with online learning. Some students reported enjoying online learning because it made learning easier, it was entertaining and effective and they found it beneficial. Some other participants, however, had more negative thoughts, claiming online courses were boring, tiring, not fair and not necessary. They also admitted facing certain technical problems such as punctuation issues.

Attitudes towards technology integration is a valuable area research in order to examine future teachers' intentions to integrate technology into their classes. Cullen and Greene (2011) argued that attitudes towards technology use was the best predictor of motivation to use technology. Thomas and O'Bannon (2013), for instance, investigated pre-service teachers' perceptions about cell phone usage in the classroom. It was revealed that the teacher candidates thought that cell phones could serve many purposes, such as calculating, voice recording, video recording and texting. The prospective teachers thought that using cell phones in educational contexts was beneficial because they increased student engagement, student motivation, and communication. As for main disadvantages of using cell phones in the class, "class disruption" and "cheating" were listed. It was seen that most teacher candidates were unsure whether cell phones should be used in the classroom. Spaulding (2013) compared the perceptions of both pre-service and in-service teachers regarding technology integration. As the result of this comparison, it was discovered that the pre-service teachers who had no teaching experience up to date were more positive about using technology while teaching and they felt more ready to integrate technology in their classes then the in-service teachers. A similar finding that the pre-service teachers had more positive attitudes towards technology use than their future colleagues was obtained by Çakır, Yükseltürk and Top (2015). Their investigation into the perceptions of ICT teachers of using Web 2.0 technologies in class showed that even though the in-service teachers believed in the benefit of using technology, they did not use technology as frequently as the pre-service teachers. Moreover, pre-service teachers had significantly more positive attitudes towards the matter. Similar findings were obtained by Aydın (2013). He proved that although the EFL teachers had limited knowledge about technology and they lacked experience and support, they had positive attitudes towards the integration of computers into the language classroom.

Perceptions and attitudes of pre-service teachers who were studying at the EFL department were also investigated in the Turkish context and the many studies indicated that Turkish EFL teacher candidates have overall positive attitudes towards using technology and computers (Sarıçoban, 2013; Harmandaoğlu Baz, 2016). Şahin-Kızıl (2011) worked with 76 prospective EFL teachers to learn more about their ICT use and attitudes towards ICT use. It was seen that although the teacher candidates did not use as much technology as expected, almost all of them had positive attitudes towards using technology in the classroom. A study by Korkut (2016) also established that pre-service

English teachers had more positive than negative attitudes toward technology integration and concluded that teacher candidates believed technology to be both practically and pedagogically related to language education. Likewise, Yüksel and Kavanoz (2011) showed that prospective teachers are more likely to develop positive attitudes when technology is available and accessible for them as much as possible.

It was discussed that the pre-service teachers were open to further education regarding how to use technology in educational settings and they could become more competent and frequent users of technology with proper instruction. Similarly, Hismanoğlu (2012) proved that the main reason the pre-service teachers had negative attitudes toward technology was the inadequate training as to what ICTs are and how to use them. Hence, the students reported feeling incompetent technology users. Hismanoğlu argued that this problem could simply be solved with proper technology training. Başöz (2016) preferred to focus on language instruction using social media. 120 EFL teacher candidates participated in the study and they self-reported believing in the efficiency of using social media in developing vocabulary knowledge. In addition, they admitted that social media provided language learners with a more relaxed learning environment and that it could help with developing language skills. It was stated that thanks to the use of social media, language learning became less stressful, more accessible and more authentic.

It cannot be denied that pre-service teachers form most of their technology integration related opinions and develop their beliefs and attitudes during their teacher training. Hence, the training they receive and the courses they take affect their attitudes and inconsistencies between their training and real-life experiences can lead to negative attitudes (Merç, 2015). Therefore, it is of utmost importance that a stronger relationship between technology integration training in teacher training programs and technology integration practices at schools is established by offering teachers more course options related to successful technology integration and allowing them to have hands-on experiences with technology as much as possible (Hismanoğlu & Hismanoğlu, 2011; Merç, 2015).

Table 2.7.1. *Summative table of perceptions and attitudes towards technology use studies.*

Author(s) & Year	Main purpose	Context	Main findings
İstifçi, İ. (2017)	To investigate perceptions of prospective EFL teachers toward online language learning programs and blended learning.	167 EFL student studying English at Anadolu University, the School of Foreign Languages answered a questionnaire and 10 of them were interviewed.	Students are mostly positive about using online platform because of the freedom such platforms provide, but they prefer having a face-to-face interaction with their teachers and classmates.
Cullen, T.A., Greene, B.A. (2011)	To investigate pre-service teachers' attitudes and motivation regarding technology integration.	114 pre-service teachers were given a questionnaire. 67 of them also completed a pre-post activity and a reflective task.	Attitudes is the strongest predictor of technology integration intentions. When pre-service teachers have negative attitudes, they are not motivated to integrate technology.
Thomas, K., O'Bannon B. (2013)	To investigate the perceptions of pre-service teachers about using cell phones in the classroom.	92 pre-service teachers at a Midwestern university.	Pre-service teachers believe in the usefulness of cell phones' different features. They believe that cell phones increase learning opportunities and student engagement.
Spaulding, M. (2013)	To compare perceptions of pre-service and in-service teachers towards technology integration.	230 participants (112 pre-service teachers and 118 in-service teachers).	Even though both groups have average technology skills, pre-service teachers are more confident and they have more positive attitudes toward technology integration.
Çakır, R.,Yükseltürk, E., Top, E. (2015)	To investigate the perceptions of in-service and pre-service teachers toward the use of Web 2.0 tools in class.	516 pre-service teacher and 317 in-service teachers working at state and private schools participated.	In-service teachers have more positive attitudes towards using Web 2.0 technologies and they believe in their usefulness more than pre-service teachers do.
Aydın, S. (2013)	To investigate Turkish EFL teachers' perceptions about computer use.	157 Turkish EFL teachers working in elementary and secondary schools in Balıkesir.	EFL teachers are not very knowledgeable about how to use certain software and they do not receive enough support, but their perceptions are mostly positive.
Sarıçoban, A. (2013)	To investigate pre-service ELT teachers' attitudes towards computer use.	95 students in English departments at three different state universities in Ankara.	Participants mostly have positive attitudes and affective elements affect attitudes. However, perceived usefulness decreases as attitudes increase.
Harmandaoğlu Baz, E. (2016)	To investigate pre-service ELT teachers' attitudes towards technology use.	98 student teachers were given a scale. 8 of them participated in focus group interviews.	Prospective teachers have highly positive attitudes towards technology use in language teaching and learning processes.

Table 2.7.1. (Continued) Summative *table of perceptions and attitudes towards technology use studies.*

Author(s) & Year	Main purpose	Context	Main findings
Şahin Kızıl, A. (2011)	To investigate attitudes of EFL teachers toward the use of ICTs.	76 Turkish EFL teachers working at state schools.	Teachers hold positive attitudes toward using ICTs and they frequently use technologies such as interactive exercises and PowerPoint presentations.
Korkut, P. (2016)	To investigate pre-service English teachers' attitudes toward technology integration through focus group interviews.	20 junior year ELT students training at a state university in Turkey.	Teacher candidates have positive attitudes toward technology, and they believe that technology use is meaningful when combined with pedagogical knowledge.
Yüksel, G., Kavanoz, S. (2011)	To investigate attitudes of pre-service EFL teachers toward technology.	200 pre-service teachers at Yıldız Technical University, Turkey.	Pre-service teachers' attitudes are mostly positive, and they develop positive attitudes as they experience with technology.
Hismanoğlu, M. (2012)	To investigate attitudes of prospective EFL teachers toward the use of ICTs.	85 Turkish EFL teacher candidates who are still continuing their 4th year of teacher training.	Most pre-service teachers have negative attitudes towards using ICTs because they did not receive a proper instruction as to how to use them and they feel incompetent.
Başöz, T. (2016)	To investigate attitudes of prospective EFL teachers toward using social media as a language learning tool.	120 Turkish EFL teacher candidates who are receiving their teacher training at a state university.	Prospective teachers believe that social media is a natural part of language learning and that it should be in teacher training programs.
Hismanoğlu, M, Hismanoğlu S. (2011)	To investigate attitudes of prospective EFL teachers in different settings.	175 English teacher candidates in formal and distance education settings (Turkey and Cyprus)	Setting has an effect on attitudes (more positive in formal education than distance education). Number of ICT courses should be increased for more positive attitudes.
Merç, A. (2015)	To investigate pre-service English teachers' technology use during practicum.	86 EFL teacher candidates who taking teaching experience course.	There are inconsistencies between teacher training programs and real-life experiences and these inconsistencies need to be dealt with.

Studies mentioned above show how effective incorporating technology into language instruction can be and how much this area of research is in need of further investigation. Two tools chosen for the present study, both DNAS and TAMPST are highly reliable and valid yet since they are relatively newer measures, they need to be put into the test further. Lastly, it is clearly seen that perception and attitude studies can yield various results in different contexts and more empirical findings are needed in order to

have a more comprehensive idea about the issue. In order to meet all these purposes, the present study was designed. The study design is explained in detail in the next chapter.

CHAPTER 3

3. METHODOLOGY

3.1. Introduction

This chapter examines the procedure that was followed when conducting this study. The participants (both the ones that provided quantitative data by answering the questionnaire and the ones that agreed to take part in the second step of data collection, being semi-structured interviews) have been introduced in the chapter. Participant demographics have been analyzed and presented in a table. This study employs a mixed-methods approach and both quantitative and qualitative data collection tools were used. Quantitative data collection tools (participant demographics, Digital Nativity Assessment Scale (DNAS), Technology Acceptance Measure for Pre-service Teachers (TAMPST)) as well as the source of qualitative data (semi-structed interview questions) that were employed in order to gather data have been detailly explained. Finally, how data was analyzed and interpreted have been mentioned.

3.2. Participants and Setting

This study was conducted in Anadolu University, located in Eskişehir. The Faculty of Education is responsible for training the teachers of the future in 8 different departments. The English Language Teaching (ELT) department educates and trains the prospective English language teachers and based on the Council of Higher Education statistics (2020) 808 students are currently enrolled in the ELT program of Anadolu University as for the 2020-2021 academic year. In the current academic year. The ELT department of Anadolu University provides its student with two elective courses about what educational technologies are and how they are used. These courses are E-Skills for Foreign Language Teachers and Digital Material Development in English Language Teaching. In these courses, teacher candidates are given general information regarding how to achieve successful technology integration in language classrooms. They are also informed about the copyright issues so that they are aware of the fact that not every material they find can be adopted and copied, and even if the material can be copied there might be certain requirements or restrictions. Finally, they are taught how to use several

online tools such as ZOOM, Canvas, and Coursera. They are expected to prepare materials or course modules using these online tools as course assignments.

For the first part of data collection, the questionnaire was digitalized using Google Forms. The link to the questionnaire was sent to all 4th year students and 97 students responded. After the initial examination of the data, it was seen that some participants sent the form more than once. After the repetitive responses were eliminated, 92 participants were left for further analysis. Data collection procedure for the quantitative data took 11 days (December 15th – December 26th), while qualitative data was collected in the course of 23 days (January 12th – February 3rd). All participants were informed consent prior to the questionnaire and at the very beginning of interviews.

The ages of the participants range between 20 and 40. The majority of the participants, however, are 21 and 22 years old. Hence, the age mean of the respondents is 22,61 (SD: 3,15). As for the gender of the participants, the majority of them are females. 53 female (57,6 %) and 39 male 4th year students (42,4%) answered the questionnaire. The indication of age and gender was only demanded in order to gather information regarding participant demographics. This information was not used for further analysis. In addition to age and gender, the participants were asked whether they received any technology-related courses throughout their teacher training in order to understand whether the teacher candidates are provided with courses of this nature. The results indicated that the number of the participants who took technology-related courses (48 participants; 52,2 %) and the number of the participants who did not take any courses of this nature (44 participants; 47,8 %) are almost equal. Participant demographics have been summarized in Table 3.2.1.

Table 3.2.1. *Participants demographics (N:92)*

	Frequency (n)	**Percentage (%)**
Age		
20 -24	84	91,3
24+	8	8,7
Gender		
Male	53	57,6
Female	39	42,4
Technology-related Courses		
Yes	48	52,2
No	44	47,8

3.2.1. Semi-structured interview participants

Initially, the participants for the interviews were chosen based on their DNAS scores. Therefore, 6 students with the highest DNAS scores and another 6 students with the lowest DNAS results were e-mailed and invited to participate in the semi-structural interview, but many of them did not respond or indicated that they were unable to participate in the second phase. In order to get more students to volunteer for interviews, all 91 students were (1 participant did not provide e-mail information) contacted, informing them about the interviews and inviting them to take part. A total of 10 students positively responded to the invitation and online ZOOM meetings were arranged with them. Demographic information as well as DNAS and TAMPST scores of the interviewees are provided in Table 3.2.1.1

Table 3.2.1.1. *Participant demographics and scale scores of semi-structured interview participants (n:10)*

Participants	Gender	Age	DNAS Score	TAMPST Score
P1	Female	21	138 (High)	112 (High)
P2	Female	34	82 (Low)	74 (Low)
P3	Male	22	90 (Low)	97 (Medium)
P4	Female	22	71 (Low)	74 (Low)
P5	Female	22	107 (Medium)	88 (Medium)
P6	Male	21	97 (Medium)	76 (Low)
P7	Female	23	124 (Medium)	92 (Medium)
P8	Male	23	113 (Medium)	104 (Medium)
P9	Male	23	132 (High)	96 (Medium)
P10	Male	22	126 (High)	97 (High)

3.3. Data Collection Tools and Procedure

This study aims to collect both quantitative and qualitative data; hence it adopts a mixed method approach. The mixed method approach was preferred for the present study because mixed-method design studies combine the strengths of both quantitative and qualitative approaches (Dörnyei, 2007). Data, as mentioned above, was collected from 4th year English as a Foreign Language (EFL) teacher trainees at Anadolu University.

Data collection was a two-step procedure. For the first part of data collection, the participants were given the quantitative measure, which consists of 4 sections (see Appendix B). The first section informs the participants about the study and confirms that they participate in the study voluntarily. In addition, participant demographics (gender, age, and whether the participants received a technology-related courses throughout their teacher training) have been obtained in the first section in order to gather some general

information about the participants. Lastly, participants were asked to provide their email addresses if they were voluntary to take part in the second phase of the study, the semi-structured interviews.

The second section of the quantitative measure was the Digital Natives Assessment Scale (DNAS), a measure created by Teo (2013) in order to decide whether individuals are digital natives or not. DNAS is a 7-point Likert scale with 21 items, and it is mainly based on the "Digital Natives" theory (Prensky, 2001). The items on the scale are divided into 4 sub-scales; namely "Grow up with Technology", "Comfortable with Multitasking", "Reliant on Graphics for Communication", and "Thrive on Instant Gratifications and Rewards". The subscales were formed based on the well-known qualities of digital natives.

The final section of the quantitative data is the Technology Acceptance Measure for Pre-service Teachers (TAMPST), which was developed by Teo (2010) in order to understand how accepting the pre-service teachers are of technology so that it is possible to predict their technology use once they start their careers as teachers. TAMPST is a 7-point Likert scale and is based on a number of theories such as The Theory of Reasoned Action (Fishbein & Ajzen, 1975), The Theory of Planned Behavior (Ajzen, 1991), and Technology Acceptance Model (TAM) (Davis,1989). The scale consists of 16 items which were divided into 5 sub-scales; namely "Perceived Usefulness (PU)", "Perceived Ease of Use (PEU)", "Attitudes Toward Computer Use (ATCU)", "Facilitating Conditions (FC)", and "Subjective Norm (SN)". The total of these 4 sections forms the quantitative measure for this study. The demographic questions, DNAS and TAMPST were turned into an online form and sent to the students via Google Forms. Since both scales were created and developed by Teo, his permission was asked before the scales were used.

The second phase of data collection was the collection of the qualitative data. In order to obtain data, semi-structured interviews were conducted with 10 participants. Initially 6 participants with highest DNAS scores and 6 with lowest scores were sent an e-mail and were invited to participant into the second phase of the study. However, only a few student teachers responded to the e-mails and some of the respondents reported not being able to participate any further. Since only a small number of participants accepted to be interviewed, all 91 participants who provided their e-mail addresses in the first phase were e-mailed. As a result, 10 volunteering participants were recruited to take part in

semi-structured interviews. 3 main questions were prepared for the interviews and these questions were asked to the participants (see Appendix D). The first question is related to digital nativity asking the participants to elaborate on why they use technology in their daily lives. Second and third questions examine the attitudes toward technology use in educational settings. In the second question the participants are asked about their experiences as a student – mainly a language learner – and whether technology had any role in their language learning process. The last question aims at discovering the attitudes of the participants about using technology to teach languages. Their opinions as a future language teacher were asked. The main questions have sub-questions, as well, which might be asked to the participants depending on the course of conversation (See Appendix D). The questions aim at discovering the attitudes the prospective teachers have toward technology use in the classroom mainly for language teaching and learning purposes, since they are EFL teacher candidates, and they were inspired by the items and the sub-scales on the quantitative measures. This way the roots of their digital nativity and technology acceptance have been better understood.

The interviews took 28 minutes on average. The participants' answers were digitally recorded to be transcribed. The interviews were performed online by scheduling ZOOM meetings via e-mails that were sent to the participants beforehand and all participants were informed consent both in the e-mails and at the very beginning of the ZOOM meeting in order to make sure that they knew the interviews were recorded and they participated voluntarily. The interviews were conducted in the participants' native language (Turkish) so that they could properly express themselves and any problems that might result from language barriers could be prevented.

3.4. Data Analysis

The participant demographics (gender, age, and technology-related courses taken) were analyzed as descriptive statistics. As for the scales, a final score for both scales were calculated; because both scales use a grade system where every choice a participant makes stands for a point from 1 to 7. The points are then added to reach to the final score of the participant. Hence, the lowest score that can be obtained from the 21-item DNAS is 21 (21*1), while the highest possible score is 147 (21*7). As the results of the same calculation, the lowest score that can be obtained from the 16-item TAMPST is 16 (16*1), while the highest possible score is 112 (16*7). In order to examine the relationship

between the two scales to understand whether digital nativity guarantees technology acceptance or vice versa, Pearson's Correlation Coefficient was calculated.

Once the interviews were conducted via ZOOM and the dialogues were transcribed, the data was analyzed using Content Analysis in order to pinpoint similarities and differences between the attitudes of lowest and highest scoring participants. Content analysis is a well-known and preferred way of analyzing qualitative data, and Creswell's (2012) method was followed in order to conduct the analysis. First, all the interviews were digitally recorded and transcribed as a preparation for content analysis. Then, the data was examined, and main themes and sub-themes were formed. When the results of the analysis were being explained, excerpts from participants' answers as well as tables where theme and sub-theme frequencies were presented were provided for a reader-friendly representation. Lastly, the findings were reexamined four weeks after the initial analysis in order to establish intra-rater reliability (Creswell, 2012; Dörnyei, 2007). During the re-examination process, previously determined themes and sub-themes were once again visited and checked. The excerpts taken from the participants' interviews were also re-read, additions and emissions were made.

CHAPTER 4

4. RESULTS

4.1. Introduction

      This chapter contains the results of the analysis of both quantitative and qualitative data. For the analysis of quantitative data, the answers given to the questionnaire were analyzed. The questionnaire consisted of digital natives assessment scale (DNAS), and technology acceptance measure for pre-service teachers (TAMPST). For the web tools checklist, the participants were given three options and the percentages of responses to the options have been calculated based on the answers from the prospective teachers. Regarding the two scales used in the study (DNAS and TAMPST) mean scores and standard deviations for the whole scale and each individual item and sub-scale have been calculated and presented in tables. The possible relationship between DNAS and TAMPST has been examined. Qualitative data that was collected through ZOOM meetings with volunteering participants have been transcribed and analyzed using content analysis. The results of the content analysis based on themes and sub-themes have been summarized in "frequency" tables; frequency standing for the number of participants who mentioned a given theme or sub-theme during the semi-structured interviews.

4.2. Quantitative Data Analysis

      Quantitate data of the present study was collected with the digital natives assessment scale (DNAS), and the technology acceptance measure for pre-service teachers (TAMPST).

4.2.1. Digital natives assessment scale (DNAS) analysis results

      The first research question of the present study was "Are the pre-service English teachers at Anadolu University digital natives?" In order to answer this question, digital nativity of the participants was self-reportedly measured using the Digital Natives Assessment Scale or DNAS. Before the analyses were conducted, the reliability of the scale for the particular setting was calculated. The Cronbach's Alpha was calculated to assess whether the scale can be considered reliable with the current group of participants.

The Cronbach Alpha value yielded by the calculation was ,855, and it showed that the measure was highly reliable.

For data analysis, means and standard deviations for scale items were calculated. It was seen that the participants' level of agreement to DNAS items ranged between 4,03 (SD: 1,947) and 6,86 (SD: ,526). Taking into consideration that the measure is a 7-point Likert scale, it is clear that agreement levels are quite high, and that the participating teacher candidates can be considered digital natives. In order to support this finding, participants' individual DNAS scores were also calculated. Since DNAS is a scale, it is possible for participants to obtain a total score, which is the sum of the point correspondent of each answer given. Therefore, if a participant were to agree to all items at the lowest level, the total point would be 21 (21*1). When all items are agreed to at the highest level, however, the total score would be 147 (21*7). As for the current study, the lowest score obtained by participants was 59, whereas the highest score was 138, which is very close to a full score. The mean of the scores is 109,53 (SD:15,929). DNAS results are summarized in Table 4.2.1.1.

Table 4.2.1.1. *DNAS results*

	SCORES
Lowest Score	59
Highest Score	138
Mean Score	109,53
Standard Deviation	15,929

Mean scores and standard deviations for sub-scales and individual scale items were analyzed in detail. The order of sub-scales based on the level of agreement was as follows: "Grow up with Technology", "Comfortable with Multitasking", "Thrive on instant gratifications and rewards", and "Reliant on graphics for communication".

Data analysis showed that the most agreed sub-scale is "Grow up with Technology" (M:6,14, SD:,797), proving the significance of technology use in one's daily life on digital nativity. In line with this finding, the most agreed individual item is Item 1 "I use the Internet every day", (M:6,86; SD: ,526) indicating the majority of prospective teachers use the Internet on a daily basis.

"Grow up with Technology" was followed by "Comfortable with Multitasking" 0with a mean score of 5,84 (SD: 1,209). Especially the agreement levels of item 10 "I am able to use more than one application on the computer at the same time" (M: 6,25; SD:

1,364), and item 6 "I am able to surf the internet and perform another activity comfortably" (M: 6,16; SD: 1,320) clearly show that the participants are highly capable of doing multiple tasks simultaneously when they use technology.

Next, participants agreed with the sub-scale "Thrive on instant gratifications and rewards" on a relatively high level (M: 5,58; SD: ,941). In specific, item 18 "I expect quick access to information when I need it" (M: 6,43; SD: 1,041) highlights that the pre-service teachers prefer using technology for gathering information because it is much faster.

The least agreed sub-scale is "Reliant on graphics for communication" (M:4,31; SD:1,518). The participants reported not finding pictures, visuals, graphics and icons necessary for successful communication since the items 12 "I use pictures more than words when I wish to explain something" (M:4,16; SD:1,787) and 14 "I prefer to receive messages with graphics and icons" (M:4,14; SD:1,849) are the least agreed items of the scale. More details regarding the mean scores and individual scale items have been given in Table 4.2.1.2.

Table 4.2.1.2. *Mean scores and standard deviations for DNAS items. (N:92)*

ITEMS	MEAN	SD
Grow up with technology	**6,14**	**,797**
1. I use the internet every day	6,86	,526
2. I use computers for many things in my daily life	6,47	1,032
3. When I need to know something, I search the internet first	6,74	,783
4. I use the computer for leisure every day	5,73	1,527
5. I keep in contact with my friends through the computer every day	4,93	2,048
Comfortable with multitasking	**5,84**	**1,209**
6. I am able to surf the internet and perform another activity comfortably	6,16	1,320
7. I can check email and chat online at the same time	6,26	1,166
8. When using the internet for my work, I am able to listen to music as well	5,71	1,867
9. I am able to communicate with my friends and do my work at the same time	5,26	2,037
10. I am able to use more than one application on the computer at the same time	6,25	1,364
11. I can chat on the phone with a friend and message another at the same time	5,41	1,968
Reliant on graphics for communication	**4,31**	**1,518**
12. I use pictures more than words when I wish to explain something	4,16	1,787
13. I use a lot of graphics and icons when I send messages	4,33	1,973
14. I prefer to receive messages with graphics and icons	4,14	1,849
15. I use pictures to express my feelings better	4,64	1,855
16. I use smiley faces a lot in my messages	4,28	2,083

Table 4.2.1.2. (Continued) *Mean scores and standard deviations for DNAS items. (N:92)*

ITEMS	MEAN	SD
Thrive on instant gratifications and rewards	**5,58**	**,941**
17. I wish to be rewarded for everything I do	4,03	1,947
18. I expect quick access to information when I need it	6,43	1,041
19. When I send out an email, I expect a quick reply	5,88	1,212
20. I expect the websites that I visit regularly to be constantly updated	5,50	1,515
21. When I study, I prefer to learn those that I can use quickly first	6,05	1,208

4.2.2 Technology acceptance measure for pre-service teachers (TAMPST) analysis results

The second research question was "What is the technology acceptance level of the pre-service English teachers at Anadolu University?" To answer this question, technology acceptance of the participants was self-reportedly measured with Technology Acceptance Measure for Pre-service Teachers or TAMPST. Before the analyses were conducted, the reliability of the scale for the particular setting was calculated. The Cronbach Alpha's value yielded by the calculation was ,857 and it showed that the measure was highly reliable.

For data analysis, means and standard deviations for scale items were calculated. It was seen that the participants' level of agreement to TAMPST items ranged between 4,14 (SD: 2,063) and 6,64 (SD: ,689). Taking into consideration that the measure is a 7-point Likert scale, it can clearly be seen that agreement levels are quite high, and it can be deducted that participating teacher candidates are accepting of technology. In order to support this finding, participants' TAMPST scores were calculated, as well. Since TAMPST is also a scale, it is possible for participants to obtain a total score, which is the sum of the point correspondent of each answer given. Hence, if a participant were to agree to all items at the lowest level, the total point would be 16 (16*1). When all items are agreed to at the highest level, however, the total score would be 112 (16*7). As for the current study, the lowest score obtained by participants was 63, whereas the highest score was 112, which is the highest score that can be obtained from this scale. The mean of the scores is 93,10 (SD: 11,952). TAMPST results are summarized in Table 4.2.2.1.

Table 4.2.2.1: *TAMPST results*

	SCORES
Lowest Score	63
Highest Score	112
Mean Score	93,10
Standard Deviation	11,952

Mean scores and standard deviations for sub-scales and individual scale items were analyzed in detail. The order of subscales in terms of level of agreement was as follows: "Perceived Usefulness", "Perceived Ease of Use", Attitudes toward Computer Use", "Subjective Norm" and "Facilitating Conditions".

The results indicated that according to the pre-service teachers, the factor that has the biggest effect on technology acceptance is "Perceived Usefulness" (M:6,42; SD:,702). The significance of "Perceived Usefulness" is emphasized by the agreement level of Item 4 "I find computers a useful tool in my work" indicating that the student teachers tend to use computers when they believe it will be beneficial for their work (M: 6,64; SD: ,689).

"Perceived Ease of Use" is almost as influential (M:6,29; SD: ,915), which can be seen from the remarkably high agreement levels of items 5 "My interaction with computers is clear and understandable" (M:6,28; SD: ,976), 6 "I find it easy to get computers to do what I want it to do" (M: 6,26: SD:1,166), and 7" I find computers easy to use" (M: 6,35; SD: 1,063).

With the analysis of the scale, the importance of attitudes was made obvious one more time, thanks to the high agreement level of the sub-scale "Attitudes toward Computer Use" (M: 5,97; SD: ,966). Pre-service teachers revealed that they held positive attitudes towards technology by agreeing with item 10 "I like using computers" on a high level (M: 6,33; SD: 1,080).

Next, future teachers reported that "Subjective Norm" was an important factor affecting their technology acceptance. They admitted that they are encouraged and supported by the people who are important to them (Item 16; M:5,37; SD: 1,615) and whose opinions they care about (Item 15; M: 5,02: SD: 1,703) to use computers.

As stated above, "Facilitating Conditions" was the least agreed sub-scale (M: 4,73; SD: 1,541). The teacher candidates reported that they cannot get enough help on technical issues agreeing with Item 13 "When I need help to use computers, a specific person is available to provide assistance" the least (M: 4,14; SD: 2,063). More details regarding the mean scores and individual scale items have been given in Table 4.2.2.2.

Table 4.2.2.2. *Mean scores and standard deviations for TAMPST items. (N:92)*

ITEMS	MEAN	SD
Perceived usefulness (PU)	**6,42**	**,702**
1. Using computers will improve my work	6,47	,777
2. Using computers will increase my productivity	6,17	1,201
3. Using computers will enhance my effectiveness	6,43	,746
4. I find computers a useful tool in my work	6,64	,689
Perceived ease of use (PEU)	**6,29**	**,915**
5. My interaction with computers is clear and understandable	6,28	,976
6. I find it easy to get computers to do what I want it to do	6,26	1,166
7. I find computers easy to use	6,35	1,063
Attitude toward computer use (ATCU)	**5,97**	**,966**
8. Computers make work more interesting	6,07	1,067
9. Working with computers is fun	6,02	1,195
10. I like using computers	6,33	1,080
11. I look forward to those aspects of my job that require me to use computers	5,48	1,464
Facilitating conditions (FC)	**4,73**	**1,541**
12. When I need help to use computers, specialized instruction is available to help me	5,26	1,623
13. When I need help to use computers, a specific person is available to provide assistance	4,14	2,063
14. When I need help to use computers, guidance is available to me	4,80	1,817
Subjective norm (SN)	**5,19**	**1,545**
15. People whose opinions I value will encourage me to use computers	5,02	1,703
16. People who are important to me will support me to use computers	5,37	1,615

4.2.3. The analysis of the relationship between DNAS and TAMPST

One of the purposes of the current study was to examine the relationship between digital nativity and technology acceptance, as stated in the third research question: "Is there a relationship between digital nativity and technology acceptance?" In order to answer the third research question, Pearson's Correlation Coefficient was calculated (r:,487). The result of the calculation showed that there is a moderate positive relationship between digital nativity and technology acceptance. This means that the more digitally native a person is, the more that person is likely to be highly accepting of technology. The results are significant at the 0.01 level.

Table 4.2.3.1. *The correlation between DNAS and TAMPST*

		DNAS	TAMPST
DNAS	Pearson Correlation	1	,473**
	Sig. (2-tailed)		,000
	N	92	92
TAMPST	Pearson Correlation	,473**	1
	Sig. (2-tailed)	,000	
	N	92	92

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

The moderate and positive relationship between DNAS and TAMPST was also visualized using a scatter-plot diagram.
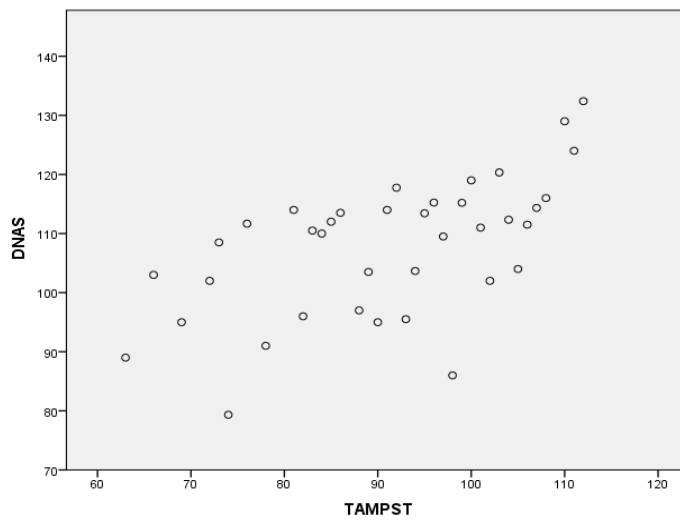
Figure 4.2.3.1. *Scatter-plot diagram of the relationship between DNAS and TAMPST*

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4.3. Pre-service English Teachers' Attitudes towards Technology Use in the Language Classroom

In order to assess pre-service teachers' attitudes regarding incorporating technology in the language teaching and learning processes, qualitative data was collected through semi-structured interviews. The interviews were carried out during ZOOM meetings and a total of 10 prospective teachers were interviewed. The interviews were digitally recorded, and they were transcribed after the meetings were over. Transcribed texts were analyzed using Content Analysis. Data was divided into main and sub-themes and was color-coded. Based on the initial analysis; data was examined and evaluated under three main themes. First, pre-service teachers' current technology use was analyzed in order to understand whether they are active users of technology. Secondly, prospective

teachers were asked about their past educational experiences, specifically the ones related to language teaching and learning processes in and outside of the classroom since their experiences can be enlightening regarding their attitudes towards technology use. Finally, teacher candidates were asked questions about the attitudes they hold towards technology use as a future language teaching professional.

The first interview question (How do you use technology daily?) asked the participants about their current use of technology. Participant' responses to this question showed that teacher candidates used technology quite actively for both personal and educational purposes. As can be seen in the samples below, for personal purposes, participants reported using technology mainly for communication (phone calls, messaging, checking e-mails) and social media.

"I use it (technology) for communication, like Instagram or WhatsApp." (P2)

"I use it (technology) for social media, for chatting with my friends." (P4)

"I use it (technology) for social purposes; to chat with my friends, to communicate." (P5)

"I use the phone for communication only." (P6)

"I use technology for communicating with friends." (P8)

Other personal reasons indicated by interviewees were watching TV shows and movies, online shopping, playing online games, reading (e-books), and code writing.

"I watch movies and TV shows on the computer." (P10)

"I use it (technology) for fun; to watch TV shows, movies. I don't play games, but I can use it for shopping." (P5)

"I use it (technology) for shopping, too. We do the shopping online all the time now." (P1)

"I play video games; it is one of my hobbies." (P3)

"I download a lot of books. I use technology for that the most." (P2)

"I learned how to write code when I was very young. I worked on it. I still have some skills." (P3)

Prospective teachers also reported taking advantage of technology for educational purposes such as participating in live lessons and online courses:

"I usually use it (technology) for live lessons, and I attend a language class online on the weekends." (P4)

"I take online courses from platforms like Udemy. (P5)

"I use Mergen and Anasis." (P6)

They admitted searching for readily made online materials and tools and watching example lessons through web sites and social media to help with their school experience course.

"I look at oral materials that I can use from the computer, I watch other lessons." (P3)

"I find materials that I can use in lessons." (P7)

Finally, they conducted educational research and reading articles in their field:

"I usually use it (technology) for educational research." (P1)

"I usually use it (technology) to do research mostly." (P2)

Prospective teachers' technology use is summarized in Table 4.3.1, based on the number of teacher candidates who mentioned using these technologies during the interviews.

Table 4.3.1. *Prospective teachers' current use of technology*

	Frequency
PERSONAL USE	
Communication (phone calls, messaging, WhatsApp, e-mails)	7
Social media	4
Watching movies \ TV shows	3
Online shopping	3
Playing games	3
Reading (e-books)	1
Parental guidance	1
Code writing	1
EDUCATIOANAL USE	
Distance education (Live faculty lessons)	4
Distance education (Online courses; Udemy, Coursera)	4
Searching for online tools and materials	4
Educational research \ articles	3

Other than their current technology use, prospective teachers were asked about whether technology was a part of their language training (mainly English), and if it was, how it was utilized, as the second interview question was "Did you make use of technology inside or outside the classroom during your language learning?". This question had two sub-questions, being "Did your language teacher use technology?" and "Were there technologies you discovered?" However, there was no need to ask the first sub-question since the student teachers began talking about their in-class experiences and their teachers' use of technology once they were asked the main question.

Participants reported that their language teachers did not actively use technology during their first years of language training, starting from 4th grade.

"I don't remember having a teacher who used technology very effectively in elementary and middle school. They used the board and our books, Not technology. Technology was particularly influential in high school, during my prep years." (P4)

> "Technology wasn't used much from fourth grade until I started university. Smart boards were used in high school, different from middle school. Apart from that, there was not much change in the university, again smart boards were used. In high school, our teacher used to bring voice recorders and tapes to class. That was it." (P10)

Lack of technology integration in their elementary school and middle school years shifted in their high school years with the initiation of FATIH project and the arrival of smart boards. Some teacher candidates admitted that some of their teachers were able to use technology effectively in the classroom and that it was mostly used to show videos or movies, to provide listening practice through voice recorders and MP3s, to show the course book on the smart board, to show visuals and play songs, to make use of educational websites and DyNED.

"The teachers made us watch something, that's all. But they wouldn't make us use it, they'd use it themselves. They showed us videos." (P1)

"When I chose the language department in High School, we were using DyNED, doing tests from there and stuff. We were watching videos." (P8)

Technology integration seemed to differ based on the school setting.

> "Military high school used a high level of technology for foreign language teaching. We had interactive foreign language classes just for foreign language teaching. We could watch movies and animations with Turkish or English subtitles there. There was also an MP3 material loading room. (…) Our commanders were giving us MP3s to listen to." (P9)

During their high school years, technology integration took a different form, with the initiation of the FATIH Project and the installation of smart boards. However, the integration of technology was not as effective as anticipated.

"There was a smart board, our teacher wrote on it. In high school, our teacher used the smart board to project pictures and stuff. The smart board was used a little bit, but the technology wasn't that active." (P7)

> "Before high school, there were projectors, and we used them if we needed visuals, but not very often. The use of technology in high school increased slightly, to be honest. Smart boards came to schools with the FATIH project. And the school I went to was one of the pilot schools, so we got the smart boards a little earlier. Some of our teachers never used it. (…)

My English teacher in high school used to use the smart board very well. He used an online source by Cambridge." (P3)

In addition, some participants' teachers seemed not to be competent users of technology and smart boards because of a number of reasons such as old age, limited experience with technology, and lack of technology training.

"Some of my teachers didn't use it, but I don't blame them either, because some of them were too old and they were not interested in those things." (P1)

"Our teachers didn't use it (smart board) very well. Because they didn't know much. But new teachers can use it better." (P5)

One of the participants (Participant 2) even admitted that she had trouble with using the smart board herself while teaching. She did not have any training on how to use the smart board and she did not have any experiences with it.

"When I was in my first college, there was no smart board. Then I gave private lessons for a long time, so I didn't use a smart board. Then I applied to work at a course, and the course uses a smart board. In 2010 or 2011, I think. I went to class. The book is loaded entirely on the smart board. I have a book, but the lesson needs to be taught on the smart board. The kids have opened their books. I was their second teacher, by the way, so they're used to it that way. But I don't know how to use a smart board! I wasn't taught, so I couldn't even open it. I went downstairs and said I couldn't open the board. They asked if I pressed the button. Turns out I didn't open the board! That lesson didn't go too well, of course. The students tried to show me how to do things." (P2)

As it can be seen from the examples above, pre-service teachers' own language teachers used technology for a number of different purposes. Their technology use is presented in Table 4.3.2.

Table 4.3.2. *Prospective teachers' language teachers' technology use*

	Frequency
Showing movies and videos	6
Listening practice (voice recorders, tapes, MP3s)	3
Showing the course book on the smart board	3
Showing visuals	2
Playing songs	2
Educational websites	2
DyNED	1

Realizing that language teachers have struggles trying to incorporate technology into their lessons, one student teacher took initiative and started an online support group with his peers from his teaching experience group and he runs an informative Instagram account.

> "I have a channel on Instagram where I teach English teachers the use of technology. I tell them what technological tools there are, how they can be used, what can be done with them. But I didn't use it much for my own English learning. The tools I'm using now are tools that can be used for teaching English. I started another project about a month ago. English teachers can reach us on WhatsApp when they need technological support. We have a website, our English teachers can fill out a form and contact us through the site if he wants, we respond to him in any way he wants; or they reach us through WhatsApp, and we respond via WhatsApp. We are trying to be supportive and helpful. We try to do our best as students during the pandemic." (P9)

Since their teachers' use of technology in the classroom was not particularly intense or effective, some pre-service teachers tried to use technology on their own outside the classroom in order to improve their language skills and they talked about how they made use of technology when they were asked the sub-question: "Were there technologies you discovered?". The answers pre-service teachers gave to this question revealed several ways they used technology to improve their language skills. These were watching movies and TV shows in the target language, using an online language learning tool called Duolingo, researching for assignments and preparing homework, listening to songs in the target language, using social media to access materials in the target language, chatting online.

> "I entered this department (ELT) in 2015. I had to use technology a lot at the time because I had completely forgotten English. I needed to listen to remember. I watched movies, I listened to it. I didn't use a lot of source books on the grammar issues I had problems with. I used videos from the Internet, like YouTube." (P2)

"I used Duolingo. When I first discovered it, I thought this site would be very useful to me. There was a website called Interpals to talk to foreign people. I'd say I used more foreign language sites." (P10)

"Outside of class, I used to do things like listen to songs or watch videos on YouTube. I also learned English from watching foreign TV shows. There were online chat apps, we could chat with foreign people. I used them for a while." (P5)

Teacher candidates also played computer games in order to expand their vocabulary and improve their pronunciation. They even shared their language products through vlogs.

"Definitely computer games. I used to go to the neighbor's house and play video games so I wouldn't lose my language skills from first to fourth grade. I used to play Max Pain. I learned most of the English curse words from this game. I learned American slang. During this period, I met the "Assassin's Creed" series, and thanks to this game, I can say that I exposed myself to everyday language. There was information about historical characters or buildings. I'd write down words I didn't know and looked up their meanings later." (P3)

"When English, I wanted to know how to pronounce the names of characters in video games. That's how I figured out the pronunciations. The video games I play, the movies I watch, contain American accents, so I usually use an American accent." (P8)

"I was talking to myself. Now there are vlogs on the Internet; people record their day and put it on the Internet. (…). I'm probably one of the first to use vlogs. I'd write. I had poems and stuff; I'd share them on Instagram." (P1)

In addition to the examples above, it was revealed that some prospective teachers still use technology for language learning purposes, to learn other languages.

"I've had a foreign friend for a long time. We've been chatting for about five or six years. It helped me a lot, especially when I was writing in English. I've seen different usages of the language. Then I started learning Korean because of him." (P4)

"I used some Duolingo for French." (P7)

"I usually use apps like Duolingo that teach the language interactively, that I can communicate with, talk to, pronounce, write to." (P8)

Prospective teachers' technology use for language learning purposes is summarized in Table 4.3.3.

Table 4.3.3. *Prospective teachers' technology use for language learning*

	Frequency
Watching movies / TV shows in the target language	4
Duolingo (Online language learning app)	4
Researching for \ preparing homework	4
Listening to songs in the target language	4
Social media (Instagram and YouTube)	4
Chatting online	2
Playing video games	2
Making vlogs	1
Online dictionaries	1

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The final interview question was "As an English teacher candidate, what do you think of the place of technology in language education?" The student teachers were asked about their attitudes as future professionals towards technology integration into the language teaching and learning processes and about the possible advantages of using technology while teaching languages. Teacher candidates' utterances clearly indicated that they have a positive attitude towards technology in general. According to pre-service teachers, students become more interested in language instruction when it is combined with technology and they start paying more attention. They think that using technology makes lessons more fun and memorable, that it supports learning.

"Technology may be more interesting to the student. We can play songs, we can watch movies, TV shows. It will help students. The students' enjoyment will also make their parents happy. The student should be able to use it (technology) without the teacher." (P1)

> "It lets the students internalize the language, which is an advantage. They become interested, that's the most important thing. Because today's children love technology, and it attracts their attention. (…) It also makes learning easier because they don't see it as a lesson. That's an advantage." (P2)

> "Students are now the next generation of children and they are in a lot of technology. The use of it in the classroom, the teachers doing such things makes them happy, it makes them feel good. They're more motivated, they're competing with each other. It has a positive effect." (P5)

> "First of all, they're having so much fun. The student doesn't see it as learning, he sees it as a game. They're actually doing something we think is very important; they use language as a tool. Using language as a way to achieve a goal and not as a goal. It'll be more fun for the teacher. Maybe it's more motivating. When he sees how eager the students are, the teacher can think, "I'm accomplishing something, it's going well."" (P7)

Pre-service teachers claimed that technology exposes students to more authentic language.

> "Technology can be useful when it comes to providing input. It's very important in terms of showing the correct forms and usage because sometimes kids don't believe the teacher. (…) Autonomous learning is also an advantage. Technology provides an advantage with the right orientation for autonomous learning." (P3)

> "We are not very lucky in terms of language exposure in Turkey. That's why technology is so important to us in terms of language exposure. It can be of great benefit to speech. I think it (technology) has a very important place in the development of the four language skills. It certainly provides practice." (P4)

"I think it's very important. The issue of authenticity in language learning is the subject that I care about the most. (…) I think the most important thing is that technology provides authentic materials. In addition, technology ensures that language teaching is not limited to the classroom." (P9)

Pre-service teachers also suggested that using technology would give learners a chance to interact with native speakers and actively use the target language, that it would enhance students' comprehension, make exercises more effective, support implicit learning and provide ample input.

"In order to use that language, they (students) need to contact people from different parts of the world." (P9)

"When videos are used, they provide both audio and visual input. I think the more input there is, the more effective language learning is." (P8)

In addition to the advantages mentioned above, prospective teachers claimed that using technology would motivate students, help them how to use online tools and assist them to learn the language at their own pace as well as the target culture. With technology, students could receive instant feedback, and become autonomous learners. One teacher candidate believes that using technology can also be helpful for visually impaired students.

"Technology lets the student learn at his own pace." (P9)

"It (technology) can be useful for visually impaired children and listening activities can be done. That might help. It encourages students to use technology outside the classroom, too." (P10)

Prospective teachers also reported that using technology is easier for the teachers, and with the vast variety of materials it offers, technology helps save time and money.

"It can be useful in terms of time, especially if you know how to use it." (P1)

"Using technology is more effortless. It's more practical for our teachers. It buys time because it takes time to write everything down. It's more fun for students, too." (P4)

"I think technology makes our job easier. It makes it much easier for us to prepare the activity on a web page, print it out or project it onto the board, than constantly preparing an activity on paper; it can serve as both a money saver and a time saver." (P5)

Moreover, pre-service teachers stated that using technology would also be more fun for the teachers and it would motivate them.

"We (teachers) can open apps and sites from the board and show them (students) how to use them." (P1)

"It'll be more fun for the teacher. Maybe it's more motivating. When he sees how eager the students are, the teacher can think, "I'm accomplishing something, it's going well." (P7)

As stated in the excerpts above, pre-service teachers believe in the benefits and usefulness of technology from both students' and teachers' perspectives. Advantages of incorporating technology in the classroom based on student teachers' responses are presented in Table 4.3.4.

Table 4.3.4. *Advantages of using technology according to prospective teachers*

	Frequency
STUDENTS' PERSPECTIVE	
Interesting \ attracts more attention	6
Fun and game-like learning	5
Exposure to authentic language use	4
Chance to actively use the language	4
Enhance comprehension	3
Efficient exercises	3
Implicit learning	3
Input	3
Learning how to use technology	2
Motivation	2
Learning at own pace	1
Learning about target culture	1
Instant feedback	1
Autonomous learning	1
Useful for visually impaired children	1
TEACHERS' PERSPECTIVE	
Ease of use	4
Vast variety of materials	3
Time \ money \ energy saving	3
Fun	1
Motivating	1

Everything that has advantages has its drawbacks. Although the pre-service teachers are highly optimistic about what technology has to offer to enrich language instruction, they do not disregard its disadvantages that could surface if technology is used inappropriately and the possible problems that could be faced. Student teachers evaluated this issue from both students' and teachers' point of view. As far as disadvantages that could influence the students' go, prospective teachers said that technology can be a source of distraction.

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"Technology can be distracting. For example, the kid enters the computer to do homework, but he also plays games from the other tab. He's not paying attention to the class. Student may be answering a quiz while also looking at his messages. It's hard for the teacher to control." (P1)

"Students can use technology for other purposes while we try to use technology for educational purposes; they can open a game, text among themselves." (P4)

"Nowadays, technology is more of a distraction as it leans towards the entertainment industry, students can go on YouTube, play games on another tab, which is another problem. Even I have looked at Facebook from the other tab in a few lessons." (P6)

Students also may not have access to the Internet or technological devices. Some might not be able afford such devices to take advantage of online learning:

"Not all students have equal access to the internet, to devices. The inequalities of opportunity in education became more and more revealed during this period." (P7)

Pre-service teachers are worried that the students' can get too used to technology which might make students lazy and reduce their productivity over time.

"A child who is used to watching videos has a hard time playing games. He wants to do similar activities all the time. That's where his production declines." (P2)

"It (technology) can make the student lazy. When technology comes into play, slides are read, or when doing activities, the student just clicks on things or drag things around." (P10)

Prospective teachers are also concerned that not all students have the same technology skills or knowledge.

"The faster we get information, the faster we get false information. A student can get lost in misinformation without proper counseling while searching the Internet for something." (P3)

"Not every student can use technology in the same way. When they're doing an activity, if they have to write something from the computer; not every student can write at the same speed, the same way." (P5)

"Children's technology skills are a little limited." (P7)

"The student uses technology to sabotage the course because no technology training is provided for the students." (P9)

Other students-related problems mentioned by prospective teachers that can be faced while using technology are security issues, becoming addicted to technology, ignoring learning part of the lesson, experiencing eye problems, cheating, not attending online classes, and not being exposed to incorrect information.

"A kid who's not 18 yet is talking to someone halfway around the world, but what's he talking about? It's hard to keep track of." (P9)

"Children can lose themselves in the game and skip the learning part. Or overly competitive students can create problems. Students may want to do the same thing all the time." (P7)

According to prospective teachers, the main problem teachers' face with technology integration is hardships that can be faced due to lack of technological training and knowledge. Pre-service teachers think that when teachers do not have enough experience with technology and when they are not knowledgeable about technical issues, they cannot effectively use technology and students respond negatively to teachers' incompetence. This, in return, decreases both teachers' and students' motivation. Prospective teachers are also concerned that teachers might not be able to keep up with the latest technological developments, and that they would not have enough time to improve their technological skills.

"Not being technically equipped is a problem. Not being able to use it (technology) is a serious problem." (P2)

> "The teacher may not know how to open an app. I guess it's usually a problem that the teacher doesn't know what to do and how to do it. In particular, some of our teachers do not trust themselves because they are not very competent users. Even if they do, they get excited in class." (P4)

"The teachers can't comprehend the system or there's a problem with the system. They can't keep up. This has a negative effect on students, too" (P6)

"I think there should be more technology use lessons for teachers because some of our teachers still can't use technology. Some teachers can't use it because they're old, but some can't because they don't know." (P10)

"I think it is important to look at the conditions under which teachers use technology in this regard. For example, is the teacher technologically adequate? Technology has already progressed so far. Where's the teacher in this progress?" (P9)

Teacher candidates ~~are~~ were also concerned that multitasking is required while using technology and when it is combined with classroom management, it can become overwhelming for the teachers.

> "The teacher should be very efficient. If the teacher isn't competent enough, it's hard to control the class. On the one hand, he's going to look at the app, and on the other hand, he's going to check on the students. It's hard to manage classes sometimes because the teacher is supposed to multitask, there is a lot to do." (P5)

Based on prospective teachers' answers, the final problem that could surface because of technology integration into language education is technical issues, such as disconnection of the Internet, device malfunctions, power outages, and inadequate or outdated equipment.

"There can always be technical problems, we need to be prepared. You can make a beautiful slide and go to class, but the board won't turn on, or the power will go out. So, it's not enough to prepare the slide." (P1)

"There are a lot of technical problems. It's happened to me, too. I couldn't open a smart board in one of my classes. It just didn't turn on. I learned that day that I always have to have a backup plan in case there may be problems with technology." (P3)

"The teacher may not get a chance to fully evaluate the performance of the students. As I said, a very successful student may not be able to fully perform because the devices are outdated, or the internet connection is problematic." (P7)

"We may face technological problems. No matter how well you use it (technology), there can be problems. (…) Technology is a really nice thing, but sometimes it makes us forget we have to have a backup plan." (P8)

However, pre-service teachers thought that technical problems would not pose an obstacle provided that teachers do not completely rely on technology and prepare a back-up plan before going to the class.

"If the course is adjusted according to technology in the classroom environment, there may be problems when there is a technical problem because the course may freeze. But if the teacher goes with that alternative, it won't be a big problem." (P2)

> "There may be situations that affect both the student and the teacher, such as disconnection of the Internet. The teacher can try to solve such technical problems. (…) As long as there is an alternative to activity, technical problems such as computer problems do not do much harm." (P10)

Possible disadvantages of technology integration and potential problems that can be faced while using technology are listed in Table 4.3.5.

Table 4.3.5. *Disadvantages of using technology according to prospective teachers*

	Frequency
STUDENTS' PERSPECTIVE	
Distraction	4
Not having access to \ affording devices	2
Becoming lazy \ decrease in productivity	2
Security	2
Not knowing how to use educational technologies and tools	2
Technology addiction	2
Getting lost in games \ ignoring learning	1
Eye problems	1
Cheating	1
Attendance	1
Misinformation	1
TEACHERS' PERSPECTIVE	
Lack or inadequacy of technology skills and knowledge	5
Not being able to keep up with technological developments	3
Multitasking	2
Lack of time to improve	1
TECHNICAL ISSUES	
Internet (access, connection speed)	6
Device malfunctions	5
Power outages	5
Outdated \ inadequate equipment	3

CHAPTER 5

5. DISCUSSION AND CONCLUSION

5.1. Introduction

This study aimed at investigating digital nativity, technology acceptance and attitudes towards technology use in the language teaching and learning process. In addition, it aimed to uniquely examine the possible relationship between digital nativity and technology acceptance. To achieve these purposes the following questions were posed:

1) Are the pre-service English teachers at Anadolu University digital natives?

2) What is the technology acceptance level of the pre-service English teachers at Anadolu University?

3) Is there a relationship between digital nativity and technology acceptance?

4) What are the attitudes of the pre-service English teachers at Anadolu University towards technology use in the language classroom?

Digital nativity and technology acceptance were examined quantitatively through scales (Digital Nativity Assessment Scale (DNAS) and Technology Acceptance Measure for Pre-service Teachers (TAMPST)) while the attitudes were discovered through semi-structural interviews conducted via online ZOOM meetings.

In this chapter, findings of both quantitative and qualitative analysis will be revisited and discussed. Findings will be evaluated in the light of previous studies conducted in the area. Finally, implications, limitations of the study, and recommendations for further research will be mentioned.

5.2. Discussion of Findings

5.2.1. Digital nativity of prospective teachers

The first aim of the present study was to assess digital nativity of pre-service teachers who are still continuing their teacher training at Anadolu University. For this purpose, Digital Natives Assessment Scale (DNAS) formed and tested by Teo (2013) was applied. Although the majority of DNAS studies focus on students or teachers in educational contexts, a limited number of Turkish studies investigated digital nativity of

teacher candidates (Teo, Kabakçı Yurdakul & Ursavaş, 2016; Kabakçı Yurdakul, 2018). Because of the gap in this area of research, this study aimed to assess digital nativity of prospective English teachers.

The analysis of DNAS showed that pre-service teachers can be considered digital natives. In previous studies, it was discussed that participants' DNAS agreement levels between 3,63 and 6,14 was enough for the respondents to be classified as digital natives (Teo, Kabakçı Yurdakul & Ursavaş, 2016). Huang, Teo and He (2019), on the other hand, claimed that university teachers were digital natives because their agreement level ranged between 4,60 – 5,71. Compared to previous studies, DNAS agreement levels of the present study was considerably higher, ranging between 4,03 and 6,86, indicating that English teacher candidates studying at Anadolu University are, indeed, digital natives.

It was also seen that DNAS items and sub-scales were agreed on at rather high levels. In particular, the sub-scale that questioned participants' everyday computer use "Grow up with Technology" was the most agreed sub-scale. (M:6,14; S.D: ,797). Students reported that they used the Internet every day (Item 1, M:6,86; SD:5,26). Semi-structured interview answers also showed that students indeed use technology and the Internet mainly for communication purposes such as messaging through apps like WhatsApp, social media, e-mails, and online meeting platforms like ZOOM. Students also stated that they used technology for many things (Item 2, M: 6,47; SD: 1,032) and that they look at the Internet when they want to learn about something (Item 3, M: 6,74; SD: ,783). This finding was revealed probably because digital natives' primary choice for performing tasks is technological and the Internet is their main source of gaining knowledge.

Next most agreed sub-scale of DNAS was "Comfortable with Multitasking" (M: 5,84; SD: 1,209). Through the items of this sub-scale, pre-service teachers reported being able to multitask while using technology, such as checking e-mails and chatting online at the same time (Item 7; M: 6,26; SD: 1,166) or using multiple apps on the computer simultaneously (Item 10; M: 6,25; SD: 1,364). However, during interviews, prospective teachers also reported that they were concerned about multitasking being too overwhelming for the teachers. This outcome could have resulted from the fact that the teacher candidates lack real-life teaching experience because of the ongoing Covid-19 pandemic. Due to their lack of experience, they are not sure whether their everyday technology-related multitasking skills can be transferred to the workplace.

The sub-scale "Thrive on Instant Gratification and Rewards" was agreed on a relatively high level, as well (M:5,58; SD: ,941); showing that speed that is offered by technology is an important factor for digital natives. In specific, the participants almost entirely agreed with item 18 "I expect quick access to information when I need it" (M: 6,43; SD: 1,041). Apparently, one of the main reasons digital natives prefer using technology to gather information is that technology allows them to obtain information faster than traditional sources of information such as books and encyclopedias.

The least agreed sub-scale of DNAS was "Reliant on graphics for communication" (M: 4,31; SD: 1,518). They reported that receiving messages with plenty of graphics and icons (Item 14, M: 4,14; SD: 1,849) and using pictures and visuals in order to convey their message and to explain something (Item 12, M: 4,16; 1,787) was not their preference. Indeed, during the interviews, only one participant specifically mentioned preferring visual media such as Instagram or YouTube for obtaining information and for keeping up with current issues. Except for that one student, none of the other interviewees expressed a certain fondness for using or seeing pictures and visuals.

5.2.2. Technology acceptance of prospective teachers

With the undeniable involvement of technology in life and in educational contexts, technology acceptance became an important area of research. Gu, Zhu, and Guo (2013) argued that technology acceptance between teachers and students was a matter of the way they used technology and how important they thought technology was. Gyamfi (2017) chose to work on pre-service teachers' technology acceptance and discovered that prospective teachers' technology acceptance was affected by many factors such as leadership support and job relevance.

Like Gyamfi (2017), many researchers preferred to focus on pre-service teachers' technology acceptance over the years and measures were developed for this purpose. Teo's (2010a; 2010b) Technology Acceptance Measure for Pre-service Teachers (TAMPST) is a well-known scale that was formed to assess future teachers' technology acceptance in specific. This particular measure was tested in Turkey and was proved to be a valid tool in the Turkish context (Teo, Ursavaş & Bahçekapılı, 2011; Teo, Ursavaş & Bahçekapılı, 2012). Hence, TAMPST was chosen as the second quantitative measure of the present study.

Data analysis revealed that ELT student teachers of Anadolu University are indeed accepting of technology. In a previous piece of research, it was discussed that an agreement level between 5.10 and 5.83 to TAMPST "indicates an overall positive response" (Teo, 2010b). In the present study, participants indicated even higher agreement with the scale items; although the lowest agreement mean was 4,14 and the highest mean was 6,64. In the light of these findings, it is possible to conclude that respondents of the current study are accepting of technology.

Prospective teachers reported that the biggest contributor of their technology acceptance was "Perceived Ease of Use" (PEU) (M: 6,42; SD: ,702), indicating that the easier they thought a certain technology is to use, the more accepting they are of that particular technology. This finding clearly supports the original "Technology Acceptance Model" developed by Davis (1989). According to pre-service teachers' answers, their interaction with computers is clear and understandable (Item 5; M: 6,28; SD: ,976), they find it easy to get computers to do what they want to do (Item 6; M: 6,26; SD: 1,166), and they overall find computers easy to use (Item 7; M: 6,35; SD: 1,063). Likewise, in interview answers, the most frequently mentioned advantage of using technology from teachers' perspective is that technology is easy to use, which is probably the reason why they prefer using technology for carrying out many tasks, as mentioned in the previous section. In line with this finding, Huang, Teo, and Zhou (2019) discussed that the usefulness of technology perceived by teachers stemmed from increased motivation and engagement as well as the availability of additional sources.

"Perceived Usefulness" (PU) (M:6,42; SD:,702) items were also agreed by the participants on higher levels. In other words, pre-service teachers tend to accept technology because they think that it will improve their work (Item 1; M: 6,47; SD: ,777), that it will increase their productivity (Item 2; M: 6,17; SD: 1,201), that it will enhance their effectiveness (Item 3; M: 6,43; SD: ,746), and that computers are useful tools (Item 4; M: 6,64; SD: ,689). Pre-service teachers also admitted looking for online tools that would be useful to them for their school experience course, where they are required to observe an English teacher and teach English themselves, and in their future career during the interviews, indicating that they believe in effectiveness of technology in their work. They claimed that using technology can save energy, time, and money and it would provide the teachers with a vast variety of materials that they can use or get new and creative ideas from. Teo, Ursavaş and Bahçekapılı (2012) discovered the same effect of

perceived usefulness on the intention to use technology. Gyamfi (2017) also proved that job relevance is a significant predictor of high levels of perceived usefulness. Sarıçoban (2013) even claimed that ELT teacher candidates' beliefs about the usefulness of computer are stronger that those of other branches. All of these outcomes support the finding that ELT teacher candidates are accepting of technology and that perceived usefulness is a significant factor affecting their technology acceptance. Other reasons why pre-service teachers strongly believe in the usefulness of technology was revealed during interviews. Prospective teachers admitted that it was much easier to find authentic materials and interact with native speakers of the target language with the help of technology and that using technology motivated both teachers and students. Moreover, pre-service teachers think that it is more practical to teach about the target culture through technology.

The third most agreed sub-scale of TAMPST was "Attitude toward Computer Use" (ATCU) (M: 5,97; SD: ,966). This sub-scale investigated how prospective teachers felt about technology and what attitudes they held toward using it. All items in the sub-scale were agreed on very considerably high levels. According to pre-service teachers, the biggest advantage of using technology is that it is interesting for the students and it attracts their attention (Item 8,–M: 6,07; SD: 1,067). Hence, teacher candidates think that technology should definitely be integrated into the language teaching and learning processes. All interview participants agreed that technology should be actively used without overlooking students' level and interest or forgetting about the language focus. They believe that technology can serve many purposes such as entertaining and motivating students, providing language practice, and making learning more memorable.

The second item of the ATCU sub-scale was "Working with computers is fun" (Item 9; M: 6,02; SD: 1,195). Prospective teachers clearly think that learning with technology is more fun for students – and the teachers – and when technology provides the learners with game-like learning opportunities, they do not see language learning as just a lesson, and they get more involved in the process.

Next on the ATCU sub-scale was Item 10 "I like using computers" (M: 6,33; SD: 1,080). Interview findings of the current study discussed above already showed that pre-service teachers enjoyed using technology for various reasons and purposes such as entertainment, education, and self-improvement, and this is likely to be the reason of the high agreement rate of this scale item (see section 4.3).

The final item of ATCU was item 11 "I look forward to those aspects of my job that require me to use computers" (M: 5,48; SD: 1,464). This item was the least agreed item on ATCU, and the relatively lower agreement level of this item could have resulted from pre-service teachers' concern about technological competence. During the interviews, pre-service teachers reported having taken technology-related courses during their teacher training and they admitted that they benefitted a great deal from these courses.

"I am confident in terms of speed and usage. I am not that confident in term of knowledge. I don't know many sites or apps. For example, when I think about it now, I can only think of Quizlet." (P1)

> "E-skills course was a good lesson for me as an introduction. In general, we were working on online education. We started with what online education is. It was pretty good as an introduction. (…) But it might be helpful if it was a series of courses or a compulsory elective course." (P6)

However, they also said that as language teachers of the digital era, they need more courses of this nature and they would like to take more courses if the program offered more:

"I took a class last year called E-Skills for Foreign Language Teachers. (…) That was a great lesson. There are no such courses in the faculty, and very few if any. It'd be nice if there were more. (…) I'd love to get more lessons like this if I could …." (P3)

> "There are no compulsory courses related to the use of technology. (…) Especially during this pandemic, we understood how important it is to know technology. I think it could have been both a compulsory course and more elective course options could be offered to appeal to students' interests." (P4)

"Our lessons are aimed at introducing. I think it might be more effective if it was more about the use. I don't remember seeing any other electives besides what I took, these courses can be increased in number. I'd consider taking more if there were more." (P5)

"I took one lesson called "E-skills for Foreign Language Teachers." It's been very productive for me. I liked it a lot. I learned about the use of distance education systems (…) It improved me a lot." (P7)

"I don't think the lessons in our department are sufficient. We need to be able to adapt not only educational technologies, but also technologies that are not designed for educational purposes." (P9)

As it is indicated by the excerpts above, pre-service teachers are in need of a through training as to how to use online sources and how to incorporate them into their lessons. Hence, their experience with using technology for language teaching is limited and their lack of enthusiasm to use technology in a professional sense, as indicated by the "Attitude toward Computer Use" sub-scale- could have resulted from this lack of experience. Nonetheless, with adequate technology training, prospective teachers would become more confident in their technology skill and they would feel more eager to use it in their classrooms.

Prospective teachers agreed with the sub-scale "Subjective Norm" on a relatively high level, as well (M: 5,19; SD: 1,545). By agreeing to the items of this subscale, pre-service teachers reported that encouragement from people whose opinions they value (Item 15; M: 5,02; SD: 1,703) and support from people who are important to them (Item 16; M: 5,37; SD: 1,615) mattered to them when they used technology, showing that they do not only have professional or technical reasons for using technology, they also clearly have personal reasons. In addition to the scale items, it was revealed during semi-structured interviews that prospective teachers think that there are other subjective factors that should be considered for a successful technology integration. For instance, students' families are from different socio-economic status and they may not be able to afford digital devices. This situation would lead to inequalities in education.

The teacher candidates' technology acceptance is the least affected by the "Facilitating Conditions" (M: 4,73; SD: 1,541). Prospective teachers reported that they could not benefit from specialized instruction (Item 12; M: 5,26; SD: 1,623), receive help from people (Item 13; M:4,14; SD:2,063) or receive guidance (Item 14; M :4,80; SD: 1,817) when they were in need of help and assistance with using computers and technology. However, during the interviews, pre-service teachers also mentioned having taken technology-related elective courses for specialized instruction and guidance and they reported having benefited from these courses immensely. Nonetheless, they also admitted that they think that there should be more such courses and more varied in nature, and that if they were offered more elective courses on technological issues, they would consider taking them. Merç (2015) also discovered that Turkish EFL teacher candidates receive insufficient technology training and that it leads to unsatisfactory use of technology.

5.2.3. The relationship between digital nativity and technology acceptance

Individuals' digital nativity and technology acceptance have been a demanded area of research for years. Although there are many studies that investigated digital nativity (Teo, 2013; Yong & Gates, 2014, Şahin-Kızıl, 2017, Doğusoy & İmer, 2019) and technology acceptance (Teo, Ursavaş &Bahçekapılı, 2011; Teo, Ursavaş &Bahçekapılı, 2012) on its own; combining digital nativity and technology acceptance with other variables and investigating the relationship between those variables is not a new idea.

Lewandowski (2019), for instance, examined the relationship between digital nativity and computer self-efficacy of secondary educators, using DNAS as one of the measures and she discovered that the participating secondary educators are both digital natives and highly efficient computer users, suggesting that digital nativity might have a relationship with effective use of technology.

TAMPST as a technology acceptance measure was not combined with other measures in educational settings but the Technology Acceptance Model itself was investigated in relation to other factors. Holden and Rada (2011), for example, showed that teachers' technology self-efficacy influences perceived ease of use, affecting technology acceptance in return. Kiraz and Özdemir (2006) compared educational ideologies of pre-service teachers' and proved that differences in educational ideologies lead to differences in technology acceptance. Baturay, Gökçearslan and Ke (2017) showed that there is a significant relationship between computer competence, attitudes toward computer-assisted education and technology acceptance.

The present study both measured digital nativity with DNAS and technology acceptance with TAMPST and is unique in the sense that the relationship between the two was investigated and it was seen that the there is a positive and moderate relationship between prospective teachers' digital nativity and technology acceptance. In other words, if it is known that a person is a digital native, there is a possibility that the same person is also accepting of technology. The initial theory of digital nativity discussed that digital natives' brains are different from the rest and therefore, they think and learn differently, they prefer visuals and gratification, and they want to reach information as quickly as possible (Prensky, 2001a; 2001b); and it would not be wrong to conclude that the most suitable way for digital natives to perform tasks would be through technology. Hence, it had been questioned whether being digitally native automatically meant being accepting of technology (Gu, Zhu & Guo, 2013). The current study showed that even though a

conclusion that digital natives are unquestionably accepting of technology cannot be drawn from only one study, there is an undeniable relationship between digital nativity and technology acceptance. Similar findings to those revealed by the present study were reported previously. Gu, Zhu and Guo (2013) compared technology acceptance of young and supposedly digital native students and their digital immigrant teachers and discovered a difference that could have resulted from digital nativity. However, this study based the digital native – digital immigrant difference entirely on participants' ages and it did not measure digital nativity with an additional measure. Nevertheless, since the current study also showed that technology acceptance is in fact linked to digital nativity, the outcomes of this study support those of the present study.

5.2.4. Attitudes of prospective teachers towards technology use in the language classroom

The present study showed that prospective teachers hold highly positive attitudes towards technology use in the language classroom. Teacher candidates think that technology should definitely be integrated into the language teaching and learning processes. All interview participants agreed that technology should be actively used without overlooking students' level and interest or forgetting about the language focus. As can be seen in the following samples, they believe that technology can serve many purposes such as entertaining and motivating students, providing language practice, and making learning more memorable.

"Of course, I use technology. Why wouldn't I? If I didn't use it, the kids would find it weird. It can be used for entertainment purposes. Fun activities and games can be prepared." (P1)

"We have to use technology because we do not have much chance to use foreign language under Turkey conditions. We have to practice with technology." (P2)

"Technology can help students understand and perform activities and exercises better. I think technological exercises will be more effective than exercises on paper, supported by videos and interviews." (P10)

When the student teachers were asked to elaborate on why they think technology integration is a necessity in language classrooms, advantages of technology use were mentioned. According to pre-service teachers, the biggest advantage of using technology is that it is interesting for the students and it attracts their attention. Prospective teachers

also think that learning with technology is more fun for students – and the teachers – and when technology provides the learners with game-like learning opportunities, they do not see language learning as just a lesson, and they get more involved in the process. Similarly, Li (2017) put forward that games give the players rewards and instant feedback, motivating the players to do better and score higher. In a game-like experience Cheng and Chen (2016) showed that second life was seen as fun and rewarding by the language learners and that they were motivated to use different communication channels through the game in order to establish and maintain conversation in the target language. Reinders and Wattana (2014) also reported an increase in learners' motivation and willingness to communicate in the target language when they were playing a commercial game called Ragnarok Online.

Another reason that future teachers care about technology integration is that technology provides an opportunity for exposure to authentic language. It is easier to find authentic materials with the help of technology and thanks to such materials language learners are exposed to the real language. Authentic input is essential for language acquisition and "technology is widely used as a language resource for authentic input" (Li, 2017, p.39). Moreover, online platforms such as chat rooms and video games give the learners a real and meaningful purpose to put their linguistic knowledge into use. Communicating with native speakers or simply being exposed to the target language can also lead to unconscious learning and the students can improve their language skills without even realizing.

The Internet is an endless resource with so many websites, tools, and materials which can be utilized in language teaching and learning. Hence, student teachers see technology as a way of enhancing the language teaching and learning process. They believe that technology would allow learners to actively use technology with the native speakers of the target language. Indeed, Tudini (2003) argues the significance of interacting with native speakers and Cadd (2012) suggests studying abroad as a way of interacting with native speakers. Be that as it may, today's language learners are able to have conversations with native speakers of any language without even leaving their homes, thanks to technology.

According to teacher candidates, with the incorporation of technology, learners' comprehension of the language would be enhanced, and the learners would be able to participate in the activities and exercises more efficiently. In addition, implicit learning

would be supported since the Internet is a valuable source for providing ample input. With enough input, they believe a better understanding of the target language can be achieved. This way, technology use can also be motivating for the learners. In addition, prospective teachers are strong believers that if language learning and acquisition is to take place, language instruction in the classroom is not enough on its own. They mentioned finding online sources to develop their linguistic knowledge when they were learning English and still making use of online tools if they are trying to learn another foreign language. They believe that their future students should also find tools and sources that would help them with their language learning and that if the teacher actively uses technology in the classroom, it encourages the students to use technology outside the classroom. Doing so, learners can also get a chance to learn the language when and where it is appropriate for them and at their own pace and they can repeat what they previously learned as many times as they feel necessary. Li (2017) pointed out that teachers should have a facilitating and supporting role in a technology-integrated classroom and they should steer, help, and encourage the students and studies showed that language learners are motivated to keep learning outside the classroom using technology (Lai & Gu, 2011; Lai& Zheng, 2018; Garcia Botero, Questier & Zhu, 2019). By using technology to keep learning the language outside the classroom, the students would be able to learn the language at their own pace.

Teacher candidates see learning about the culture as a natural part of language learning and they are hopeful that integrating technology would be helpful for cultural learning. Lin and Wang (2018) improved their language learners' multicultural competence through viewing a series and TEDTalks and asking students to reflect on what they watched. The students began considering watching videos as a way of broadening their horizons and learning about other people's cultures. Özdemir (2017) reported that Turkish EFL students benefited from communicating with people from different cultures through Facebook. Prospective teachers also believe that technology makes communication so much easier and that faster interaction with the teacher would make possible for the students to get instant feedback on their mistakes, errors, and assignments, even if they are physically in different places. There is also previous research claiming that online feedback help learners improve their work more than face-to-face feedback (Liu & Sadler, 2003; Hatime & Zeynep, 2012; Özkul & Ortaçtepe, 2017). Additionally, pre-service teachers think that using technology and encouraging the students to do the same could allow students to take responsibility for their own learning

and help them become autonomous learners. Finally, one pre-service teacher suggested that visually impaired learners can be aided as they learn a language with the incorporation of technology.

Pre-service teachers' interview answers made it clear that technology integration not only advantageous for the students, but also for the teachers. The most frequently mentioned advantage of using technology from teachers' perspective is that technology is easy to use. In line with this finding, Huang, Teo, and Zhou (2019) discussed that the usefulness of technology perceived by teachers stemmed from increased motivation and engagement as well as the availability of additional sources since technology offers a vast variety of materials that they can use or get new and creative ideas from. Moreover, prospective teachers think that using technology would save energy, time, and money and it would be both more fun and more motivating for the teachers.

As much as pre-service teachers believe in the efficiency of technology, they think that the use of technology should not be without its boundaries. Prospective teachers believe that language teaching and learning should not completely surrender to technology and it should be limited when appropriate:

"Of course, we should use technology, but there has to be a limit." (P4)

"It shouldn't go further than being a support. Education should not be built on technological programs. I don't think such an education would be very fruitful." (P6)

"It should be neither too much nor too little. We have to use it where it's effective." (P8)

As it can be seen from participant quotations above, pre-service teachers support the idea of appropriate amount technology use, saying that the entire process of language teaching and learning should not surrender to technology; because they are not indifferent to the disadvantages of using technology and to possible problems that can be faced while using it. For instance, pre-service teachers think that technology can be a distraction for the students. Gudmundsdottir and Hatlevik's study (2017) is line with this finding. They examined the attitudes of 356 newly qualified Norwegian teachers and showed that even though the majority of their participants held positive attitudes towards technology use in the classroom, half of them still had negative attitudes as well, and the main source of those negative attitudes was the distracting effect of technology they had to struggle with during teaching experience. In-service teachers also reported partly believing in the distracting nature of technology use (Howlett & Waemusa, 2018).

Students come from families with different socio-economic status and they may not be able to afford digital devices. Hence, pre-service teachers are strong believers that if technology will be integrated into education, authorities need to be sure that all students have access to devices and the Internet. Otherwise, it could lead to inequalities.

Prospective teachers are worried that if the leaners get too accustomed to do everything easily with technology their productivity may decrease. In addition, prospective teachers are aware of the significance of technology in providing learners with opportunities to interact with native speakers and they clearly emphasized this when they talked about the advantages. However, they think that when students interact with native speakers, it is difficult to monitors what they do and what they talk about. Such a difficulty can pose a security problem. Srikwan and Jakobsson (2007) emphasized the significance of online security in their report and discussed that every active user of technology and online sources should be educated as to how to properly use technology. They also highlight the importance of providing technology training that is most suitable for a certain group of learners.

Teacher candidates know that children grow up using technology and that they are competent users. Yet, they still think that using technology for personal reasons on a daily basis is not the same as using technology for educational purposes and that it could be a problem if the students are not familiar with technologies that teachers intend to use in the classroom. Gu, Zhu, and Guo' findings (2013) support pre-service teachers' concern because they pointed out that the amount the students use technology at home is significantly higher than the amount of technology use in class and what they use in and outside of the classroom differs. Luckily, Pinto-Lorente, Sanchez-Gomez, Garcia-Penalvo, and Casillas-Martin (2017) showed that with adequate training students can still enjoy using a technology that they had never used before. Hence, if the students are properly introduced to technologies and digital tools, the integration of technology would be easier, more enjoyable and more effective.

Using technology too much can also result in technology addiction in students. Another possible disadvantage of technology integration stated by prospective teachers is that the students can even get lost in game-like experiences and simply skip the language learning elements in those games and activities. Other disadvantages that students may have to deal with are health issues such as eye problems caused by looking at a screen for a long time, cheating if they are supposed to take exams online, difficulty

of monitoring attendance for online courses, and being exposed to misinformation if the students do not know how to tell apart correct and incorrect information and how to reach reliable knowledge using online sources.

Secondly, teacher candidates talked about disadvantages that could result from the teacher. The biggest teacher-related problem, based on student teachers' answers, is teachers' lacking or inadequate technology skills and knowledge. Some prospective teachers have already experienced such issues in places they worked or during school experience. Moreover, they observed these problems with their own teachers. They reported that their teachers had a limited use of technology, even after the installation of smart boards and that not many teachers tried to become competent technology users because of reasons such as advanced age or not being particularly interested in technical issues. Indeed, Li (2008) discovered differences in in-service teacher attitudes depending on many factors. It was shown that teachers who had a computer and access to the Internet had more positive attitudes towards using technology. Similarly, younger teachers were more positive about using technology. Experience in the profession, however, had a negative effect on attitudes, more experienced teachers had less positive attitudes. Pre-service teachers also mentioned that when teachers might have confidence issues when they do not think they are competent enough. Teachers' confidence issues were previously reported to be problematic (Lam 2000; Thao, 2003; Vanek, 2017). Yücel, Acun, Tarman and Mete (2010) even suggested that negative attitudes towards technology is not related to ICT knowledge but to self-inadequacy and that when teachers internalize using ICT in class, lack of administrative support becomes less of a problem for them. In addition, Liu and Kleinsesser (2015) reported that proper instruction can help teachers with both their lack of technology knowledge and skills and their lack of confidence. Thus, it can be suggested that not only prospective teachers, but in-service teachers as well would benefit from receiving training in using technology in the classroom.

It is thought that teachers may not be able to keep up with the latest technological developments because technology improves rapidly. Therefore, student teachers are aware that they should always do their best in order not to left behind by the technical improvements of the era:

"As teachers, we have to work all the time. I think that technology education should be given at the university, this is as important as other courses, but it is not enough on its own. The teacher always has to improve." (P2)

"Technology is developing so fast that a technology produced today will be very old in 2 years." (P9)

Technology interaction also forces teachers to multitask; they are supposed to actively and effectively use technology themselves and monitor the students to make sure they are not doing something else on their devices. Multitasking can be overwhelming for the teachers. In addition, teachers have really busy schedules, and they may not have enough time to search for the newest developments and learn about them. Jones (2001) argued that even if teachers possess proper technical knowledge, they may still not prefer to use technology because they think that using technology could be time consuming.

Finally, pre-service teachers mentioned possible technical problems that can be encountered while using technology. According to pre-service teachers, the Internet itself can be problematic if a stable connection cannot be maintained or if the speed of the connection is too slow. Device malfunctions such as not being able to turn on devices and power outages are other frequent problems mentioned by future teachers. In some schools, technological equipment is too old or inadequate in number. Prospective teachers think that teachers may be able to solve these problems in some cases, but in most cases, such as power outages, there is nothing teachers can do. Hence, prospective teachers repeatedly emphasized the importance of not relying completely on technology and always having a back-up plan in case anything goes wrong.

5.3. Conclusion and Implications

The present study has presented highly promising findings. It was revealed that pre-service English teachers are indeed digital natives, that they are highly accepting of technology, and that they actively use technology for several purposes such as communication, entertainment, schoolwork, and professional development. Furthermore, most of their attitudes towards technology integration are positive and they strongly believe that technology would enhance their work, performance, and professional career. They approach using technology in the classroom positively because they think technology would help them attract their future students' attention, and it would provide the learners with a fun game-like language learning experience. Technology also makes

it possible for learners to be exposed to the authentic language and actively use the target language in real life-like situations and with native speakers. Pre-service teachers strongly believe in the efficiency of technology integration in enhancing comprehension, making language exercises more effective, supporting implicit learning and providing the learners with ample input. According to prospective teachers, using technology would motivate and engage their students in a fun and effective way, allowing them to establish and maintain a productive language teaching and learning environment. Additionally, the students could learn how to use online tools from their teachers and use those tools independently and this would make it possible for them to learn the language at their own pace. With the help of technology, learners would learn about the target culture, receive instant feedback, and become autonomous learners. Technology would also support visually impaired students' language learning process. Teacher candidates are also hopeful that using technology will let them improve themselves since they will be able to save time, money and energy with the help of technology integration. With the ease of use and variable materials technology offers, they would be able make language instruction more fun and motivating for both themselves and their students.

This study also revealed that the future teachers are not indifferent to the possible drawbacks of technology integration. They admitted being concerned about technology being a distraction and leading to inequalities in education if all the students cannot afford necessary digital devices. Teacher candidates think that their students can also face problems with decreases in their productivity, online security, lack of technological knowledge or experience, technology addiction, and ignoring language learning as they play educational games. Eye problems, cheating during online exams, not attending online classes regularly, and being exposed to incorrect information were also mentioned as problems. Prospective teachers are also worried that if teachers are not knowledgeable or competent enough to use technology, if they cannot keep up with latest technological developments or if they cannot find enough time to do so, and if they are too overwhelmed by multitasking required by technology integration, incorporating technology in the classroom would be problematic. Finally, according to pre-service teachers, technical problems such as Internet access and speed, device malfunctions, power outages, and outdated or inadequate equipment can pose problems as they try to use technology. Luckily, teacher candidates are not hopeless about perceived disadvantages of technology and possible problems they might face while using technology. They think that they

would be able to solve their future problems with close and careful monitoring and a lot of practice. Moreover, they suggest that they would be more competent and successful at incorporating technology in the classroom if they are provided with sufficient pre-service and in-service trainings. Hence, this study has certain implications both for education provided in K-12 schools and teacher training programs of universities.

Previous studies clearly showed integrating technology into the language teaching and learning processes is highly beneficial and influential, provided that it is done correctly. Turkish Ministry of Education speeded up technology integration with FATIH project when an Interactive White Boards were installed in classrooms all over the country and the students as well as teachers were given Tablet PCs. However, there are still schools that does not have a stabile Internet connection. The connection availability and quality need to be checked and improved. In fact, the chance to connect to the Internet quickly and without any misconnections should be provided to the whole country because the pandemic that Turkey and the rest of the world have been battling with for the past year showed that education cannot be paused because of unusual circumstances and precautions should be taken to provide education whenever and wherever possible. Technology and distant education enhanced educators' and learners' options and made education and training possible during the COVID-19 pandemic. In addition, study shows that language learners demonstrate an interest to studying languages outside the classroom by using online sources and they need Internet connection to do so, with or without the pandemic.

Language teachers should be supported to incorporate technology in their classes and to encourage their students to experiment with technology on their own. Teachers' technology skills and knowledge can be developed with regular in-service trainings. In these trainings, new and varied online tools and devices that can be employed in language instruction should be introduced to the teachers in line with technological advancements. Another implication that can be considered in the light of pre-service teachers' suggestions is to test teachers' technical knowledge on a regular basis and provide them with ample opportunity to grow and develop if their skills seem inadequate. Once necessary training and support is provided, teachers would become better technology users and technology integration would considerably improve.

Finally, it should be realized that even though younger learners grow up surrounded by technology and they develop certain technical skills at a very young age, they might lack knowledge and experience with educational tools. A weekly course or an orientation session should be considered regarding how to properly use a certain technology before it is used in the classroom for more efficient and fruitful lessons.

Prospective teachers are highly hopeful that they are ready to meet the needs and expectations of modern education and tech-savvy learners and they believe they can improve their skills even further with additional training. English teacher candidates of Anadolu University are currently offered two technology-related elective courses: E-Skills for Foreign Language Teachers and Digital Material Development in English Language Teaching and they reported having benefited from these courses immensely. Although the necessity of technology training was realized, and a few lessons were provided for prospective teachers to take, pre-service teachers reported that they wished to take more courses on language education tools and how to use them in class. More elective lesson options should be offered to teacher candidates so that more online tools can be taught, and more students can benefit from these courses. Moreover, in case some students are not fully aware of the significance of technology training, some technology-related courses can be given to teacher candidates as compulsory methodology courses, where they could learn how to effectively teach the target language with the integration of technology. Advisors can also steer future teachers to choose more technology electives, informing them about the availability and importance of such courses. As the participants of the present study stated, insufficient quota can be problematic in some cases, so, it should be made sure that students do not miss technology courses simply because they could not find a place in the class. Technology integration can also be made a part of the teaching practicum, where the teacher candidates can be required to include online tools into their lesson plans or during in-class lesson presentations.

5.4. Limitations and Recommendations for Further Research

This study, like every other, had its limitations. Firstly, this study was conducted with a limited number of 92 participants. Similar studies that would investigate prospective language teachers' digital nativity, technology acceptance, and attitudes towards technology acceptance can be conducted with a larger number of participants. More variables can also be added to the research design. For example, age and gender of

participants were asked during data collection, but this information only provided participant demographics information. Thus, future studies can investigate possible effects age and gender might have on digital nativity, technology acceptance and attitudes. The majority of participants were in their early 20s, participants from different age ranges can be worked with in the future. This would make an age-based comparison possible.

Data collection of this study was completed over the course of a month and a half. Since the present study emphasizes the significance of technology training, longitudinal studies where the effects of technology courses at universities, additional technology training or in-service training are examined can be designed. Such a research design can focus on pre-service teachers, in-service teachers or both, if a comparison is wished to be made. Since the present study only focused on prospective teacher, future studies can focus on in-service teachers, as well. Studying in-service ELT teachers and investigating their digital nativity, technology acceptance, and attitudes towards technology would also help authorities form an idea regarding the current state of language teachers. The findings of such studies, in return, would assist shaping in-service teacher trainings as well as pre-service teacher training programs accordingly.

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APPENDIX-A. Consent Form

Dear Participant.

By answering the questionnaire, you will be contributing to a dissertation study designed and conducted by Hilal TUNÇKOL and supervised by Assistant Professor Hülya İPEK. For any questions you might have you can mail the researcher: hilaltunckol@gmail.com

The survey you are about to take consists of 4 main sections.

The following questions aim to gather personal information. Please read the items carefully and answer accordingly. Your name and e-mail address are asked solely for research purposes and will be used if you choose to be notified of the results of the study or if you choose to volunteer for the second phase of the study. They will only be seen by the investigator and will not be shared with anyone else. If you decide that you do not want to participate in this study at any stage of the study, you can mail the researcher and withdraw from the investigation.

Please confirm that you have read the text above and that you participate in this study voluntarily.

APPENDIX-B. Participant Demographics and Questionnaires

Section A – Participant Demographics

Name:

E-mail:

Gender

Male   Female

Age:

Did you take any courses about technology use during your teacher training?

Yes   No

APPENDIX-B. Participant Demographics and Questionnaires (Continued)

Section B - *Teo's (2013) Digital Natives Assessment Scale (DNAS)* **-** (Teo, 2013) – 7-point Likert scale; 4 sub-scales

This section includes a 7-point scale questionnaire. Please read the item carefully and choose the option that is most suited to you (1:strongly disagree; 7:strongly agree).

ITEMS	1	2	3	4	5	6	7
Grow up with technology							
1. I use the internet every day							
2. I use computers for many things in my daily life							
3. When I need to know something, I search the internet first							
4. I use the computer for leisure every day							
5. I keep in contact with my friends through the computer every day							
Comfortable with multitasking							
6. I am able to surf the internet and perform another activity comfortably							
7. I can check email and chat online at the same time							
8. When using the internet for my work, I am able to listen to music as well							
9. I am able to communicate with my friends and do my work at the same time							
10. I am able to use more than one application on the computer at the same time							
11. I can chat on the phone with a friend and message another at the same time							
Reliant on graphics for communication							
12. I use pictures more than words when I wish to explain something							
13. I use a lot of graphics and icons when I send messages							
14. I prefer to receive messages with graphics and icons							

15. I use pictures to express my feelings better							
16. I use smiley faces a lot in my messages							
Thrive on instant gratifications and rewards							
17. I wish to be rewarded for everything I do							
18. I expect quick access to information when I need it							
19. When I send out an email, I expect a quick reply							
20. I expect the websites that I visit regularly to be constantly updated							
21. When I study, I prefer to learn those that I can use quickly first							

APPENDIX-B. Participant Demographics and Questionnaires (Continued)

Section C

Technology Acceptance Measure for Pre-service Teachers (TAMPST) (Teo, 2010) – 7-point Likert scale; 5 subscsales.

This section includes a 7-point scale questionnaire. Please read the item carefully and choose the option that is most suited to you (1: strongly disagree; 7:strongly agree).

ITEMS	1	2	3	4	5	6	7
Perceived usefulness (PU)							
1. Using computers will improve my work							
2. Using computers will increase my productivity							
3. Using computers will enhance my effectiveness							
4. I find computers a useful tool in my work							
Perceived ease of use (PEU)							
5. My interaction with computers is clear and understandable							
6. I find it easy to get computers to do what I want it to do							
7. I find computers easy to use							
Attitude toward computer use (ATCU)							
8. Computers make work more interesting							
9. Working with computers is fun							

10. I look forward to those aspects of my job that require me to use computers							
Facilitating conditions (FC)							
11. When I need help to use computers, specialized instruction is available to help me							
12. When I need help to use computers, a specific person is available to provide assistance							
13. When I need help to use computers, guidance is available to me							
Subjective norm (SN)							
14. People whose opinions I value will encourage me to use computers							
15. People who are important to me will support me to use computers							

APPENDIX-C. Scale Owner's (Timothy Teo) Permission

Permission to Use Measures ⟩ Gelen Kutusu ×

Hilal Tunçkol <hilaltunckol@gmail.com>   29 Eki 2020 15:29 (9 gün önce)
Alıcı: Timothy.Teo ▾

Dear Doctor Teo;

My name is Hilal Tunçkol and I am an M.A. student at Anadolu University, Turkey. For my dissertation, I am designing a study to examine digital nativity and technology acceptance of Turkish EFL teacher candidates, as well as the relationship between these two variables, if there is any. I am hoping to conduct my study by using your Digital Natives Assessment Scale (DNAS) and Technology Acceptance Measure for Pre-service Teachers (TAMPST) and I would like to get your permission to use these measures.

Thank you for your time.

Best regards,

Hilal TUNÇKOL

Timothy Teo   29 Eki 2020 15:33 (9 gün önce)
Alıcı: ben ▾

Dear Hilal,

You have permission to use the two instruments mentioned below.

All best wishes to your research.

Regards,
Timothy Teo, PhD

APPENDIX-D. Semi-Structured Interview Questions

1.   Günlük hayatınızdaki teknoloji kullanımınızdan bahseder misiniz?

a)   Teknolojiyi en çok hangi amaçla kullanırsınız? Kişisel mi (oyun, eğlence, sohbet, alışveriş vb.), eğitim amaçlı ya da profeyonel mi? (Dil öğrenme ve öğretme)

2.   Kendi yabancı dil öğreniminiz sırasında sınıf içinde ya da dışında teknolojiden faydalandınız mı? Örnek verebilir misiniz?

a)   Yabancı dil öğretmeniniz teknolojiden faydalandı mı? Size bu yönde öneride bulundu mu?

b)   Kendiniz keşfedip kullandığınız teknolojiler oldu mu?

3.   Bir İngilizce öğretmeni adayı olarak, teknolojinin dil öğretimindeki yeri hakkında ne düşünüyorsunuz?

a)   Ne kadar kullanılmalıdır?

b)   Hangi amaçlara hizmet etmelidir?

c)   Teknolojiyi dil öğretimine dahil etmenin olası avantajları nelerdir?

d)   Teknolojiyi dil öğretimine dahil etmenin olası dezavantajları / karşılaşılabilecek sorunlar nelerdir?

APPENDIX-E. Data Collection Schedule

The Collection of Participant Demographics, Web Tools Checklist, and The Questionnaires (Quantitative Measures): December 15th – December 26th, 2020

The Interviews (Qualitative Measures): January, 12th – February 3rd, 2021

APPENDIX-F. Invitation to Interviews

Sevgili Öğretmen Adayı;

İsmim Hilal Tunçkol, üniversitemizde yüksek lisans öğrencisiyim. Birkaç hafta önce staj danışmanınızla linkini paylaştığım "An Investigation of Pre-Service English Teachers' Digital Nativity, Technology Acceptance, and Attitudes about Technology Use in the Classroom." isimli anket çalışmama katıldığınız için teşekkür ederim.

Çalışmanın ikinci aşaması için de katılımınıza ihtiyaç duymaktayım.

Bu aşama;

- ZOOM uygulaması üzerinden online görüşme olarak Türkçe olarak gerçekleştirilecektir.

- Görüşmeler 30-35 dakika sürmektedir.

- Görüşmeler araştırma amaçlı kayıt altına alınacak fakat yalnızca araştırmacı tarafından görülecektir.

Lütfen katılıp katılamayacağınıza dair bu maili cevaplayınız. Katılmanız durumunda en yakın zamanda ne zaman müsait olduğunuzu da cevabınızda bana bildirmenizi rica ediyorum.

Şimdiden teşekkür eder, iyi çalışmalar dilerim.

APPENDIX-G. Etik Kurul Karar Belgesi

| Evrak Kayıt Tarihi: 13.11.2020 | Protokol No: 66704 | | Tarih: 25.11.2020 |

ANADOLU ÜNİVERSİTESİ
SOSYAL VE BEŞERİ BİLİMLER BİLİMSEL ARAŞTIRMA VE YAYIN ETİĞİ KURULU
KARAR BELGESİ

ÇALIŞMANIN TÜRÜ:	Yüksek Lisans Tez Çalışması
KONU:	Eğitim Bilimleri
BAŞLIK:	An Investigation of Pre-Service English Teachers' Digital Nativity, Technology Acceptance, and Attitudes about Technology Use in the Classroom. İngilizce Öğretmeni Adaylarının Dijital Yerlilik, Teknoloji Kabulü ve Sınıfta Teknoloji Kullanımına Başkan Tutumları
PROJE/TEZ YÜRÜTÜCÜSÜ:	Dr. Öğr. Üyesi Hülya İPEK
TEZ YAZARI:	Hilal TUNÇKOL
ALT KOMİSYON GÖRÜŞÜ:	.
KARAR:	Olumlu

Prof.Dr. Emel ŞIKLAR
(Başkan İkt. ve İdari Bil. Fak.)

Prof.Dr. T. Volkan YÜZER (Başkan Yardımcısı Açıköğretim Fak.)	Prof.Dr. Esra CEYHAN (Eğitim Fak.)
Prof. Hayri ESMER (Güzel Sanatlar Fak.)	Prof.Dr. M. Erhan ÖYÖMEZ (İkt. ve İdari Bil. Fak.)
Prof.Dr. Handan DEVECİ (Eğitim Fak.)	Prof.Dr. Oktay Cem ADIGÜZEL (Eğitim Fak.)