

T.C.
ISTANBUL SABAHATTIN ZAIM UNIVERSITY
GRADUATE EDUCATION INSTITUTE
DEPARTMENT OF ENGLISH LANGUAGE TEACHING

**THE EFFECTS OF MOBILE-ASSISTED LANGUAGE
LEARNING (MALL) ON TURKISH EFL STUDENTS'
VOCABULARY LEARNING**

MASTER THESIS

Şenol SÖĞÜT

Istanbul
June, 2021

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Thesis Advisor
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Istanbul
June, 2021

THESIS APPROVAL

This thesis has been approved in partial fulfilment of the requirements for Master Degree in English Language Teaching

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SCIENTIFIC ETHICS DECLARATION

This is to certify that this MA thesis titled “**The Effects of Mobile-Assisted Language Learning (MALL) on Turkish EFL Students’ Vocabulary Learning**” is my own work and I have acted according to scientific ethics and academic rules while producing it. I have collected and used all information and data according to scientific ethics and guidelines on thesis writing of Sabahattin Zaim University. I have fully referenced, in both the text and bibliography, all direct and indirect quotations and all sources I have used in this work.

Signature

Şenol SÖĞÜT

June, 2021

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Şenol SÖĞÜT

Istanbul, June 2021

ABSTRACT
THE EFFECTS OF MOBILE-ASSISTED LANGUAGE LEARNING
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VOCABULARY LEARNING

Şenol SÖĞÜT

Master, Department of English Language Teaching

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Mobile-Assisted Language Learning (MALL) apps have become increasingly ubiquitous and popular in language learning. However, there are not many experimental studies investigating the effectiveness of such apps on middle school EFL learners. This study aims (a) to investigate the effect of Duolingo, a free online language learning platform on vocabulary learning, the objective of which is to develop English vocabulary and grammar acquisition for beginner learners and (b) to explore the perceptions and attitudes of learners towards MALL supplementation. The participants of this study were selected by convenience sampling method and consisted of thirty (N=30) EFL students enrolled at a Turkish public middle school in 2020-2021 academic year. As research design, a two-group pretest-posttest design was selected from quantitative research models. The experimental group received MALL supplementation, whereas the control group did not receive any treatment. In this quasi-experimental study, data were gathered through pre- and post-test, post-treatment questionnaire and semi-structured interview. The treatment lasted for eight weeks. At the end of the treatment, pre- and post-test scores of the groups were compared and analysed to measure the effect of MALL supplementation on the students’ vocabulary knowledge. The obtained test results demonstrated that the experimental group statistically outperformed the control group. Post-treatment questionnaires and semi-structured interviews were administered to the treatment group to explore their attitudes and perceptions towards MALL supplementation. Findings revealed that the participants had

positive perceptions and attitudes towards MALL supplementation which facilitated learning opportunities of the students.

Keywords: Mobile-Assisted Language Learning, Duolingo, Attitude, Perception, Vocabulary Learning



ÖZET
MOBİL-DESTEKLİ DİL ÖĞRENİMİ (MODDÖ) UYGULAMASININ
TAMAMLAYICI BİR MATERYAL OLARAK İNGİLİZCE KELİME
ÖĞRENİMİ ÜZERİNE ETKİSİ

Şenol SÖĞÜT

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Mobil-Destekli Dil Öğrenimi (MODDÖ) uygulamaları dil öğreniminde gittikçe yaygın ve popüler hale gelmiştir. Ancak, bu tür uygulamaların İngilizceyi yabancı dil olarak öğrenen ortaokul öğrencileri üzerine etkinliğini araştıran çok fazla deneysel çalışma yoktur. Bu çalışma (a) ücretsiz bir çevrim içi dil öğrenme platformu olan Duolingo'nun kelime öğrenimi üzerindeki etkisini araştırmayı ve (b) öğrencilerin MODDÖ takviyesine yönelik algı ve tutumlarını keşfetmeyi amaçlamaktadır. Bu araştırmanın katılımcıları amaçlı örneklem yöntemiyle seçilmiş olup araştırmanın örneklemi 2020-2021 eğitim öğretim yılında bir Türk devlet ortaokulunda öğrenim gören otuz (N=30) ortaokul öğrencisi oluşturmuştur. Araştırma deseni olarak nicel araştırma modellerinden iki gruplu ön test-son test deseni seçilmiştir. Deney grubu öğrencileri MODDÖ takviyesi alırken kontrol grubu öğrencileri herhangi bir destek almamıştır. Bu yarı deneysel çalışmada veriler ön ve son test, uygulama sonrası anketi ve yarı yapılandırılmış görüşme yoluyla toplanmıştır. İşlem 8 hafta sürmüştür. İşlemin sonunda, MODDÖ takviyesinin öğrencilerin kelime bilgisi üzerindeki etkisini ölçmek için grupların ön ve son test puanları karşılaştırılmış ve nicel olarak analiz edilmiştir. Elde edilen bulgular, deney grubunun kontrol grubundan istatistiksel olarak daha başarılı olduğunu göstermiştir. MODDÖ takviyesine yönelik tutum ve algılarını araştırmak için deney grubuna işlem sonrası anketi ve yarı yapılandırılmış görüşme uygulanmıştır. Bulgular, katılımcıların öğrenme fırsatlarını kolaylaştıran MODDÖ takviyesine yönelik olumlu algı ve tutuma sahip olduğunu ortaya çıkarmıştır.

Anahtar Kelimeler: Mobil-Destekli Dil Öğrenme, Duolingo, Tutum, Algı, Kelime Öğrenimi

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LIST OF ABBREVIATIONS

CALL: Computer Assisted Language Learning

EFL: English as a Foreign Language

IOS: iPhone Operating System

MALL: Mobile Assisted Language Learning

MMS: Multimedia Messaging Service

SPSS: Statistical Package for the Social Sciences

SMS: Short Message Service

VAT: Vocabulary Achievement Test

ZPD: Zone of Proximal Development

CHAPTER I

INTRODUCTION

Recently, the development of technology and the internet have changed the use of computers and mobile devices in language learning. With the emergence of mobile devices such as smartphones, portable digital assistants (PDAs), tablets, laptops, and other small portable devices, the notion of ‘mobile learning (m-learning)’ has become popular. It is fair to say that, most of the learners own a smartphone today. According to data from the Statista, German online portal for statistics, by the end of 2021, almost 72% of the world population will have one of these devices. This growing interest towards mobile devices caused the emergence of educational messaging software, huge mobile devices market, multimedia messaging companies, mobile learning websites, and bulk texts across the world. Mobile applications are usually downloaded from app stores such as Google Play, App Store and Windows Phone Store. These apps are intended to run on mobile devices such as tablets, smartphones and PDAs. Some of these apps are paid to download and some others are free of charge. Categories of mobile apps are entertainment, education and gaming (Gangaiamaran & Pasupathi, 2017). The app’s usage statistics are explained below:

- Total number of apps downloaded – 500 million
- People aged 18-24 years spend 34.7 hours on tablet apps and 90.6 hours on smartphone apps per month.
- By 2021, \$189 million in revenue is expected from the app.
- Apple’s App Store consists of more than 2.2 million Apps that are available to download on iOS devices.

- Google's Play Store consists of more than 2.8 million Apps that are available to download on Android devices.
- 21% of millennial generation use a certain app more than fifty times a day.
- 49% of people use a certain app more than eleven times every day.
- Mobile apps comprise 57% of all digital media usage.
- An average smartphone owner uses around thirty apps per month.

Mobile phones can be regarded as one of the most crucial tools in language education. Language learning got into a new era with the help of the mobile applications which are operated with mobile phones. This popularity, ongoing developments in mobile devices and constant change of trends inspired investors, scholars and educators to further explore the use of those mobile devices in language learning and teaching. If we can equip these devices with convenient applications, they can be effective tools in language teaching. Nowadays, there are number of mobile applications which are designed with the purpose of learning English (Hockly, 2012). Some of the most popular Mobile Assisted Language Learning (MALL) apps are Duolingo, Memrise, Busuu, LanguageLift, Lingua.ly, Babbel and HelloTalk. Duolingo is the most popular of all having more than 500 million users, becoming the world's most downloaded education app. However, this is an area which is not yet fully explored in the literature as there is little research done related to the effectiveness of these apps on language learning.

A particular app, Duolingo, will be used in this study. It is free of charge and can be accessed through a smart phone, a tablet or a desktop computer. It is available on the biggest app markets like Google Play and App Store. This app aims to teach grammar and vocabulary through a series of exercises divided into skills and lessons. The app promises to bring learners to an elementary level (A2) if they complete all the required modules. Therefore, this study seeks to investigate the effects of Duolingo as a supplementary material on Turkish middle school EFL learners' vocabulary learning.

1.1. Statement of the Problem

Since the global outbreak of Covid-19, MALL has obtained a pivotal role in language teaching. Mobile learning applications proved to be practical since the limitations of time and space are no longer affecting learning. Vocabulary learning is one of the areas where mobile devices are mostly used. Some mobile dictionaries and mobile applications have been designed and created in order to support effective vocabulary learning. With advancements in mobile technologies, some language researchers and educators claimed that some aspects of language acquisition, such as vocabulary, can be mediated through digital tools. However, vocabulary learning continues to be as one of the challenges of language learning in Turkey. Language teachers try to find new ways and teaching strategies for more effective vocabulary teaching. There are many parameters affecting vocabulary learning process of learners such as anxiety, motivation, attitudes and perceptions towards language learning and so on. Nonetheless, it is essential for language teachers to consider how to teach vocabulary more effectively without boredom. This study aims to find out the impact of MALL supplementation on vocabulary knowledge of EFL learners through the use of Duolingo platform. The findings of this research should provide some important implications about effective vocabulary teaching practices in view of the rapidly growing mobile technologies.

1.2. Purpose of the Study and Research Questions

When m-learning has been adapted to language learning this concept has been shifted as Mobile-Assisted Language Learning (hereafter MALL). MALL is benefiting from mobile technology in language learning based on the theory of m-learning. MALL is not as common and de facto as CALL as it is new and studies on MALL are so limited, which leads the researcher to focus on this subject. Thus, the aim of this study is to determine the effectiveness of MALL supplementation in terms of vocabulary learning. Besides, this study aims to get an opinion about perceptions and attitudes of learners towards the app. Thus, the research questions of this study are as follows:

1. Are there any statistically significant differences between the experimental group and the control group students in terms of vocabulary achievement?
2. What are the perceptions and attitudes of Turkish middle school EFL learners towards MALL supplementation?

1.3. The Hypothesis of the Study

This study aims to investigate the effect of MALL supplementation on vocabulary knowledge of the students as well as their perceptions and attitudes towards the treatment. The hypotheses of the present study are as follows:

1. The experimental group students will statistically outperform the control group students in terms of vocabulary achievement.
2. The experimental group students will show positive attitudes and perceptions towards MALL supplementation.

1.4. Significance of the Study

This study tries to determine if MALL supplementation is effective in vocabulary learning. In the related literature, there are several studies using m-learning apps for vocabulary learning. These studies often used SMS as mobile tool (Çavuş & İbrahim, 2009; Hayati, Jalilifar & Mashhadi, 2013; Hu, 2013; Lu, 2008; Saran, Seferoğlu & Çağıltay, 2012; Song & Fox, 2005; Zhang, Song & Burston, 2011). The other mobile tools used for vocabulary learning in the research studies were e-mail and different systems developed by the researchers (Başoğlu & Akdemir, 2010; Chen & Chung, 2008). However, there is little research conducted about the effect of MALL apps in foreign language learning. MALL apps differ from SMS and e-mails greatly, as many features that are included in apps do not exist in SMS. MALL apps present variety of games and activities that SMS cannot utilize. Furthermore, interactivity and the quality and quantity of visuals and audio materials in the MALL apps separate them from SMS studies. Thus, considering these features of mobile applications and the role of these features in learning, this study will utilize a popular MALL app, Duolingo, to assess the effects of the app as language learning tool outside the classroom. Moreover, it is aimed

that with the use of mobile applications, some challenges of SMS such as storage problem are compensated as there is no storage problem in mobile applications. In the SMS studies, it was observed that although the use of SMS was effective in vocabulary teaching, getting continuously SMS from the teacher was the reason of distraction and create distributions for the students (Zhang et al., 2011). In the use of Duolingo, this distribution is not the case, as the learners study in time and place they want. When mobile learning is defined as learning anytime and anywhere, sending SMS at a specified time does not fully meet the logic of learning anytime. In this study, the logic of learning anytime and anywhere with mobile devices is grounded so no intervention by any researcher will be used for mobile learners.

In literature, there are some studies that encourage the use of mobile applications in language learning. However, these studies usually focus solely on the attitudes of the learners towards mobile applications (Deng & Shao, 2011; Nino, 2015; Steel, 2012) or review some MALL apps such as 50Languages, Duolingo, Learn English and Vocab Lite (Cowan, 2015; Gangaianmaran & Pasupathi, 2017; Nushi & Egbali, 2017). There are not many experimental studies investigating whether mobile applications are really beneficial in language learning outcomes. Thus, this study will try to fill this gap in the literature. Furthermore, by using an application that focuses on vocabulary and grammar in which Turkish learners have much difficulty to have a good grasp of learning, this study aims to help them to learn the target vocabulary items. Although there are some studies using certain MALL apps as a supplementary app focusing on adult learners, however, there is little study with secondary school EFL learners to supplement language learning outside of the classroom. Another significance of this study is that this study tries to present whether the app is helpful in improving the attitudes of EFL learners towards MALL as most of the studies lack generalizable outcomes through a structured intervention. Additionally, there is limited number of research studies focusing on the role of mobile technology in learner attitudes. These researchers used, as mentioned above, SMS and similar systems. It is difficult to find studies dealing with the role of MALL applications to complement language learning in the classroom. Thus, this study will try to be a point in the gap in the subjects aforementioned.

Moreover, this study should assist EFL teachers and learners participating in language courses in terms of examining the probability of combining conventional face-to-face course with MALL applications. They can assist mobile learning app developers to assess the effectiveness of their applications.

1.5. Scope of the Study

The scope of the present study is limited to the seventh and eighth grade students studying at one of the state middle school in Beykoz in Turkey during the spring semester of the Academic Year 2020-2021. A quasi-experimental design consisting of two group pre-test post-test was utilised in this study. One group was the control group and the other one was the experimental group. Each group consisted of 15 participants. According to the Common European Framework of Reference for Languages (CEFR), English language proficiency level of the participants is beginner (A1). The treatment lasted for 8 weeks. During this process, the experimental group students were supplemented with MALL application, Duolingo whereas the control group students were supplemented with traditional language materials.

1.6. Limitations of the Study

The first limitation of the study was related to the definitions of both dependent and independent variables. Concepts like m-learning, perceptions and attitudes have various definitions. There is not a de facto definition of these concepts. This situation is more concrete in m-learning as it is a new field and it gains new definitions with each passing day. Moreover, as technology is continuously and fast-changing, it is difficult to give a settled definition to m-learning.

The second limitation was that the number of participants of the study was relatively small. Therefore, it is important to test these conclusions in a larger study for more statistically significant results and generalizability of the study. Additionally, the treatment lasted for 8 weeks which means participants' experience of application was short. A longer period may ensure additional and better insights.

The third limitation was that all participants of the study were from the same setting. The findings need to be verified in different settings as the advantages and disadvantages of using MALL apps may be different.

1.7. Definition of Terms

Attitudes: “Attitudes” corresponds to the experiences, thoughts and feelings of the students.

Computer-Assisted Language Learning: the search for and study of applications of the computer in language teaching and learning” (Levy, 1997, p.1)

Duolingo: It is the most popular language education app in the world which is created by Professor Luis von Ahn in 2012.

Learner autonomy: “Learner Autonomy” refers to the situation in which the learner is totally responsible for all of the decisions concerned with his learning and the implementation of those decisions” (Dickinson, 1987; p.11).

Mobile Assisted Language Learning: “Mobile Assisted Language Learning” refers to any kinds of language learning using mobile devices.

M-learning: “M-learning” refers to a learning process which occurs anywhere and anytime through the use of mobile devices.

Ubiquitous learning: “Ubiquitous learning” refers to having a learning opportunity without time and place limitations.

Vocabulary achievement test: In this study “vocabulary achievement test” refers to an assessment instrument which is utilized to measure vocabulary knowledge of a language learner.

1.8. Conclusion

This chapter was comprised of seven sections as follows: *statement of the problem, purpose of the study and research questions, hypothesis of the study, significance of the*

study, scope of the study, limitations of the study and definitions of terms. Firstly, *statement of the problem* section summarized the gap in the existing literature related to the study. Then, the researcher explained why this research was carried out and two research questions of the study were listed in *purpose of the study and research questions* section. Next, two hypotheses of the study were presented in *hypothesis of the study* section. Afterwards, how and what this research can contribute to the relevant literature was explained in *significance of the study* section. Finally, limitations of the study were identified and presented in *limitations of the study* and definitions of key terms related to the study were explained in *definitions of terms* section. Next chapter will present information related to concepts of MALL and vocabulary teaching. In addition, studies relevant to the research questions of the study will be presented.

CHAPTER II

LITERATURE REVIEW

2.1. Introduction

This chapter presents overview of studies and concepts which are related to mobile assisted language learning (MALL) from different perspectives.

2.2. Theories related to mobile learning and perspectives on m-learning.

There are some attempts to conceptualize m-learning within a theoretical framework (Impedovo, 2011). Traxler and Koole (2014) suggest three ways of forming a theory of m-learning. These ways are a) importing traditional theories from learning, b) developing a theory of local interest and c) subscribing to some more general and abstract theories. The first suggestion is getting use of the traditional learning theories. As there is still no generally accepted theory of m-learning, m-learning has been dealt with by receiving support from the traditional learning theories. These theories behind mobile learning differ in research articles. According to Özdamlı (2012), there are several learning theories such as collaborative learning, blended learning, active learning and constructivism behind m-learning. On the other hand, Motiwalla (2007) states that it is acknowledged that m-learning does not replace classroom and e-learning approaches, but it can contribute to some learning models such as Social Constructive Theory and Conversation Theory. According to Taylor et al. (2006), the pedagogical perspectives of mobile learning are, Constructivism, Context Awareness Learning, Situated Learning, Informal and Lifelong Learning, Behaviorism, Activity Theory, Socio-Cultural Theory, Conversational Learning, Collaborative Learning and Problem-based Learning. In addition to these Keskin and Metcalf (2011) add four more perspectives which are Location-based Learning, Cognitivism, Navigationis and Connectivism to the list of Taylor et al (2006). According to the review report of Naismith et al. (2004), the learning theories that are well with m-learning are Behaviorism, Lifelong Learning, Constructivism, Collaborative Learning, Situated and Informal Learning. Although there

are some differences in the lists of researchers, the ones that are more comprehensive and fit well with m-learning are briefly described and their relations with m-learning are tried to be shown below:

Behaviourism: Behaviourism meets us as one of the earliest approaches to learning and teaching, with the studies of Pavlov, Skinner and Watson. According to Behaviourism, learning occurs with stimulus, a response to this stimulus and then repetition comes. Reinforcement is essential for sustaining the behaviour which can be observed and measured in Behaviourism. The mobile devices, especially the mobile applications, present various learning materials which can be regarded as stimulus. The users give a response to these materials by being active in different educational activities such as answering questions or playing games. At the final stage, the users get feedback about whether they win the game or the answer is right, which can be regarded as reinforcement.

Constructivism: Being popular with the views of Piaget and Bruner, Constructivism has influenced learning and teaching profoundly. Constructivism sees learning as the process where learners build meanings for their experiences (Merriam & Caffarella, 1999). It has been regarded basically as learning by doing. There are two major sub-theories of constructivism which are Cognitive and Social Constructivism. Piaget, who shapes the cognitive constructivism, proposes two main notions related to learning. One of these notions is “ages and stages” which is an attempt to predict what a child can and cannot understand at different ages. The other notion is “theory of development” explaining children’s way of developing cognitive abilities (Amineh & Asl, 2015). The second major strand of constructivism which is Social Constructivism stands on the works of Vygotsky. One of the most important concepts of Social Constructivism is Zone of Proximal Development. Ellis (2008) proposes that in order to understand The Zone of Proximal Development (ZPD), three levels of development must be distinguished. The first level is “the actual developmental level that is the level of development of the child’s mental functions that has been established as a result of certain already completed developmental cycles (Vygotsky, 1978; p.85). At this stage, the learner is independent where he feels that he will solve the problems on his own

(Redd, 2011). The second stage is the ZPD where the learner needs assistance in solving problems. Here, the concept of scaffolding gains importance. At the third stage, the learner tries to move beyond his current knowledge but he is unable to do so even if he gets support.

M-learning is associated with Constructivism as it provides autonomous learning which is important in constructivism. In Constructivism, the learner is active and constructs knowledge as in m-learning. Many recent approaches to learning and teaching especially ones related to technology can be held under constructivism as these approaches are learner-centred and give the learner the chance of learning autonomously and learning by doing. The social constructivism, which focuses on learning constructed through interaction, is an important concept for m-learning as interactivity and collaboration are main characteristics of m-learning. Furthermore, mobile devices are associated with ZPD as these devices scaffold to learners as they try to move beyond their current knowledge.

Informal and lifelong learning: Lifelong learning has been the hottest topics of modern societies of the 21st century (Hake, 1999). Thus, technologies and learning strategies contribute to it are welcomed by these societies. The final report of m-learning, occurring anywhere and anytime, leans against informal and lifelong learning. Mobile devices can be both used in school and any other places and at any time the users wish to learn.

Situated learning: Situated learning (location-based) is a type of knowledge transfer based on location-based intelligence empowered by wirelessly networked interfaces and sensors modifying to the existence of the user at a definite location (Greer, 2009). Some functionalities of mobile technology enhance situated learning. These technologies are a) geospatial technologies such as Bluetooth, 2D and 3D barcodes, and GPS chips, b) mobile search like visual search c) cameras for visual captures, d) social networking (Greer, 2009). With mobile devices situated learning are enhanced as m-learning present the chance of learning during the course (Ferdousi & Bari, 2015).

Conversation theory: This theory was put forward by Gordon Pask (1976), who is seen as the father of Cybernetics. The theory has psychological assumptions and is mostly regarded as a teaching and learning theory. It has pedagogical implications showing how to use technologies for learning and teaching (Scott, 2001). As to this theory, learning occurs through conversations about how and why of a topic. Harri-Augstein and Thomas (1991) add how and why of learning to how and why of a topic. The concepts of “autonomy” and “teach back” are important in Conversation Theory. If an individual can teach back a topic, then s/he memorizes it (Scott, 2001). Mobile devices can provide a shared conversation space and so enhance effective learning as people can have conversations about why and how of a topic (Taylor et al., 2006).

2.3. Mobile Assisted Language Learning (MALL)

Implementations of technologies in English language teaching (ELT) has gathered momentum in classroom practice and in the literature because of fast growing development of information technologies and computers. (Thornton & Houser, 2005; Kukulska-Hulme, 2006; Lu, 2008; Kukulska-Hulme & Bull, 2009). Although there is an unanimity on the relationship between MALL and CALL, definition of ‘mobile learning’ (m-learning) is a bit problematic. Traxler (2005) defined mobile learning as “any educational provision where the dominant or sole technologies are palmtop or handheld devices” (p. 262). These definitions show that the concepts such as ease of access and mobility are clearly realized by the researchers. They are some of the main characteristics that make mobile learning popular among educators, scholars and learners.

In this context ubiquity is related to the availability of a mobile device in anywhere and anytime in the sense of portability. Portability is related to size of mobile devices and lightness which make them a common and familiar thing in our everyday life, which makes MALL a type of learning. Such ubiquitous, lightweight and small devices are called ambient as they turn out to be natural parts of our daily lives. (Kukulska-Hulme, 2005).

2.4. Types of MALL devices

M-learning is a field which has been growing extremely fast over the last few years with countless applications and devices constantly being introduced and developed. Trinder (2005) offers an extensive list of mobile learning and MALL devices that are ranging from multi-purpose high technology devices like tablets and smartphones to single-purpose devices such as audio-players. Trinder's (2005) list of mobile devices consists of smartphones, laptops, MP3 or MP4 players, PDAs, videotapes, e-books and e-game tools. Trifanova et al. (2004) defines mobile devices as "any devices that is autonomous, unostentatious and small enough to accompany us everywhere" (p. 3). MALL has been extensively used for educational purpose including language learning.

2.4.1. Personal Digital Assistants (PDAs)

Personal digital assistant (PDA), which is often referred to as a small PC, is a mobile device which provides information and computing for business or personal use. PDAs are sometimes referred to as a pocket computer or palmtop as well. It is such a multifunctional device that can work as a fax machine, a web browser or a mobile phone (Viken, 2009). Many PDAs possess a pen-based stylus for input unlike computers where you need a keyboard which means they may incorporate features like handwriting recognition. Moreover, some PDAs comprise voice recognition technologies which can react to voice input. PDAs are available in two versions; keyboard version and stylus version. PDAs that are used for learning purposes are included in the category of portable devices. Song and Fox (2008) conducted a study where they focused on using PDAs for vocabulary teaching. The results of the study indicated that participants used PDAs in different ways to extend and develop their vocabulary knowledge. PDAs are used by participants for connecting to the Net and as portable virtual dictionary. Today, people still use PDAs but in different type and form. The new types of PDAs are represented and available on market as Tablet PCs, Blackberry devices, smart pagers, smart watches, cell phones with PDA features and Symbian OS PDAs.

2.4.2. Smartphones

In the early 2010s, the popularity of PDA devices began to diminish due to the widespread ownership of smartphones which were running IOS and Android operating system (Smith, 2010). As mobile devices were transformed by blooming technology developments, PDAs became old fashioned and devices like smartphones and tablets gained tremendous popularity among students and educators. A smartphone is a cell phone which lets you make phone calls and send text messages. You can also browse the Internet and run simple programs like in a computer. Users are usually in interaction with their phones by touching its screen with their fingers. That is to say, they are handheld devices integrating mobile phone capabilities with the common features of a PDA or handheld computer. In comparison to common mobile phones, smartphones are more compact in size and slightly bigger than them. In a study conducted by PBS Frontline (2011), they investigated young teens' use of portable devices. The results revealed that 37% of participants owned smartphones and most of smartphone owners (95%) used the Internet. Smartphone's widespread ownership percentage is increasing every day due to its higher capabilities and portability.

2.4.3. Laptops

A laptop, sometimes referred to as a notebook and laptop computer, is a small and portable personal computer which is having a thin LED or LCD computer screen mounted. Laptop is such a portable device which is enough to sit on someone's lap as its name suggests. It can be easily used and carried in different places. Many laptops can often run the same software or open the similar types of files as they are designed to have all of the functionality of a desktop computer. However, some laptops, like notebooks, give up some of its functionality so as to be a bit lighter and even more portable. There are some notable differences between desktop computers and laptops as laptops are designed for portability. A laptop has such an all-in-one design, with a built-in speakers, monitor, touchpad (replacing the mouse), and keyboard. This means even if there are no peripherals connected to it, it is completely functional. A laptop has less cable to deal with and it is much quicker to set up. One may not even need to use a

mouse or keyboard, as some of the newer laptops even possess touchscreens. Thornton & Houser (2005) suggests that the important rationale behind laptop computers' superiority is their extensive ownership and their higher accessibility. In addition to these, it is easy to connect them to the any wireless Internet network in anywhere and anytime just as the other portable devices.

2.4.4. Tablet PCs

The continuous developments on computers brought out new technological devices like notebooks and computers. After many years of experimenting, researching and hard work, scholars have come up with a device that many believe would change the educational outlook. This device, often referred to as tablet or tablet computing device, is used by various manufacturers in different capabilities and sizes. It is obvious that tablet computers are easier to use, more portable and comfortable devices in comparison to laptop computers. Tablet, usually referred to as a tablet PC or tablet, is a device which is hybrid between notebook PC and a PDA. It is a mobile computing device that is equipped with a touchscreen interface which resembles a large smartphone. Tablets, like a computer, have multitasking capabilities which let you do many things simultaneously. Most people consider tablets as devices as they are mostly used to browse social networking sites, read e-mails, watch videos and browse the Internet. Earlier devices possessed a stylus or light pens for typing, however; nowadays most of them are equipped with virtual keyboards and touchscreen for input.

In addition to this, it is possible to connect to external devices like a flash drive or a keyboard. Thanks to the recent technological developments and its obvious advantages, students enjoyed a different alternative to their personal computers (Li et al., 2010). It is important to acknowledge that the ubiquitous Internet network contributed to this rapid growth in tablet ownership. One of the reasons for current growth happening in the ownership and use of tablet in the USA can be attributed to blooming Internet usage. One in five users in the USA has a tablet device which proves the rapid increase in tablet use (Johnson, 2013). With the introduction of the Apple's iPad in 2010, tablet PCs came into the market like a bombshell. These tablets are lightweight, easy to carry,

handy devices allowing finger input and more affordable compared to its predecessors. Today, the most popular and the most common type of tablet in the market is Apple's iPad.

2.5. Advantages of MALL as a Supplementary Material

It is useful for language learning to investigate the advantages of different MALL devices individually to gain a better understanding about the usefulness of them as supplementary material. The ubiquity of mobile phones from anytime and anywhere allow students to avoid limitations like time and place and this situation motivates learners a lot. In addition, learners may feel more motivated when they are not limited to where and when to learn. Mobile devices like tablets, smartphones and laptops allow language learners to access the information and Internet whenever or wherever they want. In a study conducted by Nah, White and Sussex (2008), listening skill development by using the mobile phones through the Internet was investigated. The findings of the study indicated that Wireless Application Protocol (WAP) websites accessed using mobile phones were useful in developing listening skills of EFL learners and they proved to be useful as a means of supplementary learning to be used outside the class if they are used regularly. Moreover, the integration of many advanced features and reasonable price of a mobile phone, mobile communication and gigantic broadband capacities of the GSM servers could be considered as other advantages of supplementary MALL devices like smartphones.

In a similar study conducted by Kukulska-Hulme (2009), the effectiveness of MALL apps on conventional language learning were investigated. Unlike the other studies in the field, MALL was utilized as a supplementary material in which the researcher suggested MALL as a potential alternative for language instruction in the classroom and presented some suggestions about how to use them effectively in language instruction.

There were several studies emphasizing the mobility or ubiquity of MALL devices which let the users use them whenever and wherever they want. (Chinnery, 2006; Wishart, 2008; Kennedy & Levy, 2008; Cherian & Williams, 2008; Power & Shrestha,

2009; Kukulska-Hulme, 2009). Similarly, this type of learning was not restricted to traditional classroom setting. This particular characteristic of these devices comes up with certain benefits. For instance, Kennedy and Levy (2008) indicated that portability of MALL apps can motivate language learners. Another advantage of MALL devices such as tablets, smartphones, media players and laptops is that they have widespread ownership and they are highly accessible devices (Thornton & Houser, 2005). The ubiquity of MALL devices corresponds to the concepts of accessibility, portability and widespread ownership which have been useful in defining MALL and m-learning. (Kukulska-Hulme, 2005). Considering the previous studies (Kukulska-Hulme, 2006, 2009; Chinnery, 2006; Thornton & Houser, 2005), portability, improving mobility, providing learners opportunities with easy and fast access to information sources as well as the thrill of language learning with technology can be considered as the other advantages of adopting MALL and using m-learning facilities for the purposes of education.

2.6. Disadvantages of Using Mobile Devices as a Supplementary Material

Use of mobile devices, potential benefits and advantages of MALL are discussed above. In addition, there are several claims about the difficulties and the drawbacks of MALL as well as plenty of benefits in using it as supplementary material. First of all, mobile phones are criticized for their keyboarding problem and small screen size due to its one-finger data entry feature (Chinnery, 2006). These features of mobile devices make them inappropriate for enhancing certain language skills such as writing. According to Thornton and Houser (2002) mobile devices are not appropriate to learn new content; however, they can be effective tools in terms of practicing and reviewing. Kiernan and Aizawa (2004) conducted a study investigating the effectiveness of mobile devices by analysing the learning achievements of three groups of students involving face-to-face speaking learners, PC e-mail users and mobile phone e-mail users. The results of the study showed that user groups using mobile phone with e-mail could not complete the given tasks on time, whereas all the students in other groups were able to complete them successfully. This struggle in completing the given tasks in due time can be related to

one-finger data entry which may indicate that MALL may not always be effective tool in enhancing all aspects of the language learning. According to Chinnery (2006) it is very difficult to expect mobile technologies function as language teachers in the language classrooms. He says they are only beneficial as an instructional tool in the hands of successful and qualified teachers. He backs his arguments by explaining some of the disadvantages of using MALL were originating from its nature such as lack of audio-visual quality, limited battery life, small screens and virtual keyboarding which indicate MALL cannot probably function like conventional language learning (Chinnery, 2006, p. 13).

In their study, Shudong, and Higgins (2006) discussed the problems related to the elements hindering mobile phones' suitability as well as learning through it. Researchers administered a questionnaire about a mobile phone use to the 32 university students. The findings of the study showed that more time is required for mobile learning to be accepted as part of person's lifelong study. Furthermore, they suggested that people, pedagogically, did not get used to mobile learning. Ugur, and Koc (2015) conducted research to gain insight on the frequency and manner of mobile phone use in college classrooms. The results of the investigation showed that majority of the learners did not use their smartphones to enhance learning, but they used them for their personal use. Another result showed that most of the students were distracted by their classmates' mobile phone use in class. Students also suggested that if the administrators do not take any precautions, they would continue to use their mobile devices like that. According to Fallahkair et al (2007), learning goals can be achieved by using traditional materials, books, written documents and even TV programs. There is a different study criticizing m-learning (Kukulka-Hulme & Shield, 2007) which focuses on the lack of understanding of the mobility or portability of MALL activities and because of that adequateness of the argument is questioned to demonstrate whether MALL is useful in language learning situations. Further studies on different and specific aspects of language are needed to help answering attempts to the questions related to MALL efficacy. It is important to keep in mind that some of the structures, aspects of language or skills may not be conveyed properly through MALL tools. Therefore, studies should

be careful not to make assertions about the efficacy of MALL on language learning and should focus on more particular levels and learning environments as well as specific aspects of language learning to make sure better realization, understanding and application.

In sum, it can be inferred that although mobile phones have some beneficial upsides, they have some downsides to consider as well. Therefore, educators carefully need to take into consideration of mobile phones' potential problems and the use of them as an education tool to abolish these potential problems at once.

2.7. MALL for Middle School Learners

Students at the age of 12-17 belong to the middle school level learners. According to Redd (2011), mobile devices present language learners freedom to be in control of their language learning process. Bonnstetter and VanOverbeke (2012) believed "the elementary classroom builds basis for the future success and content areas of students" (p. 3429). Tan and Liu (2004) presented m-learning environment (MOBILE) to support assessment and teaching in middle school. They introduced a mobile learning tool (m-Tool) which has the ability to control the entire in and outside classroom language learning activities for elementary students. The research yielded some promising results in terms of improving learners' motivation and attitudes towards the language with the assistance of MOBILE.

2.8. Students' Attitudes towards MALL

Many studies in different contexts are conducted about MALL and most of them have given different results about advantages and disadvantages of MALL and the usefulness of mobile devices in language learning. In other words, majority of previous studies investigated the relationship between the improvement in specific language skills such as listening or writing and use of mobile devices. There is also a clear lack of research on students' attitudes towards MALL devices and applications which can be used in different situation despite many relevant studies and their findings will be discussed in

this part. MALL devices and the applications installed on these devices can be considered as supplementary learning materials for learning English and there is still a need for further studies in order to investigate the attitudes of language learners towards the usefulness of MALL devices and applications as supplementary learning materials. Therefore, the current study aims to fill in this gap in the literature by delving into the perceptions of EFL students about the usefulness of these applications.

The attitudes of learners can be best understood in the effectiveness studies by exploring their ideas, comments, perceptions and performance. For instance, in one of the study conducted by Kennedy and Levy (2008), the findings of the post-treatment questionnaire revealed that most of the participants found vocabulary learning through MALL as very effective and motivating.

In another research conducted by Todd and Tepsuriwong (2008), the participants of the study found “mobile mazes” that are used in English language teaching as quite motivating and effective language learning tool. In addition, Stockwell (2008) elicited in his study that even though some of the participants experienced certain difficulties throughout MALL treatment, they still had strong motivation and high expectation from the treatment.

In a study conducted by Corlet et al. (2005), researchers explored the attitudes of the learners towards MALL using PDAs. The findings of the study revealed that MALL apps were not proved to be very effective as a means of learning. However, survey results still yielded some positive results for language learning with MALL devices like iPods.

2.9. Background of the Study

Mobile learning gained momentum with mobile devices because they have personality of being informal, ubiquitous and spontaneous (Miangah & Nezarat 2012). Many studies suggested that mobility and especially motivation are common and crucial factors of gamification. Researches showed that these characteristics of gamification affect motivation of users and motivation is a key factor to be successful in learning

(Jovanovic & Matejevic 2014). When we take these factors into consideration, motivation can be thought as the most important one among all. In this respect, motivation through gamification is intrinsic because the users give a start on their own (Trentin & Repetto 2013). Effectiveness of intrinsic motivation cannot be compared with extrinsic motivation. It gives more pleasure to the users, is more creative and the learning is long-termed (Ryan, R. M. 2000).

There have been many studies for mapping learning outcomes and results of gamification. However, few empirical works have been done on gamification and verification of their effects in non-game context. Authors underline that more works are needed to be done on effects of gamification on both context of use and demography of 5 users (Li, Grossman, 2012, Domínguez, Saenz-de-Navarrete, de-Marcos, Fernández-Sanz, Pagés, Herráiz, 2014, Hamari, Koivisto, Sarsa, 2014, Seaborn and Fels 2015).

Alcorn (2003) supposes game as a kind of sport or entertainment that needs engagement, competing against rivals to achieve certain goals. Having rules and certain targets are required for an application to be a game (Donmus, 2010). Juul (2003) considers game as a rule based system. In this system different outcomes are devoted to different values. According to Juul (2003) the definition of game contains six parameters; effort, rules, player's attachment, outcome, negotiable consequences and value.

Effort: the user endeavours to get better results.

Rules: Games include rules.

Player's attachment: The dependency that the user feels as a winner or loser.

Outcome: The results of games.

Negotiable consequences: The practicality of game.

Value: Some different positive or negative outcomes that are designated to games.

From behavioural point of view, gamers have control over games. Consequently, the users impact the game outcomes directly. Under this circumstance, clear goals and end conditions are needed to be clear so users can formulate them. Users are required to be encouraged to develop strategies to make some changes on their game play. Users

should have possibility to estimate the outcomes. One more crucial element is the initiation of gamification with no force; users should not be forced to play.

The continuation of awards after each achieved goal is an appeal of gamification (Morford et al., 2014). Besides cooperation and competition are other reinforcements. Game designers also explored the reasons for playing games (Crawford, 1984; Rouse, 2005). First of all, gamification is a virtual world and it provides opportunities to discover new identities and roles. The users can act in the ways that they cannot do them in real world, they can control their experience. There are some other potential benefits such as competition and peer acknowledgement, Crawford (1984) also warns that there can be some users who perceive gamification unsafe and this can create demotivation.

Besides, there is a consensus about some users as they play to socialize with other people with no competition. This is the emotional aspect of gamification (Crawford, 1984). Games are the only way that the users can create the gameplay so they can amplify the attached emotions. Lee and Hammer (2011) also support this idea as they suggest that gamification has an effect on three different areas: emotional, social and cognitive.

English learners need to get new vocabulary. In order to memorize new words learners take part in various task-based activities. These activities also include vocabulary games to develop their vocabulary and use new words in different context. Traditionally, vocabulary has not been the focus while learning a new language. However, vocabulary has been tried to be taught through speaking, listening, writing and reading activities. Many English learners try to learn new vocabulary by memorizing a list of new words with their meanings in their native language without real context practice. Therefore, they notice that memorizing a list of new words does not satisfy them and consequently they start to think that they have bad memorization (Gnoinska 1998:12). Contrary to that traditional way of learning new vocabulary, Communicative Language Learning (CLT) emphasizes that learners should practice new vocabulary in meaningful activities with various tasks. In this way they improve their communicative competence. Many experts on language learning methodology agree that games are good way to learn vocabulary. Some experts have mentioned some characteristics of games in context of effectiveness.

According to Lee (1995) games help language learners to get beyond the boundaries of the classroom. Furthermore, Ersoz (2000) states that games should be appreciated more in language learning.

In L2 learning process personality factors have plays a great role. Brown (1994) mentioned several of these and made some suggestions to make contribution for successful learning. Some of the factors he mentioned in his study were self-esteem, risk-taking, anxiety, empathy and motivation. He argued that motivation has great impact on L2 learning and it is responsible for initiating and continuing aimed-goals.

2.10. What is Gamification?

Gamification is a term which has been emerging and still contested concept. Since it has shown up, there have been many attempts to define it. Still, there is a definition which has been agreed on. As a term, gamification means the use of game elements or game design techniques in non-game contexts (gamification.org, 2010; Werbach, 2013; Lee, 2012, p. 75). Kapp (2012) also defines gamification as “It is using game-based mechanics, aesthetics, and game thinking motivating and encouraging users and helping users to overcome troubles.” Gamification is not just a play; it is structured and goal-oriented effort. The researchers use players, gamers, users and students to define the people who utilize gamification.

2.10.1. Game Design Elements

Hamari et al. (2014) states 10 different elements on gamification. When we search on the internet, 24 elements can be seen on gamification. Still, in this study, three basic elements will be analysed. These are points, badges and leader boards Werbach and Hunter (2012). Zichermann and Linder (2013) add two more elements to these three basic elements which are levels and rewards.

Points are the score that the user gains throughout the game. Zichermann and Linder (2013), emphasize that the points provide feedback on accomplishment which mainly conducted via assigning experience points for completed tasks, getting certain skill

levels, or appearing of desired behaviour. In this way gamification helps to develop the right behaviours and to raise motivation.

Badges are visual representors of achievements in gamification. They are certain signals of getting a particular aim (Zichermann & Linder, 2013). Collected badges provide clear and visual indication for user's success. Badges can easily be customized according to goals, interests and contexts.

Leader boards are the ranking of users. They show the users' status within gamification. Wang and Sun (2011) agree with this definition and state that they have few benefits because the leader boards can motivate some users but on the other hand they may have negative effect on others. To eliminate such effects individualized leader boards should be used which give a chance the users at the bottom to compare themselves with the closest users in rank. Therefore, they do not feel pressure to compete with the users at the top.

2.10.2. Gamification in Duolingo

It offers bite-sized English lessons. It is totally free application for language learning. The lessons can be adapted to users' learning style, exercises were designed to help users learn and review effectively. The application has interactive exercises and these exercises provide instant feedback. It also offers virtual coins to unlock new levels to keep the users motivated. It can be used at schools as well. It includes interactive activities and fun homework (<https://en.duolingo.com>). The graphics of Duolingo can be read easily. Colours can be distinguished; icons and text can be separated easily. It has two main colours, blue and white. While answering questions, users get green and red colour, green is for correct answer and red is for wrong answer. Users need to complete each category successfully to unlock further section. The sections include different words, users face words which have a sequence from easy to difficult.

Users have a chance to listen to the pronunciation of words and record their own voice using a microphone; the software is capable to recognize the word. As gamification side of the application, a user has five hearts in each lesson, if the user makes a mistake, s/he

loses one heart. When user loses all hearts, s/he needs to restart the lesson. On the other hand, a good performance is rewarded by experience points (XP), when user collects a certain amount of XP, s/he moves to next level (e.g. 25 XP rewards level 1, 50 XP rewards level 2) As gamification mechanics, Duolingo includes XP points for measurement, player lives provide opportunity to fail, levels to show progression, it also has a social aspect of adding friends thus friends can follow their progression.

2.10.3. Use of Gamification in Education

Since the 21st century, technology has started to take part in our lives ever before. Internet-based technologies have changed our point of view towards instruction. The difference in the lifestyle of new generation has necessitated teaching according to their routines. In today's world most of the students are digital natives (Prensky, 2001). Old generation was used to write diaries, games on street, socialize in neighbourhood, send letters etc. However, new generation is used to blogging, digital games, social media, tweets and sending e-mails. Naturally the teacher of new generation need to implement various teaching strategies focused on Information and Communication Technologies (ICT). Under these circumstances use of gamification has gained momentum and teachers have gained awareness of new trends in educational technology. From NMC-Horizon Report (2014) it can be understood that gamification in education is being popular with educators. The learners need motivation and gamification can be used to open a door for improving learning and gaining educational skills.

In gamification, user tries to complete levels, after completing each level s/he feel happiness and will to succeed more and move forward. While doing these, learner becomes more engaged. With integrating prizes/awards to gamification and using badges, it can be turn into a tool for formative assessment (Buckingham, 2014).

2.10.4. Previous Use and Effects of Gamification

Gamification serves excessive repetition of grammar and new vocabulary in an enjoyable and unconscious way. It creates interaction with foreign language, boosts practice and rescue repetitions from being boring for students. Teacher-fronted lessons

will take interactive shape. It is clear that gaining grammatical structure in a playful way is more entertaining than memorizing it. If instruction sessions can be created into a playful atmosphere, help students to have fun and enable students to feel success, then undisputedly there seems to be no negative criticism against gamification.

Vernon (2006, p.1) claims that when young learners play game, they focus on the activity and ensue gaining language subconsciously. Learning subconsciously can end up with absorbing grammatical structures better and more and long-term memorization of new vocabulary. Likewise Gunn and McCallum (2005) state that games are another way to lead up students to learn and review. Uberman (1998) considers games as ways to allow students both for enjoying and entertaining with the language that they learn and practicing it incidentally.

A language teacher can design different learning situations or environments that students can benefit from with the help of games (Wright, Betteridge & Buckby, 1984). Huang (1996: 1) suggests that game based language learning may stimulate the process of social and psychological factors such as motivation, spontaneity, self-confidence, willingness for learning and better pronunciation.

Games play important role in language learning as they keep learners' energy into language learning by making them active. Characteristics of gamification such as competition, improvement, enjoyment, creativity, being active can easily satisfy the needs of language classes. Young learners consider virtual reality as natural and traditional way of teaching does not have popularity anymore.

The most important benefit of gamification is motivation. While determining the effectiveness of learning, the learners' motivation is important. In gamification, motivation is mostly intrinsic because learners pick up their own learning (Trentin and Repetto, 2013). Intrinsic motivation is more effective while learning than extrinsic motivation. To gain intrinsic motivation, competence, autonomy, and relatedness need to be satisfied (Ryan and Deci, 2000).

Hamari and Koivisto (2013) studied an application which contains gamification mechanics. It was mainly focused on social sides of gamification. The users understood

usefulness, enjoyment and playfulness in time. The results show that just the age and ease of use decreased the benefits of gamification. We can understand from the experiments of Hamari (2015) that use of badges has positive effect on interaction. Several studies have been conducted on gamification regarding e-learning. McDaniel, Lindgren (2012) also used badges and achievements in online courses. Students gave different reactions to the use of badges. Some of them found these badges hard to get so use of these badges affected the grades of course outcome. Another study on badges was done by Denny (2013). In this study, students' results were not grounded on badges. Student activity was higher when badges were used. The study comes to conclusion that the badges had positive effect on participation of the study. Domínguez, Saenz-de-Navarrete et al. (2013) went a step further, they used levels, challenges, badges and leader boards as gamification mechanics. The study states that gamification has potential to increase motivation but the responses from participants were mixed. Mostly the results were better but the performance and participation were poor. There were also some problems of implementing of application; therefore, these problems may be seen as the reason of poor performance and participation.

Another way to achieve additional motivation is to use gamification as a design method. Gamification uses the mechanics of games and implements them to a product. Mechanics of gamification constitutes the pieces of games. To set an example Yahtzee has mechanics of gamification such as randomness and points. Throwing dices is randomness and it creates excitement. The points can be collected with the eyes of the dices. Gamification can be used to promote user engagement, increase activity, social interaction quality of actions (Hamari, Koivisto and Sarsa, 2014).

There are several experts in the literature who argue that games are essential parts of effective language learning. Cronk (2012) studied the implementation of a virtual tree in a management information systems course at a college. He claims that the game increased students' engagement with tasks. However, it is reported that some of the students did not understand the game; consequently, this problem may have skewed the results further. Highlighting the steps clearly is very important while introducing a new system. In his study there seems to have been increase in engagement but many

methodological criteria were not taken into consideration, consequently the benefit of the results is very limited.

Extensive e-learning such as mobile gamification may weaken the relationship between teacher and student. This means that teacher will not be able to affect studying of the students and their motivation any longer (Ozuorcun and Tabak 2012). Another negative aspect of gamification is stated by Hanus and Fox (2015), who compared two different groups, one of the groups has attended a Gamified course and the other has attended a Non-Gamified course. The students who had gamified course reported that gamification decreased their intrinsic motivation and satisfaction in time. The reason was choosing badges and leader board as gamification mechanics. Therefore, the mechanics of gamification have to suit the context of the content (Zichermann and Cunningham 2011).

A teacher needs to make a special effort while teaching and the games are one of the best ways to do this. However, to be successful while using games it is vital that the teacher should consider some factors such as choosing the appropriate game and appropriate time to use game in the classroom. Before integrating the games into the teaching session, it is very important for a teacher to make the necessary preparations about the game such as organizing the class and making the game understandable by students. Celce-Murcia (1979, p.54) claims that the games can be used to prevent class from being monotonous or to attract students' attention. However, for a game to be pedagogically successful, teacher should know his/her roles and other factors affecting the teaching process.

Lin (2014) implemented a system which based on achievement. The aim of the study was to see how the performance would be affected and whether the assessment would be more objective or not. The system consisted of two factors, one was awarding points for positive behaviour and the other was deducting points for negative behaviour. In the process, these points could be used for buying certain benefits. But there was a problem because some key methodological circumstances were not taken into consideration, for example, the number of the students and composition of them in the classes. The

rational for using points was non-existent. Nevertheless, the students reported that the system was fun and a good addition to their learning.

Goehle (2013) carried out a study which investigated a certain program which consist of gamification elements such as achievement points, learning awards and level promotion system where you move up to another level when you collect certain amount of point. The researcher claimed that such gamification elements increased the engagement of learners. Further, this gamification and rewarding system through the app improved the students' homework habits. They became more disciplined learners as they finish homework on time. Findings of the questionnaire revealed that learners found this system motivating, fun and engaging. The ability to monitor their learning progress in particular was very exciting for them. But no reported benefit can be seen to the students' learning outcomes. Moreover no methodology was described to use it in similar cases and because it was a qualitative study, the generalizability is limited.

Gamification in learning and teaching have already existed over years. Authors mostly aimed at outcomes and results of the studies. However, few empirical works have been done on gamification and evaluation of their effects in non-game contexts. Therefore, authors state that more empirical works are needed on effects of gamification not only context of use but also demography of users. (Liu, Grossman, 2012, de-Marcos, Domínguez, 2014, Hamari, Koivisto & Sarsa, 2014, Seaborn & Fels, 2015).

It is clear that authors need to examine more game elements and study with larger groups of students. Because most of the studies implemented on small groups with no control and generalizations lack validity. To have accurate measures for the effects of gamification, qualitative studies are needed. After studying the results of the articles, obviously the availability of gamification is greatly depends on the users and the contexts. Game mechanics are also important, different mechanics should be used for different contexts in this way the results of the research may vary and can be replicated for other.

Taking all these points stated into consideration, it could be concluded that gamifying or gamification of an English lesson should also be seriously considered since English

classes already have the necessary dynamics. In an English class, where students can go on a quest instead of taking a quiz, get experience points (XP) and level up just like in a computer game when they complete their assignments and follow their progress, choose to do what they want from a list of alternatives and challenge others as a member of their own group or individually; they could enjoy what they do and also learn better. Since the new generation enjoys playing computer games more than most of the things related to school, gamification could be a remedy to motivation and engagement issues that most teachers have been experiencing at any learning environment all over the world.

2.11. Vocabulary Teaching

The importance of vocabulary is beyond any doubt in language learning. Vocabulary knowledge is essential part of a foreign language communication. As Wilkins (1972) states you can do few things without grammar, but without vocabulary you cannot do anything with the language. Similarly, Richards et al. (2008) point out that “vocabulary knowledge is indispensable to acquire grammar” (p. 270). Due to this importance, many vocabulary teaching techniques have found a place in all of language learning approaches. While this technique is memorization of long vocabulary lists in the Grammar Translation Method, showing pictures and realias are the techniques in the Direct Method. While the Communicative Approach proposes that vocabulary should be taught within the text, the Community Language Learning teaches the words by giving their native language equivalent. The Audio-lingual Method uses dialogues, Silent Way uses word-charts and the Total Physical Response makes the verb central and teaches the word through imperatives and the objects around the environment where learning takes place. This shows that vocabulary learning has been always there but with different perceptions of teaching. Some have suggested that vocabulary should be taught directly and some suggested it should be emphasized. This leads to two different and opposite approaches to teaching vocabulary which are implicit and explicit vocabulary teaching. Explicit vocabulary teaching opponents believe that words should be taught explicitly e.g. by giving vocabulary lists or games. On the other hand, the implicit

vocabulary learning says that vocabulary should be taught without making the learners be aware that they are learning vocabulary such as integrating the words into a reading text. None of these approaches or techniques defeated the others, so teaching vocabulary is still a tough job.

2.11.1. Studies on the Role of Mobile Technology in Vocabulary Learning.

The studies that investigate the use of mobile devices in vocabulary learning can be divided into three parts: use of SMS (or MMS), use of e-mail, use of some programs developed by the researchers or program developers. The most preferred one has been SMS-based vocabulary learning. These studies generally have concluded with positive results. For example, Zhang et al. (2011) carried out an experimental study with sophomores in a Chinese university. Experimental group were sent SMS and the control group studied papers in order to learn target vocabulary. The results showed that experimental group did better than the control group. However, in delayed tests, a significant difference between two groups was not found. The study also surveyed students about advantages and disadvantages of that SMS- based implementation. The students believed that implementation provided them to take advantage of fragmented time and to motivate them. Nonetheless, there were several issues related to that implementation of the study. The first issue was technology related where the memory of the phone was not enough for certain amount of messages and phonetic symbols were not clear to see due to the screen resolution. The second issue was about the constant messages coming at certain periods of time during the day which was distracting annoying for the students. On the other hand, the participants of the study belonging to Çavuş and İbrahim (2009) were satisfied with the frequency of receiving messages; they did not state any distraction. The undergraduates receiving technical English words were satisfied with SMS-based vocabulary learning and they were successful in their post-test. Although m-learning was an important approach, it should not be used independent from a teacher, says the findings of Hayati et al. (2013). These researchers tried to teach idioms with the use of SMS. They had three groups which were a) SMS-based group which received four idioms each day from their instructors, b) contextual learning group

which studied idioms based on a book and with the guidance of a lecturer and c) self-study group which was given a printed version of target idioms. The findings showed that the SMS-based group was more successful than other groups in post-test and that group was more enthusiastic. However, Hayati et al. (2013) concluded that although there were contributions of mobile devices to learning, the language classes should not be entirely mobile-based as this would not fit all subject matters and a teacher was necessary as s/he was the real provider of input and inspiration. Song and Fox (2005) also integrated SMS technology into web-based vocabulary learning in a pilot study conducted with 10 learners. They found that there were significant improvements in learners' vocabulary learning performance and their attitudes towards m-learning were positive. However, as the number of participants was so limited and there was no control group, it would be not true to show these findings as a support for mobile learning. Hu (2013) also used a message system which was Fetion (a free text message software of China) to help 24 adult learners acquire new vocabulary. The findings collected from the participants showed that instant vocabulary messaging system promotes autonomous learning where they were able to use their spare time to learn the target vocabulary items anytime and anywhere. Similarly, Lu (2008), who sent SMS to vocational high school students, found that the students expressed their positive thoughts and feelings towards vocabulary learning through the use of mobile phones due to its immediacy, legibility, portability, novelty, spacing effect and motivation it generated. Furthermore, the students in SMS group were better than the paper group in the post-test. Nonetheless, there was not statistically significant difference in the delayed post-test scores of two groups. Although in the studies mentioned above (Lu, 2008; Zhang et al., 2011) it was found that mobile learning did not differ in terms of the retention of learned words, in Saran et al.'s (2012) study, the learners who got MMS were more successful both in their post-test and delayed test than the other control groups which were web-based and paper-based. The retention of words was higher in experimental group than control group also in the study of Alemi, Sarab and Lari (2012). They used SMS to teach 320 words from Academic Word List (Coxhead, 2000) to 28 students in experimental group for 16 weeks. The control group consisting of 17 students used dictionaries to learn

these words. At the end of 16 weeks, the post-tests scores of both groups showed that there was no difference between two groups. On the other hand, in the delayed test, the experimental group outperformed control group. Thus, the researchers concluded that using SMS to learn vocabulary was not effective for short-term memory but effective for long-term memory. Apart from using SMS, e-mail has been also selected to teach vocabulary. Thornton and Houser (2005) used e-mail that contained mini-lessons and a website for improving learners' idiom knowledge. The results showed that the implementation helped them learn the vocabulary and the students were positive to the implementation. Unlike the other research using the SMS of mobile phones, Liu and Chen (2014) used camera of mobile phones for vocabulary learning. They conducted an experimental research where the experimental group took photos for the target phrases with their mobile ones while the control group searched the images of target phrases. The post-test of the study showed that the experimental group achieved higher scores in the achievement test and developed positive attitudes towards using the mobile phones for vocabulary learning.

Some researchers developed programs in order to see how effective mobile devices were in vocabulary learning. For example, Başoğlu and Akdemir (2010) developed a program compatible with mobile phones and conducted an experimental research with undergraduate preparatory students. While experimental group used the program developed by the researchers, control group used flashcards for six weeks. The results showed that the experimental group was more successful than the control group in their post-tests. It was concluded that using mobile phones as a tool for vocabulary learning helped the students learn the words better and improved their attitudes towards the use of mobile phones in vocabulary learning.

Chen and Chung (2008) also developed a system which was personalized mobile English vocabulary learning system. They concluded that this system both promoted learning interests of students and enhanced students' vocabulary learning abilities. Similarly, Stockwell (2007) developed a system, called VocabTutor and used it in a group consisting of 11 students. These students tried to learn the target words both on mobile phones and on computers. Stockwell concluded that learners spent more time

with the computer than the mobile system and had the tendency to achieve higher scores with the computer system. In the study, there were no pre-tests and post-tests and the data was collected through a survey with a small number of participants. Thus, it is difficult to conclude learners using computer system were more successful than the ones using the mobile system.

On the other hand, Stockwell (2010) then used the same mobile system (VocabTutor) but this time with 175 participants. He focused on the comparison of the control group who used a computer and experimental group using mobile systems in terms of time and scores in the activities. This time, it was seen that there was no difference between two groups in terms of getting higher scores in the activities. Another finding was that completing activities in the mobile system took more time than completing them in the computer.

Ağca and Özdemir (2013) used the 2D barcode to teach vocabulary to college students. The findings showed that the vocabulary level of students increased with the mobile-assisted learning environment.

Aforementioned studies were mostly related to vocabulary learning with mobile devices through the use of certain programs such as SMS, MMS and e-mail. Further, there were also programs specifically developed and designed by the researchers for language learning. Recently, there have been many studies exploring the perceptions and attitudes of language learners towards the use of mobile app. For example, Deng and Shao (2011) investigated the attitudes of participants towards the use of Remword for vocabulary learning. Findings of the study revealed that the students had positive attitude towards the app. They found that the app with its flexibility promotes autonomous learning and this enhances vocabulary learning experience of the learners.

Another study which was conducted by Steel (2012), aimed to find out the attitudes of learners towards the use of mobile apps in language learning. The results of the research demonstrated that mobile apps can be useful tools promoting independent learning as they allow language learners to practice the language wherever and whenever they want. Furthermore, there were many other factors such as portability, ease of use and

convenience which make them useful applications. Nino (2015)'s study findings were in line with the findings of Steel's study. Both studies presented similar results in terms of the benefits of mobile applications in language learning. Both researchers concluded that features like immediate feedback, convenience, flexibility of use, authentic resources, interactivity and effective vocabulary learning were some of the key benefits of mobile apps.

2.12. Conclusion

The main aim of this chapter was to introduce and elaborate on the issues of mobile assisted language learning in language learning process. It is clear that mobile applications and devices could provide great opportunities to the language teachers and learners in language learning context. As a natural sequence of the thesis, the next chapter is going to give detailed information about the methodologies used in this study.

CHAPTER III

METHODOLOGY

3.1. Introduction

This chapter of the study is comprised of five main sections; research design, participants and setting, procedure, data collection, and data analysis. *Research design* section deals with the methods used in the research. Then specific information about participants and setting will be given in *participants and setting* section. Next, *data collection* section explains how, which and why quantitative and qualitative data collection tools were utilized to obtain the relevant data. *Procedure* section provides specific information about the treatment process that participants go through and how the relevant data were obtained. Finally, *data analysis* section will describe the analysis of hard and soft data by giving details on analysis models, accepted significance level, variables and software programmes used in the study.

3.2. Research Design of the Study

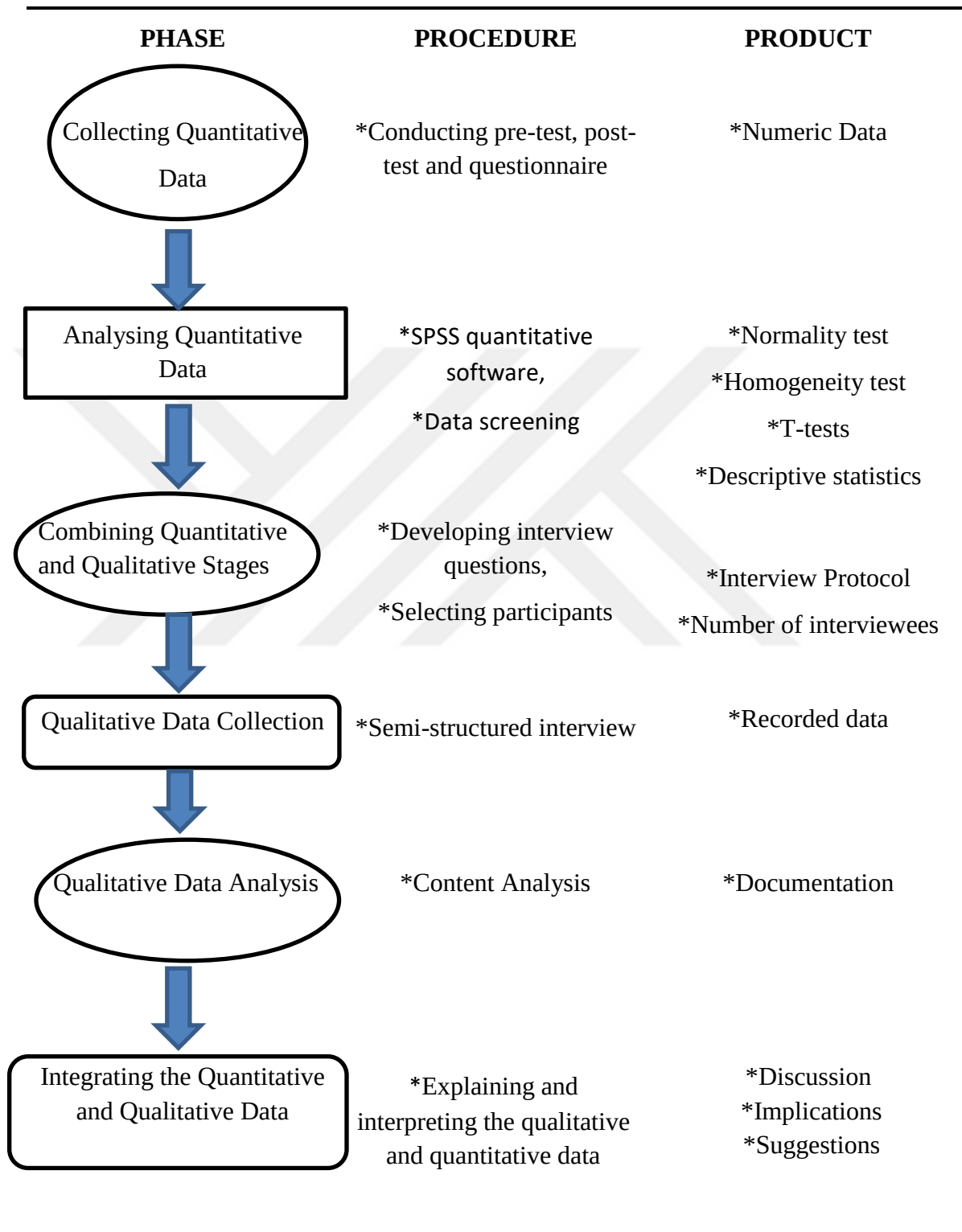
The present research adopts a mixed methods approach consisting of qualitative and quantitative data. This approach presents a better understanding for the research problem compared to other approaches as it integrates both quantitative and qualitative data (Creswell and Creswell, 2018). One of the main reasons for adopting this design is that the quantitative data can offer a general view of the research problem, as the following qualitative data can present useful information about the numeric data by extensively exploring participants' attitudes and thoughts (Tashakkori and Teddlie, 1998).

As indicated by Creswell (2003), gathering and examining the quantitative information before qualitative data tends to be specified as *a sequential explanatory mixed-methods* study. *Priority, implementation, and integration* are the three key components of this sort of design (Creswell et al., 2003). The quantitative approach was the *priority* in this research as pre-tests, post-tests and post-treatment questionnaire were utilized at the beginning of data collection process. After that, semi-structured interviews were

conducted to obtain qualitative data. In the *implementation* phase of the study, having analysed and collected the relevant data, the researcher linked and collected the text data created from the transcription of the participants' interviews with the outcomes from the first stage. The next phase of the study was *integration*, in which the researcher combined the soft data from interviews with the hard data from the vocabulary achievement tests and questionnaire. The findings of the hard data preceded the data collection of the soft data.

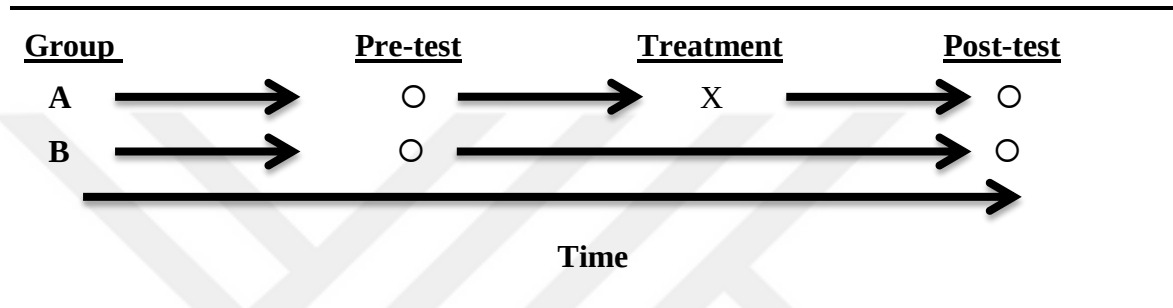
Therefore, this study can be considered as the *sequential explanatory* mixed-methods design (see figure 3.1) as the numeric data was collected and analysed first to demonstrate whether Duolingo had a significant effect on students' vocabulary knowledge. Then, text data and analysis were utilized to explain why Duolingo proved to be effective and how it helped students to improve their vocabulary knowledge.

Figure 3.1: Visual Model of the Research [Adapted Ivankova et al. (2006)]



Quasi-experimental design consisting of two group pre-test post-test control group design was utilised in this study (Figure 3.2). In this design two intact group of students (quasi-experimental) are used by the researcher. The researcher gives a pre-test to both groups, administers the treatment to one group, and gives a post-test to both groups (McMillan and Schumacher, 2006; p. 273-274).

Figure 3.2: Two- group pre-test-post-test design



When the target is determining a cause-effect relation, experimental studies are one of the most effective ways of gathering data. In quasi-experimental designs, formed groups have to be used by the researcher and they are also used when a convenience sampling is applicable (Creswell, 2009). Additionally, Seliger and Shohamy (1989) stated that, quasi-experimental studies are more valid in terms of external validity when they are performed in circumstances similar to those which are normally seen in educational contexts. Quasi-experimental studies involve the manipulation of the independent variable to eliminate the directionality problem. However, as they do not involve random assignment to conditions, they do not eliminate confounding variable problems.

The researcher tried to determine the effect of a MALL app (independent variable) on vocabulary knowledge and learner attitude (dependent variables) by administering an intervention. The use of MALL application, Duolingo was the independent variable of this study, whereas students' vocabulary achievement test scores were the dependent variables of this study. The experimental group students received treatment from Duolingo application to learn vocabulary items whereas the control group students did not receive any treatment. They continued taking their regular English instruction at school. Before the treatment, a pre-test was given to make sure that there was no significant difference among the groups and that they were at equal levels at the outset.

In the treatment process, the participants in the experimental group were asked to complete the assignments sent to them through Duolingo. Then, a post-test was given to both the control group and the experimental group at the end of the treatment in order to find out the effect of the treatment on the learning outcomes. To evaluate experimental group participants' perceptions and attitudes towards MALL supplementation, a post-treatment questionnaire was administered. The questionnaire was adapted from another study (Astarilla Dede Warman, L., 2018),

For the qualitative phase of the study, the researcher utilized semi-structured interviews as an instrument in a bid to evaluate the students' overall perceptions and attitudes towards MALL supplementation. Interviews were comprised of both open and closed-ended questions which were pre-determined by the researcher. They were administered to the participants in experimental group to gather in-depth data, first-person assessments and receive further feedback. The interview data was utilized to triangulate the data collected from pre- and post-tests as well as the questionnaire.

3.3. Participants and Setting

In quasi-experimental design, sampling is not entirely random and it is carried out among the existing group. The participants were chosen by the researcher among the students who were convenient and eligible for the research by utilizing convenience sampling technique. Convenience sampling technique is a kind of nonprobability sampling method which seeks to produce a sample that represents the population. The participants were chosen based on their convenience and easiness to obtain for the study. The study took place at one of the public middle school during the 2020-2021 academic year. The participants of the study were 30 Turkish middle school EFL learners from seventh and eighth grades who had been learning English for at least five years. Their English instructor at school was the researcher himself. They use English course books distributed by the National Ministry Education at school. Two groups, control group and experimental group, were formed with convenience sampling technique and the participants were distributed to each group by the researcher. Both the experimental

group and the control group consisted of 15 participants. Detailed information about the age and gender distributions of both groups can be seen below.

Table 3.1: Age Group and Gender Distribution of the Participants

Gender	Experimental Group		Control Group		All Participants	
	Number	Percent	Number	Percent	Number	Percent
Male	7	47%	7	47%	14	47%
Female	8	53%	8	53%	16	46%
Total	15	100%	15	100%	30	100%
Age						
11	4	27%	3	20%	7	23%
12	5	33%	4	27%	9	30%
13	6	40%	8	53%	14	47%
Total	15	100%	15	100%	30	100%

The gender distribution of the participants was almost equal as 53% of the participants were female and 47% were male. The age range was also very similar in both groups. There were 7 participants (27%) in the 11-year age group, 9 participants (30%) in the 12-year age group, and 14 participants (47%) in the 13-year age group. The mean of age in the control group was 12.33 whereas the mean of age in the experimental group was 12.13.

3.4. Data Collection Tools

In this research, the researcher gathered the necessary data through three different instruments which were Vocabulary Achievement Test (VAT), post-treatment questionnaire and semi-structured interview. Two instruments (VAT and semi-structured interview) were developed by the researcher except for the post-treatment

questionnaire which was adapted from Astarilla Dede Warman, L. (2018). VAT was used at pre- and post-test stages to find answer to the first research question which was aimed to investigate the effect of Duolingo application as a supplementary tool on vocabulary knowledge. Post-treatment questionnaire and semi-structured interviews were used to find answer to the second research question which was aimed to explore the students' attitudes and perceptions towards MALL supplementation.

3.4.1. Vocabulary Achievement Test (VAT).

A vocabulary achievement test (VAT) was developed by the researcher and used as both pre- and post-test in this study. The researcher's objective was to evaluate whether there was any statistically significant difference between the vocabulary knowledge of the control group and the experimental group at the end of the treatment. Firstly, 25 questions were prepared by the researcher and their inter validity was established by 3 English language teaching experts. Five questions were revised with their recommendations. All of the vocabulary items in the test were chosen from the lessons presented in Duolingo. The test questions were similar type of questions that participants have studied throughout the treatment process. The test was comprised of set of exercises such as picture identification, matching and multiple choice questions. The same test was applied as post-test at the end of the treatment to improve reliability of the test. Four points were given for each correct answer. T-tests were utilized to investigate the mean differences among groups. The obtained data through t-tests guided the researcher to evaluate whether there was any significant difference between the vocabulary achievement test scores of both groups.

3.4.2. Post-Treatment Questionnaire

Questionnaires are used by the researchers to collect information about the behaviour, knowledge, stance, opinion, and attitude of the participants about the research concept. One of the advantages of using questionnaires is that there are structured questions that are easier for the respondents to answer. Another advantage of using questionnaires is

that they can be immediately administered at any place and any time (Psychogyiou, Athanasia and Karasimos, Athanasios, 2019). The current study's questionnaire was adapted from another study conducted by Astarilla Dede Warman (2018) where Duolingo was used outside classroom to support regular English instruction in the classroom. The questionnaire was administered to the experimental group students at the end of the treatment and specifically aimed to find out their perceptions and attitudes towards MALL supplementation. To make it easier and simpler for the respondents in understanding the questions and in providing the answer, the questionnaire was translated into Turkish language. It took a week to distribute the questionnaire and 2 weeks to analyse it. The questions were in closed-ended form. The questionnaire was comprised of two parts. The first part consisted of 3 question items in numerical rating (0 to 10) scale which aimed to measure the satisfaction level of the respondents towards MALL treatment. The second part of the questionnaire consisted of 15 questions in five-point Likert-scale type in which each statement answered from strongly disagree (1), disagree (2), neutral (3), agree (4) strongly agree (5). The second part of the questionnaire was designed to evaluate the perceptions of the students' in terms of easiness of using Duolingo, usefulness of Duolingo, effectiveness of Duolingo, and attitudes towards learning English through the use of Duolingo.

3.4.3. Semi-Structured Interview

Semi-structured interviews were used to collect information from the participants who have perceptions, attitudes and personal experiences about the related topic. They are an effective method for data collection to validate findings and triangulate the other data sources as they provide extra information which normally does not show up in the questionnaires. Fisher (2012) states that questionnaire data should not be used a single source of data and it should be triangulated with other means of data gathering instruments such as interviews and observations. Therefore, semi-structured interview was conducted by the researcher to ten randomly selected participants to further explore their perceptions and attitudes towards the use of Duolingo in learning English. Five questions were posed to the participants. In addition, the interviews were carried out in

Turkish language to make participants understand the questions more clearly. The interviews were conducted and audio recorded using Zoom program to prevent any inaccuracy in analysing and collecting the data. Then, the audio-recordings were transcribed into the written form so that they can be studied in detail.

3.5. Procedure

Upon getting necessary research permission from the Ministry of National Education, the treatment was launched at the 2020-2021 academic year. Before the treatment process, VAT was applied as pre-test to both the experimental group and the control group. Then, Duolingo app was introduced to the experimental group students. They were asked to download Duolingo application into their smartphones, tablets, PCs or laptops. After that, the students were guided by the researcher how to use and learn English through Duolingo. The researcher created a Duolingo classroom from the Duolingo for Schools website. Duolingo for Schools is a website specifically created for language teachers. The participants were asked to join the Duolingo classroom by entering the classroom code shared by the researcher. This enabled the researcher to monitor the participants' activities and progress through the system. The researcher also received the students' progress reports in detail via e-mail. He could also follow who finished his/her assignment on time, late, or even did not finish his/her assignment. There was no intervention from the researcher or any other lecturer in the treatment process, as mobile learning is a kind of self-study approach that is independent of any time or location. The treatment lasted for 8 weeks. During 8 weeks of treatment, the experimental group students studied certain vocabulary lessons through Duolingo which were assigned to them by the researcher. The selected vocabulary lessons were food, animals, clothes, colours, dates and time, family, occupations and numbers. There were 221 vocabulary items in total to be studied. Duolingo was used outside classroom to support regular classroom instruction at school. The participants were assigned vocabulary exercises to accomplish on Duolingo based on the learning schedule prepared by the researcher. The students' daily use of Duolingo was kept monitored by the researcher and they were encouraged to practice English at least 15 minutes in a day. At the end of the treatment,

VAT was re-applied as post-test to both the treatment group and the control group to evaluate the effects of Duolingo on their vocabulary knowledge. A few days later, post-treatment questionnaires and semi-structured interviews were administered to the experimental group participants to investigate their attitudes and perceptions towards MALL supplementation. The treatment procedure is summarized below.



```
graph TD; A[EXPERIMENTAL GROUP  
(MALL SUPPLEMENTATION)] --> B[PRE-TEST]; B --> C["TREATMENT PROCESS  
*Introduction and beginning of  
the treatment  
*Studying vocabulary  
assignments through Duolingo."]; C --> D[POST-TEST]; D --> E["*Conducting Post-Treatment  
Questionnaires"]; E --> F["* Conducting Semi-  
Structured Interviews"]; G[CONTROL GROUP] --> H[PRE-TEST]; H --> I["TRADITIONAL METHOD  
* Regular language instruction  
* No treatment received."]; I --> J[POST-TEST]; K[8 weeks]
```

The flowchart illustrates the experimental design, comparing two groups over an 8-week period.

Experimental Group (Mall Supplementation):

- Pre-Test
- Treatment Process:
 - * Introduction and beginning of the treatment
 - * Studying vocabulary assignments through Duolingo.
- Post-Test
- * Conducting Post-Treatment Questionnaires
- * Conducting Semi-Structured Interviews

Control Group:

- Pre-Test
- Traditional Method:
 - * Regular language instruction
 - * No treatment received.
- Post-Test

The duration of the study is indicated as **8 weeks**.

3.6. Data Analysis

As this study adopts mixed-methods research design, it comprises of both qualitative and quantitative data gathered throughout the process. While qualitative data comes from interviews, quantitative data comes from pre-tests, post-tests, and questionnaires. To analyse the quantitative data, SPSS Statistics 19 software package programme was used. Both descriptive and inferential statistical tests were calculated. The distribution of normality test and homogeneity test were the prerequisite tests to analyse the hypothesis before analysing the data.

3.6.1. Normality Test

A normality test was used to evaluate whether the data collected from controlled and experimental group was normally distributed or not. This test was done using SPSS statistical programme. The normality of tests can be measured with level of kurtosis and skewness, central tendency, histogram, Shapiro-Wilks, Kolmogrov-Siminov and Q-Q plots. A test can be assumed as normal if significance level is higher than 0.05 in Shapiro-Wilks ($p > 0.05$). According to Seer (2013), if the participants of the tests were under 50, Shapiro-Wilks should be used to measure the normality. Thus, normality of tests was determined by looking at the significance level in Shapiro-Wilks. The decision of utilizing parametric test or nonparametric test was based on normality test results. Shapiro-Wilks test results will be presented in the results section.

3.6.2. Homogeneity Test

After collecting the normality test results, the homogeneity of data was calculated with SPSS. The homogeneity test was used to find out whether the test results in both groups were homogenous or not. Significance level should be greater than 0.05 ($p > 0.05$) to determine the homogeneity of data. As the data was normally distributed and both groups were homogenous, parametric tests (t-tests) were preferred for further analysis.

3.6.3. T-Test

T-test is used to determine whether there is a statistically significant difference between the means of two groups. In this study, the paired samples t-test and the independent samples t-test were utilized by the researcher to compare dependent variables (post-test scores) and independent variables (control and treatment group) for two different groups. The significance level was set as 0.05 which is accepted as standard value in social sciences. The hypothesis used for the independent-samples t-test was as follows:

- H_0 : There is not significant difference between the average mean scores of the experimental and the control groups
- H_1 : There is significant difference between the mean scores of the experimental and the control groups.

The null hypothesis is accepted, if the result shows Sig. (2-tailed) > sig p = 0.05 (5%). However, alternative hypothesis is accepted if the result shows Sig. (2-tailed) < sig p = 0.05 (5%). Ultimately, the quantitative analysis of pre- and post-test results of both groups was conducted using SPSS program and the overall effect of MALL supplementation on the vocabulary knowledge of the students was determined.

3.6.4. The Effect of Size

In order to determine whether the effect of the t-test result is weak or strong, the effect of size calculation by Cohen's d was used. After collecting the results, the interpretation of the Cohen's d results could be made based on the following criteria:

- a) 0 – 0.20 = Weak Effect
- b) 0.21 – 0.50 = Modest Effect
- c) 0.51 – 1.00 = Moderate Effect
- d) > 1.00 = Strong Effect

3.6.5. The Post-Treatment Questionnaire

The post-treatment questionnaire used in this study was adapted from a different study conducted by Astarilla Dede Warman (2018) in which Duolingo was used outside classroom to support regular English instruction in the classroom. The reliability of the questionnaire was measured as **0.92**. The questionnaire items were translated into Turkish language and administered to the experimental group students at the end of the treatment to find answers to the second research question of this which aimed to find out students' attitudes and perceptions towards MALL supplementation. The obtained data was quantitatively analysed for means and percentages using SPSS Statistics 19 software package programme.

The ranges used for the data analysis of five-point Likert-scale were as follows: 1.00-1.79 = strongly disagree, 1.80-2.59 = disagree, 2.60-3.39 = agree to some extent, 3.40-4.19 = agree, 4.20-5.00 = strongly agree (Pimentel, J. L., 2019).

3.6.6. Semi-Structured Interviews

The last data collection tool was the semi-structured interviews which aimed to triangulate the data collected from the post-treatment questionnaire. Written texts from the interview transcripts and documentation were the qualitative data in this study. The qualitative data was analysed using coding method of content analysis in which the codes are broken down into categories and themes with their frequencies to summarize the data. It can be studied in detail in three steps, as proposed by Sugiyono (2009). The first step was comprised of attention, selection, abstracting, concentration, transformation and simplification of raw data emerging from the interview results, and the documentation of the students' learning process. The second step was to draw conclusions and taking action by arranging the information. The last step was drawing conclusions based on collected data which were processed through display data and reduction.

3.7. Conclusion

In this section the researcher aimed to introduce the methodology of this study in detail. Extensive information was presented about the research design, the research setting and participants and treatment procedure. Then, data collection instruments were introduced in detail. Finally, the data analysis procedure was presented. In the next chapter, the obtained data will be analysed, and the results will be presented and interpreted.



CHAPTER IV

RESULTS

4.1. Introduction

In this chapter, the analysis of the data gathered from data collection instruments will be illustrated via tables and graphs. Taking the research questions of the current thesis into consideration, the results will be displayed in detail. Firstly, the quantitative analysis of pre- and post-tests and questionnaires will be demonstrated. Then, the qualitative analysis of the semi-structured interview will be presented to triangulate the data and confirm the questionnaire findings. Finally, a summary of the results will be provided at the end of the chapter.

4.2. Quantitative Data Results

In order to answer the first research question of the study which aimed to investigate the effect of Duolingo as a supplementary material on the students' vocabulary knowledge, the vocabulary achievement test (VAT) results of both groups were quantitatively analyzed and the results will be presented in the following sections. In order to answer the second research question of the study which aimed to investigate the students' perceptions and attitudes towards MALL supplementation, the post-treatment questionnaire was administered to the experimental group participants and their answers were quantitatively analyzed and the results will be presented. The quantitative data were analyzed with SPSS statistical program.

4.2.1. The Vocabulary Achievement Test (VAT) Results

Before the treatment process, the VAT was applied as pre-test to both the experimental group and the control group and the same test was applied as post-test to both groups at the end of the treatment. The control group students did not receive any treatment from the researcher whereas the experimental group participants received MALL supplementation for 8 weeks. All of the vocabulary items in the test were selected from

Duolingo lessons and they were studied by the experimental participants during the treatment process. The target vocabulary items were related to food, animals, clothes, colors, dates and time, family, occupations and numbers. Both the pre-test and the post-test were the same tests. The tests consisted of 25 questions in total. There were three questions for each vocabulary themes except for food which had 4 questions. The pre- and post-test results of the experimental group (see table 4.1) and the control group (see table 4.2.) are presented in the tables below:

Table 4.1: Experimental Group Scores in Pre- and Post-Test

No	Student Initials	Pre-Test Score	Post-Test Score
1.	FK	72	96
2.	EK	68	96
3.	EY	64	88
4.	ET	60	80
5.	ND	64	92
6.	GS	56	80
7.	GŞ	52	76
8.	HÖ	60	88
9.	HE	64	92
10.	NA	68	96
11.	ÖC	52	80
12.	RA	56	80
13.	SK	60	92
14.	Zİ	48	78
15.	ZÖ	68	100
Mean		60.8	87.6

The pre-test was given before the treatment and the same test was given as post-test at the end of the treatment process. Based on the results above, the minimum pre-test score was 48 and the maximum pre-test score was 72 while the minimum post-test score was 52 and the maximum post-test score was 72. The average mean score of the pre-tests was 60.8 and the average mean score of the post-tests was 61.4.

Table 4.2: Control Group Scores in Pre- and Post-Test

No	Students' Initial	Pre-Test Score	Post-Test Score
1.	ES	72	76
2.	YD	48	44
3.	EG	56	60
4.	GG	60	68
5.	TT	60	64
6.	MY	64	72
7.	MS	56	56
8.	YT	60	68
9.	ST	54	62
10.	DA	64	72
11.	SA	52	56
12.	HA	64	64
13.	MB	68	68
14.	BB	48	56
15.	HB	56	52
Mean		58.8	61.4

The pre-test was applied to the control group students before the treatment process launched and the post-test was applied at the end of the treatment. Looking at the results above, the highest pre-test score was 72 and the minimum pre-test score was 48.

Meanwhile, the lowest score of the post-test was 44 and the highest score of the post-test was 76. The mean of pre-test score was 58.8 and the mean of post-test score was 61.4.

4.2.2. Normality Test Results

The normality test was conducted in order to evaluate whether the data collected from the pre-tests of the experimental group and the control group was normally distributed or not. The significance level should be greater than 0.05 ($p > 0.05$) to determine the data is normally distributed. The Shapiro Wilks test was conducted with SPSS and the results were presented below:

Table 4.3: The Shapiro Wilks Normality Test

	Statistics	df	P
Experimental Group Pre-test	.144	15	.669
Control Group Pre-test	.154	15	.196

Based on the table 4.3 above, it can be seen that the significance level of the experimental group was 0.669 ($p > 0.05$) and the significance level of the control group was .196 ($p > 0.05$). It means the data is normally distributed for both groups.

4.2.3. Homogeneity Test Results

The homogeneity test was utilized by the researcher in order to evaluate whether the data collected from the pre-tests of the experimental group and the control group was homogenous or not. The significance level should be greater than 0.05 ($p > 0.05$) to determine the data is homogenous. Levene's test of homogeneity of variance was conducted with SPSS and the results were presented below:

Table 4.4: Levene's Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Pre-test	Based on Mean	.086	1	28	.771
	Based on Median	.075	1	28	.787
	Based on Median and with adjusted df	.075	1	27.971	.787
	Based on trimmed mean	.074	1	28	.788

Based on the homogeneity test results (table 4.4), the significance level was .771 ($p > 0.05$) which means both groups were homogenous and the groups did not differ from each other. As the data was normally distributed and both groups were homogenous, parametric tests (t-tests) were preferred for further analysis.

4.2.4. T-test Results

T-test method was utilized by the researcher in order to answer first the research question of the study which aimed to determine the effect of Duolingo supplementation on the students' vocabulary knowledge by investigating the differences between inter and intra group test results. Paired samples t-test and independent samples t-test were conducted by using SPSS statistical program and results were presented in the following sections.

4.2.4.1. Paired Samples T-test Results of VAT

The paired samples t-test was conducted by the researcher to find out whether there was any statistically significant difference between the pre-test and the post-test scores within groups. The findings were presented in Table 4.6 below.

Table 4.5: Paired Samples T-test Results within Groups

Groups	Tests	N	Mean	Std. Dev	df	Mean Dif.	P
EG	Pre-test	15	60.80	7.65195	14	-26.8000	.000
	Post-test	15	87.60	7.93545			
CG	Pre-test	15	58.80	6.91995	14	-2.66667	.076
	Post-test	15	61.46	6.96112			

Note: * EG: Experimental Group; *CG: Control Group

According to Table 4.5, there was a statistically significant difference ($p < 0.05$) between the mean scores of the pretest ($X = 60.80$) and the posttest mean scores of the experimental group ($X = 87.60$). On the other hand, there was not a significant difference ($p > 0.05$) between the mean scores of pretest ($X = 58.80$) and posttest of the control group ($X = 61.46$).

4.2.4.2. Independent Samples T-test Results of VAT

The independent samples t-test was conducted to determine whether the difference between the means of both groups was statistically significant. The significance level was set as 0.05 which is accepted as standard value in social sciences. The hypothesis used for the independent-samples t-test was as follows:

- H_0 : There is no significant difference between the mean scores of the experimental and the control groups
- H_1 : There is significant difference between the mean scores of the experimental and the control groups.

The independent samples t-test results of VAT are presented below.

Table 4.6: Independent Samples T-test Results of VAT

Tests	Groups	N	Mean	Std. Dev	T	df	Mean Dif.	Std. Err.	P
Pre-test	EG	15	60.80	6.9611	-.789	28	-2.0000	1.79735	.437
	CG	15	58,80	6.9199				1.78672	
Post-test	EG	15	87.60	7.9354	-9.181	28	-26.133	2.04893	.000
	CG	15	61.46	7.6519				1.97573	

Note: * EG: Experimental Group; *CG: Control Group

Table 4.6 presents both the experimental groups' and the control groups' mean score of the pre- and post-test. Based on the results, it can be said there was not statistically significant difference between the pre-test mean scores of the experimental group and the control group ($p > 0.05$). However, looking at the post-test results, the post-test mean score of the experimental group was 87.6 (SD = 7.9) whereas the post-test mean score of the control group was 61.4 (SD = 7.6). The t-test results shows the difference between the post-test mean scores of both groups was found to be statistically significant ($p = .000$). Hence, the null hypothesis is rejected and the alternative hypothesis is accepted which means there is a statistically significant difference between the mean scores of the control group and the experimental group in favour of the experimental group. In other words, the experimental group students significantly outperformed the control group students in terms of vocabulary achievement scores on the post-test, suggesting that MALL treatment was successful in teaching vocabulary.

4.2.5. The Effect of Size

In order to determine whether the effect of the t-test result is weak or strong, the effect of size calculation proposed by Cohen (2007) was utilized by the researcher. After collecting the results, the interpretation of the Cohen's *d* results were made based on the following criteria:

Cohen's Standard	Effect Size
a) 0 – 0.20	Weak Effect
b) 0.21 – 0.50	Modest Effect
c) 0.51 – 1.00	Moderate Effect
d) >1.00	Strong Effect

The formula for calculating the size of the t-test effect is as follows:

$$\text{Cohen's } d = [\text{mean of experimental group}] - [\text{mean of control group}] / SD_{\text{pooled}}$$

$$\text{Cohen's } d = (87.6 - 61.4) / 7.794989 = \mathbf{3.361134 \text{ (Strong Effect)}}.$$

Based on the calculation above, it can be seen that the effect of size is 3.36. According to Cohen's *d* effect of size criteria, it means MALL supplementation given to the experimental group had a strong effect ($3.36 > 1.00$) on the vocabulary knowledge of the participants; hence their vocabulary knowledge is enhanced.

4.2.6. The Post-Treatment Questionnaire Results

The post-treatment questionnaire was administered at the end of the treatment process to collect in-depth data on the experimental group participants' attitudes and perceptions towards MALL supplementation and aimed to answer the second research question of the study "What are the attitudes and perceptions of Turkish EFL learners towards MALL supplementation?" The questionnaire was comprised of two parts. The first part consisted of three question items in numerical rating (0 to 10) scale which aimed to measure the satisfaction level of the respondents towards MALL supplementation. The second part of the questionnaire consisted of fifteen questions in five-point likert-scale type in which each statement answered from strongly disagree (1), disagree (2), neutral (3), agree (4) strongly agree (5). The second part of the questionnaire was designed to evaluate the perceptions of the students' in terms of easiness of using Duolingo, usefulness of Duolingo, effectiveness of Duolingo, and attitudes towards learning

English through the use of Duolingo. The responses from the questionnaire were quantitatively analyzed with SPSS program and detailed results were presented below:

Table 4.7: Satisfaction of English vocabulary learning through the use of Duolingo

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
		(0-1)	(2-4)	(5)	(6-8)	(9-10)	
		%	%	%	%	%	-
1	In general, how effective was Duolingo in your English vocabulary learning?	0.0	0.0	0.0	40.0	60.0	8.6
2	In general, how enjoyable was Duolingo in your English vocabulary learning?	0.0	0.0	0.0	20.0	80.0	9.0
3	In general, how likely do you recommend Duolingo to a classmate or friend?	0.0	0.0	0.0	33.3	66.7	8.8

Table 4.7 demonstrates the participants' responses to the items related to their satisfaction of vocabulary learning through the use of Duolingo. The majority of the students found Duolingo effective and enjoyable in vocabulary learning. In addition, most of the participants agreed they would recommend Duolingo to their classmates or friends. The first part of the questionnaire findings suggests that most of the participants enjoy learning English vocabulary through Duolingo and they are satisfied with it.

Table 4.8: Easiness of using Duolingo

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
		(1)	(2)	(3)	(4)	(5)	
		%	%	%	%	%	-
4	I think Duolingo is easy to access.	0.0	0.0	0.0	53.3	46.7	4.4
5	I think Duolingo is easy to use.	0.0	0.0	0.0	33.3	66.7	4.6

6	I think it is convenient to practice English through Duolingo since I can access it anytime and anywhere.	0.0	0.0	6.7	73.3	20.0	4.1
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Table 4.8 shows the participants' responses related to the easiness of using Duolingo. Based on the table above, it can be said that the majority of students strongly agree with these items. All of the participants find Duolingo easy to access as well as easy to use while the majority of them (93.3%) agree that Duolingo is convenient because they can communicate and access it anytime and anywhere. In other words, they did not experience any major difficulties related to the access and the features of the app while learning English.

Table 4.9: Usefulness of using Duolingo

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
		(1)	(2)	(3)	(4)	(5)	
		%	%	%	%	%	-
7	I think Duolingo features are variative and useful.	0.0	0.0	13.3	73.3	13.3	4.0
8	I feel Duolingo gives me opportunities to enhance my English outside the classroom.	0.0	0.0	13.3	60.0	26.7	4.1
9	I think Duolingo is helpful to improve my English skill.	0.0	0.0	6.7	33.3	60.0	4.5
10	I think Duolingo is useful to practice my English skill.	0.0	0.0	20.0	40.0	40.0	4.2

Table 4.9 reveals the participants' responses related to the usefulness of Duolingo in learning English in different aspects. The majority of the students (86.6%) think that Duolingo features are various and useful. In addition, 86.7% of the students believe that Duolingo gives them opportunities to improve their English outside the classroom. Then, almost all of the students (93.3%) find Duolingo helpful to improve their English whereas 80% of the students believe that Duolingo is useful to practice their English skills. Based on the responses of the participants, we can conclude that Duolingo can be

used to improve the students' English skills outside the classroom at anytime and anywhere.

Table 4.10: Effectiveness of using Duolingo

No	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean
		%	%	%	%	%	-
11	I think Duolingo is effective to improve my English anytime and anywhere.	0.0	0.0	20.0	33.3	46.7	4.2
12	I think Duolingo enrich my vocabulary.	0.0	0.0	0.0	33.3	66.7	4.6
13	I believe that my achievement is possible to increase after the use of Duolingo.	0.0	0.0	20.0	53.3	26.7	4.0

Table 4.10 provides the participants' responses related to the effectiveness of using Duolingo. 80% of the students think that Duolingo is effective in improving their English while all of the participants believe that Duolingo enrich their vocabulary. In addition, the majority of the students (80%) believe that their possible achievement increased after MALL supplementation. From the data, we can conclude that almost all of the students agree that Duolingo is an effective tool which greatly contributes to their English language learning achievement.

Table 4.11: Attitudes towards learning English through the use of Duolingo

No	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean
		%	%	%	%	%	-
14	I have positive attitudes towards learning English through Duolingo.	0.0	0.0	6.7	53.3	40.0	4.3
15	I think doing assignment through Duolingo is more fun than conventional way.	0.0	0.0	0.0	33.3	66.7	4.6

16	I think using Duolingo develop self-learning skills because we can measure our progresses on Duolingo.	0.0	0.0	0.0	66.7	33.3	4.3
17	I think using Duolingo makes learning English is easier.	0.0	0.0	13.3	26.7	60.0	4.4
18	I enjoy when I am learning English through Duolingo.	0.0	0.0	20.0	40.0	40.0	4.2

Table 4.11 shows the participants' responses related to their attitudes towards MALL supplementation. Almost all of the students (93.3%) state that they have positive attitudes towards learning English through Duolingo. All of the students agree that doing assignments with Duolingo is more enjoyable than traditional ones. In addition, they all agree that Duolingo develop their self-learning skills as they can measure their progress through the app. Then, 86.7% of the participants think that Duolingo makes English learning easier. Lastly, the majority of the participants (80%) agree that they enjoy learning English through Duolingo.

4.3. Qualitative Data Results

In order to answer the second research question of the study which aimed to investigate the students' perceptions and attitudes towards MALL supplementation, semi-structured interviews were conducted to 10 randomly selected participants at the end of the treatment. The obtained data was examined and qualitatively analysed by the researcher.

4.3.1. Semi-Structured Interviews

In order to triangulate data and to broaden the analysis, the researcher conducted semi-structured interviews with 10 randomly selected participants to gather in-depth data about the participants' perceptions and attitudes towards MALL supplementation. After collecting and examining the recorded data from interviews, the researcher found out various themes towards the use of Duolingo. The obtained data was analyzed using

coding method of content analysis. Positive (see table 4.12) and negative (see table 4.13) responses of the participants are summarized in the tables below.

Table 4.12: Positive Responses of Interviewees towards MALL Supplementation

Theme	Code	f	Students
Perceptions			
Easiness	I think Duolingo is easy to use.	4	S1, S4
			S6, S9
	Duolingo is easy to access anytime and everywhere	2	S3, S5
Enjoyable	I enjoy using Duolingo to learn English.	6	S3, S5, S6, S7, S8, S9
Convenient	You can practice the lessons whenever you want since you can access it anytime and anywhere.	5	S1, S2, S4, S8, S10
	It is more convenient to carry mobile phones rather than heavy coursebooks or wordlists for vocabulary learning.	1	S10
Useful	Duolingo is useful for pronunciation.	3	S3, S5, S7
			S1, S2, S3, S4, S5, S6, S7, S8, S9
	Duolingo is useful for vocabulary learning..	9	
Motivating	Gamification features of the app are motivating.	6	S1, S2, S3, S4, S5, S8
Fun	Language learning with Duolingo is fun.	7	S1, S2, S4, S6, S7, S8, S10

All of the respondents expressed their positive opinions towards MALL supplementation. Looking at the findings in table 4.12 above, six respondents expressed his/her opinion about the easiness of the app:

S1. "...As long as you have internet connection, you can easily access Duolingo wherever you want."

S6. *"...I think Duolingo is easy app to use."*

Six of the interviewees found MALL supplementation enjoyable:

S7. *"...Vocabulary exercises and pronunciation activities on Duolingo are really enjoyable."*

S9. *"...It is like you are playing a game and I enjoy it. I feel like I learned lots of new words."*

Five of the interviewees found MALL supplementation convenient:

S1. *"...I can play Duolingo wherever and whenever I want. It also gives you instant feedback by displaying information about your level of progress while you are studying in a lesson. Moreover, the app is getting better and better with constant updates and new improvements."*

S2. *"It is good that you can use the app on different platforms. I practice the lessons on PC at home while I use it on my tablet or mobile phone outside."*

S10. *"To me, Duolingo is practical way of learning English vocabulary as it is easier to carry a mobile phone or a tablet than a coursebook. I feel stressed when I look at the long word lists through worksheets or coursebooks, I feel more comfortable when I learn vocabulary on Duolingo."*

Nine of the respondents found MALL supplementation useful.

S3. *"I think Duolingo is great tool for learning English. It helps us to improve our English. You can practice the lessons as much as you want. It is a good app to learn vocabulary and pronunciation. It is easy to use and you can use it anywhere and anytime."*

S7. *"I think Duolingo is effective for vocabulary learning. You can learn English vocabulary about different kinds of topics such as food, clothes, animals, colors, jobs etc. I still remember the words I learned two months ago."*

S8. *"I like the way that all the lessons are gradual so you progress gradually. You complete a lesson on certain topic and then you move on to the next lesson where you*

learn and practice the target words related to the topic in different exercises which is great for vocabulary learning.”

Six of the interviewees found MALL supplementation motivating:

S1. “...I get a sense of accomplishment every time I level up. Moving up in the leaderboard rankings motivate me to finish my daily goal of English practice.”

S3. “...Duolingo is a good app in terms of motivating and engaging me to learn English. To me, it is fun and enjoyable way to learn and practice new words. It also helps me to improve my pronunciation of words and how to arrange sentences correctly. It is useful app.”

S4. “I believe Duolingo helped me to become more disciplined learner because if you do not play it every day, it sends daily reminder notifications through the app and via e-mail helping me not to forget the study time. This notification system of Duolingo encourages me and motivates me to play it more often to improve my vocabulary.”

S5. “I think Duolingo has some interesting display of features like avatar, leaderboards, themes, experience points (XP), badges etc. I also like Duolingo’s voice recognition system as it can detect whether my pronunciation of a word is correct or not.”

S8. “...I like the way that it is built like a video game. You move through levels, you collect points and rewards which make language learning fun and entertaining.”

Seven of the interviewees found MALL supplementation fun:

S4. “I think learning English through Duolingo is fun. It is like a game. When I finish the lessons successfully, I collect experience points (XPs) and get lingots. Lingots are the rewards for the achievements related to your language learning. You can become the leaderboard if you collect more XPs than your friends and this makes me feel proud and motivates me to play it more and more.”

S6. “Duolingo is very useful and interesting app for language learning. It reminds me my daily language practice targets and it also has a word strength meter which gives information about my vocabulary knowledge.”

S10. “... I also like that it has a community inbuilt and you can ask and answer questions with other language learners that are going through the same lessons as you are so that’s also really fun.”

Moreover, participants were asked to express their opinions about the disadvantages and drawbacks of Duolingo. Findings of the interviews can be seen below:

Table 4.13: Negative Responses of Interviewees towards MALL Supplementation

Theme	Code	f	Students
Perception			
Annoying	Advertisements at the end of the lessons are annoying and distracting my attention.	2	S7,S9
Boring	Excessive repetition of words can be boring.	1	S4
Unnatural	Learning through Duolingo does not feel natural.	2	S3, S10
Time Consuming	I spend too much time on Duolingo. It can be addictive.	1	S8

Looking at the negative responses towards MALL supplementation in the table 4.13, two of the interviewees found Duolingo advertisements annoying:

S9. “...Advertisements come out every time I finish a lesson. These advertisements are annoying and distract my concentration. You need paid version of the app to avoid this problem.”

One of the interviewee found Duolingo exercises boring:

S4. “...Excessive repetition of words can sometimes be boring. However, if you do not finish all the levels at a sitting, maybe you can avoid this problem.”

Two respondents stated that Duolingo was unnatural:

S3. “...Learning through the app does not feel natural. It is not an actual person you are learning from. It is like you are learning English from a robot.”

One of the interviewee found Duolingo time consuming:

S8. "...I spend too much time on Duolingo. It can be addictive."

4.4. Conclusion

In this chapter, the researcher aimed to present the results of data analysis collected with data collection instruments. Both quantitative and qualitative data analysis results were presented in detail. The results revealed that the experimental group students receiving MALL supplementation outperformed the control group students in terms of vocabulary achievement scores. Moreover, the responses of the participants collected through the semi-structured interviews and the post-treatment questionnaires indicated that the participants had positive perceptions and attitudes towards MALL supplementation. In the following chapter, findings of the study will be discussed based on the relevant literature. In addition, pedagogical implications of the study, limitations of the study and suggestions for further research will be provided.

CHAPTER V

DISCUSSION AND CONCLUSION

5.1. Introduction

This chapter provides discussion of the findings in the light of the relevant literature. In the following sections, the pedagogical implications of the study will be discussed and suggestions for language teachers, learners, researchers and policymakers will be presented.

5.2. Discussion of the Results

5.2.1. The Effect of Duolingo on EFL Students' Vocabulary Achievement

The first research question of the study tried to find out the effect of MALL supplementation on Turkish middle school EFL students' vocabulary knowledge. To answer this question, the vocabulary achievement test (VAT) was given as pre- and post-test for the both experimental and control groups and test results were quantitatively analyzed by the researcher. The paired samples t-test and the independent samples t-test demonstrated that post-test scores of the experimental group who received MALL supplementation significantly outperformed post-test scores of the control group who did not receive MALL supplementation. Therefore, the alternative hypothesis which stated that the experimental group students will statistically outperform the control group in terms of vocabulary achievement scores is accepted. These findings go hand in hand with previous MALL studies investigating the effectiveness of MALL apps (Lu, 2008; Kukulska-Hulme, 2009). The experimental group students' better achievement scores in vocabulary can be attributed to the several reasons.

Firstly of all, Duolingo provides a learning environment which is engaging and interactive for vocabulary learning. The multimedia presentations of the target words through related pictures, word pronunciations and comprehensible sentences help language learners to understand the words better and increase their motivation. This also promotes learner autonomy of learners where they actively construct and connect their

verbal and visual knowledge (Mayer, 1997). Furthermore, the use of audio files and pictures in the app might result in better vocabulary retention compared to the words presented in isolation as Ramezanali (2017) in his study showed that they can also help language learners remember the words faster.

The second reason could be related to the convenience and portability of Duolingo. The participants' responses to the interviews and the questionnaire revealed that language learners can study and review the lessons through the app whenever and wherever they want. These findings were in line with the studies conducted by Steel (2012) and Kukulska-Hulme (2012). In their studies, they suggested that as the in-class language learning time is limited and plenty of time is necessary for language learning, mobile apps could be practical supplementation tools because they can extend the language learning outside the classrooms. Kukulska-Hulme (2012) also stated that mobile devices like smart phones or tablets offer language learners plenty of opportunities for effective vocabulary learning outside the classroom. These results were in line with the responses of the experimental students to the this study that they were able to study and review the target words through the app as much as they want without any time and place limitation which in turn facilitated their vocabulary knowledge.

The third reason could be attributed to the gamification features provided in Duolingo which showed some positive results in terms of vocabulary learning. The research studies conducted by Chen (2019) and Gamlo (2019) revealed that the gamification features of the app could encourage learners and help them maintain their motivation to learn the language. Moreover, game-based learning could arouse curiosity and facilitate sensory stimulation of the learners. This was observed and supported by the findings of the current study when the researcher applied MALL treatment to the experimental group, the students agreed that the interleaving approach in Duolingo where the words repeatedly appears through different form of exercises like listening, reading and writing exercises helps the memorization of the words as well as vocabulary retention. The students also stated that they felt more comfortable and confident while studying pronunciation of words on Duolingo as they were able to practice the words on their own rather than in front of people.

Therefore, this sense of enjoyment provided by Duolingo while studying and learning the target vocabulary encouraged the experimental group students to spend more time with the app which enabled them to improve their vocabulary learning and achieve higher scores compared to the control group students.

The fourth reason could be related to the features of the app promoting autonomous learning. It was not surprising to see that as a self-learning tool, Duolingo may have a positive effect on the autonomy level of students. MALL apps can encourage the students to be autonomous language learners in which they actively monitor their own learning progress and take responsibilities for their language learning process (Citrayasa, 2019). This was observed by the researcher throughout the treatment process when following the participants learning progress through the system, each student finished his/her lesson at different period of times with different time durations. Depending on the learning pace of the learner, it sometimes takes 15 minutes for one particular student to finish a lesson whereas it takes 30 minutes or so for another student. Duolingo encourages students to be independent learners by allowing them to study at their own pace without any time and place limitation. In addition, they take more initiatives for their language learning development which in turn fosters learner autonomy.

The last reason could be attributed to the spaced repetition algorithm used on Duolingo to enhance vocabulary learning of the learners. During the treatment process, the experimental group students were exposed to the target words at least five times in different kinds of exercises on different days. Ma (2014), for example, found whenever the newly learned vocabulary is retrieved from the mental lexicon for the daily use of the language; the memory trace for the word would be improved. Therefore, it can be said that the subsequent exercises and intervals of repetition of the target words can be helpful to retain them in their memories for a longer time. This was in line with Daloğlu et al. (2009)'s study which revealed that spaced repetition of words could positively affect the vocabulary knowledge of the students by transferring it from the short-term memory to the long-term memory. The positive effects of vocabulary review and spaced

repetition on vocabulary learning and retention have been supported by several studies (Schuetze & Weimer-Stuckmann, 2011; Tabibian et al. 2019).

Earlier studies also show that MALL can result in better vocabulary learning. Basoglu and Akdemir (2010)'s study showed that vocabulary learning through MALL can be more effective than vocabulary learning through flashcards. Another study conducted by Lu (2008) revealed that the experimental group participants using MALL supplementation for vocabulary learning recognized more vocabulary items than the control group who learned vocabulary with paper-based materials. In addition, Suwantarathip and Orawiwatnakul (2015)'s study found similar results where the experimental group using MALL for vocabulary learning outperformed the control group using printed materials. Therefore, the findings from all of the aforementioned studies seem to be in line with the results of the current study which found that MALL supplementation has positive effect on the vocabulary knowledge of the EFL learners.

5.2.2. Students' Perceptions and Attitudes towards MALL Supplementation

The second research question of the study aimed to explore the perceptions and attitudes of Turkish EFL learners towards MALL supplementation. Two different data collection instruments, the post-treatment questionnaire and the semi-structured interview, were conducted at the end of the treatment to answer the research question. The post-treatment questionnaire comprised of two parts. The first part of the questionnaire consisted of three questions which evaluated the students' satisfaction level of vocabulary learning through Duolingo. The second part of the questionnaire consisted of 15 questions. Ten of them were used to gather information about the perceptions of the students towards Duolingo in terms of easiness, usefulness and effectiveness, whereas five of them were used to gather information about the students' attitudes towards MALL supplementation. The lowest average mean score of the questionnaire item was 4.1 and the highest average mean score of the questionnaire item was 4.6 which indicates the majority of the participants agreed with the statements in the questionnaire. The semi-structured interview consisted of five questions and it was conducted with 10 randomly selected participants.

The responses to the questionnaire items 1, 2 and 3 (see table 4.10) revealed that the majority of students enjoyed learning vocabulary through Duolingo and they were satisfied with it. The researcher found similar responses from the participants' interviews where one of the interviewee stated that vocabulary learning through Duolingo was enjoyable experience for him and he would recommend the app to his friends and even family members.

According to the responses to the questionnaire items 4, 5 and 6 (see table 4.11), it can be said that most of the participants found Duolingo easy to use and they did not experience any major difficulties related to the access and the features of the app while learning English. They also agreed that Duolingo is convenient to use as they can access it anytime and anywhere. Seven interviewees expressed his/her positive opinions towards the ubiquitous learning opportunity provided with Duolingo. MALL presents language learners new opportunities and experiences to learn the language outside the classroom. The notion of "ubiquitous learning" refers to having language learning environment without any time or place limitation that is supported by mobile devices. It is safe to say that Duolingo promotes ubiquitous learning as the language learners can practice the language whenever and wherever they want. Moreover, 8 out of 10 interviewees stated that Duolingo made vocabulary learning easier and more enjoyable for them. 3 interviewees found mobile phones more convenient and easier to carry than a textbook or wordlists.

Based on the responses on items 7, 8, 9 and 10 (see table 4.12), it can be concluded that Duolingo is a useful app with various features and it can be used to enhance vocabulary knowledge outside the classroom at anytime and anywhere. These results also coincide with the findings of similar studies on the relevant literature (Costa & Han, 2017; Hsu et al., 2013). Al-Fahad (2009)'s study, for example, revealed that MALL apps and mobile devices are useful supplementary tools which provide a good support to the language learners outside the classroom.

As seen in their responses on items 11, 12 and 13 (see table 4.13), almost all of the students found Duolingo as an effective tool which greatly contributes to their English vocabulary learning achievement. It is evident that the findings of the study go parallel

with Al-Fahad (2009)'s study in which the participants agreed that language learning with mobile devices can be effective for vocabulary learning. Moreover, all of the interviewees expressed their positive opinions about learning English vocabulary through the use of Duolingo confirming the relevant questionnaire findings. When the experimental group was exposed to the language through MALL supplementation, they were able to study and practice new words in the target language and improve their pronunciation and comprehension of the target words during the treatment process.

Regarding the attitudes of learners towards MALL supplementation, responses on items 14, 15, 16, 17 and 18 (see table 4.14) were examined and the findings demonstrated that the majority of the students agreed that they held positive attitudes towards learning English through the use of Duolingo. All of the respondents also agreed that doing assignments with Duolingo is more enjoyable than traditional ones. According to the responses on item 17, the students believe that Duolingo develop their self-learning skills as they can measure their progress through the app. These findings acknowledge the claims of Citrayasa (2019) where she stated that MALL apps can encourage students to become autonomous language learners. Taking more control and responsibility for their own learning helps language learners to evaluate, plan and organize their language learning process (Benson, 2001).

To sum up, based on the findings collected from the questionnaires and the interviews, it can be inferred that almost all of the students enjoyed using Duolingo and expressed their positive perceptions towards MALL supplementation. The results indicated that they could learn the target words thanks to the usability, availability, portability and accessibility features of the app. Furthermore, majority of the students recognized that Duolingo allowed them to practice and review the target vocabulary items wherever and whenever they want by eliminating time and space limits. In addition, MALL supplementation could create positive attitudes towards language learning and lower anxiety of the language learners. Last but not least, most of the participants found Duolingo's vocabulary teaching method as fun and enjoyable compared to the traditional vocabulary teaching methods in which they were asked to learn long lists of words in a short amount of time in isolation. Lin (2016), argued that storing the newly

learned words for a longer period of time and using them productively and freely can only be achieved by assimilating new words into their own schematic knowledge. The results of this quasi-experimental research go hand in hand with other studies in the literature (Agca & Özdemir, 2013; Al-Shehri 2011; Bensalem, 2018; Kim, 2011; Li, & Zou 2015; Motallebzadeh et al., 2011; Nah et al., 2008; Ornprapat & Wiwat, 2015; Rahimi &Yadollahi, 2011; Saran et al., 2008; Tabatabaei & Goojani, 2012; Yu, 2019).

When it comes to drawbacks and disadvantages of the app, it can be said that most of them were related to the technical features of the app. Three interviewees mentioned internet connection requirement of the app as the biggest drawback of the app. They stated that it would be great if they add an offline mode feature to the app. One interviewee complained about delays and lagging issues during the lessons as well as lost streaks because of syncing issues. Two interviewees found advertisements in the app annoying and distracting their attention. One needs to buy paid version of the app, Duolingo Plus which offers ad-free and offline access to the lessons to avoid these problems. Two interviewees found excessive repetition of words in lessons as time-consuming and tedious. It is clear that it is not easy to satisfy all participants as they have different learning styles, backgrounds and interests. They may prefer learning English through different means of education. Nonetheless, the number of positive responses of participants towards MALL supplementation clearly outnumbered the negative ones which implies that MALL supplementation through the use Duolingo have positive effects on the perceptions and attitudes of the participants.

5.3. Conclusion

This quasi-experimental study aimed to answer two research questions. The first research question of the study investigated the effect of MALL supplementation on Turkish middle school EFL learners' vocabulary achievement. The vocabulary achievement test was used to collect the necessary data. The pre- and post-test vocabulary achievement scores of both groups were analyzed using t-tests. The findings showed that MALL supplementation had positive effect on vocabulary knowledge of the students. This is evident by the mean score of the students in each phase of the study and

the significance calculation in post-test results. The quantitative data analysis showed that the experimental group students significantly outperformed the control group students in terms of vocabulary achievement scores on the post-test, suggesting that MALL treatment was effective in vocabulary learning. Thus, the null hypothesis of the study was rejected and the alternate hypothesis of the study which stated that the experimental group will statistically outperform the control group was confirmed.

To answer the second research question of the study which aimed to investigate the students' perceptions and attitudes towards MALL supplementation, the post-treatment questionnaire was administered to the 15 participants and 10 randomly selected participants were interviewed to triangulate the data. The post-treatment questionnaire findings were quantitatively analyzed using SPSS program whereas the recorded data from interviews was qualitatively analyzed using content analysis method. The findings revealed that almost all of the participants found Duolingo enjoyable, useful, effective, fun and easy to use. Questionnaire findings were triangulated with the positive responses of the participants to the interview questions posed by the researcher. Both the questionnaire and interview findings also revealed that the participants had positive attitudes towards using MALL apps for vocabulary learning outside the classroom. Furthermore, findings indicated that the app promotes learner autonomy as it offers independent and ubiquitous learning by allowing students to practice the target language at their own pace without any time and place limitation. Based on the findings and discussions above, it can be claimed that the second hypothesis of the study which stated that the experimental group students will show positive attitudes and perceptions towards MALL supplementation was confirmed. The responses of interviewees revealed that participants enjoyed using Duolingo to practice and review the target words and they could still remember them after some time. The results also indicate that learners prefer learning the target words through the subsequent exercises presented in the app compared to conventional wordlist learning in which learners are asked to memorize the target words in isolation without context. Lately, vocabulary learning through the traditional wordlists has fewer advocates and learners usually found it as tedious because they forget the newly learned words easily (Boonkongsan, 2013). Thus, it can

be inferred that the portability and spaced review system of the app enabled language learners to retain the target words for longer period of time which in turn facilitated their vocabulary knowledge.

5.4. Pedagogical Implications and Suggestions

This research investigated the effect of mobile assisted language learning (MALL) app on vocabulary knowledge of the students and their perceptions and attitudes towards MALL supplementation. Findings of this study contributed to the literature in that MALL apps like Duolingo may serve as an effective supplementary tool for vocabulary teaching as shown by the increase in the vocabulary achievement scores of the experimental group participants. It is also found that participants developed positive perceptions and attitudes towards MALL supplementation. Within the framework of the discussion of the findings above, the following pedagogical implications and suggestions are presented for language teachers, policy makers and learners:

First of all, language teachers and educators should pay attention to the pedagogical considerations of mobile applications which are not tailor-made for vocabulary teaching and this requires careful planning which is not an easy task for teachers. Although there are hundreds of MALL apps whose developers argue that they are carefully designed for vocabulary teaching based on scientific findings, it is pivotal for language teachers to be aware of how to evaluate the usefulness and effectiveness of these apps in vocabulary teaching. MALL supplementation can be considered as a relatively new approach in language learning and if an appropriate pedagogy is used, it may have better effects on learning (Abdous et. al., 2009). For example, developing writing skills can be difficult because of the virtual keyboarding functions and tiny screens of the mobile devices (Chinnery, 2006). Although, it may not be effective to develop all basic skills of English, it would be fair to argue that Duolingo can serve as an effective supplementary tool for vocabulary learning. Therefore, stakeholders in language education should consider integrating MALL apps into English language teaching curriculum. Additionally, language coursebook publishers should also consider integrating such apps to supplement their coursebooks. According to Kukulska-Hulme and Shield (2008),

mobile devices became an integral part of our daily lives and educators cannot ignore the fact that this rapidly growing trend, MALL, should be integrated into our teaching and it is also essential for language teachers to receive training how to do that.

Currently, use of mobile devices is forbidden during the lessons in Turkey. One of the reasons for this ban is that they think mobile devices may distract students' attention to the lessons. Another reason is that they believe these devices could be misused by the students (Lyddon, 2016). However, many studies in the literature showed that these devices have positive effects on the language learning process of students. Therefore, instead of banning mobile devices completely, an effective compromise should be found by policymakers, school administrators and educators. Mobile devices are necessary tools because they give language learners opportunity to benefit from language learning apps like Duolingo. Additionally, MALL apps can be utilized for educational purposes both inside and outside of school. Some of the vocabulary lessons in the app can be given as homework to the learners by the teachers so that they can practice and learn the target words outside the classroom. These apps can also be used inside the classroom during the lessons. For instance, instead of asking language learners to carry heavy dictionaries, mobile dictionaries can be used.

There are hundreds of MALL apps, so it might be difficult for language learners to choose the suitable one for their learning needs. In this case, teachers play important role. They should collect information about the digital and computer literacy of their students and regulate their learning applications and process according to their abilities and needs (Czerska-Andrzejewska, 2016).

For language learners, it can be suggested that they should search and find the most applicable mobile application available in order to maximize their language learning experience. It is important to acknowledge that most of today's young learners are called as digital natives who are very proficient with modern information technologies. Digital natives think, learn and understand the world differently compared to the people who have not been as involved with modern technologies. Therefore, new generation of learners can benefit from these opportunities to develop their language skills by utilizing MALL apps like Duolingo.

Finally, vocabulary can sometimes be a tedious task for language learners but this study proved that with MALL apps such as Duolingo vocabulary learning through can be fun, enjoyable and effective. Gamification elements and convenience of the app seem to offer EFL learners less anxious language learning environment. Moreover, for effective vocabulary learning frequent reviews of words is necessary and mobile devices like tablets or mobile phones offer plenty of opportunities for language learners to have continuous exposure to the target language since the amount of class time is limited at school.

Last but not least, the researcher suggests other researchers and language teachers in the field that MALL apps should be seen as supplementary tools rather than a single medium for language learning.

5.5. Limitations and Recommendations for Further Studies

The current study was by no means perfect and had some limitations. The first limitation was related to the duration of the experiment process as well as number of participants. If this study had more participants from different schools with different backgrounds and duration of the experiment was extended from 2 months to 4 months or further, generalizability of results would have increased. The second limitation was related to the research setting. The research was limited to a particular middle school EFL learners studying at one of the middle schools in Istanbul during the second semester of the 2020-2021 academic year. Thus, large-scale studies can be conducted to gather better understanding about the strengths and weaknesses of MALL supplementation in language learning. The third limitation was related to the treatment procedure of the study. Because of Covid-19 restrictions, the researcher was unable to teach target vocabulary items to the control group students in the classroom using traditional materials and this might explain the little improvement in control group students' average post-test scores compared to their pre-test scores. The fourth limitation was related to Duolingo app itself. Even though Duolingo seems to be a useful program taking the students to a certain level, it is not communicative. It does not improve

language learners' communicative competence. It gives learners some linguistic knowledge but it does not provide enough exercises and opportunities for students to use that linguistic knowledge to communicate with each other

For future studies, more experimental studies investigating the effect of MALL apps on different aspects of language skills such as writing, reading or listening can be conducted in order to gather more information about the effectiveness of Duolingo.

To conclude, as time passes by MALL takes more and more prominent role as an integrated part of education process in general and ELT in particular. While markets abound with programs that claim to help language learners with their learning process, the number of empirical studies that investigate the authenticity of their claim is rare. It is hoped that this study could be a helpful step in this direction and cast light on the usefulness and applicability of these programs in ELT classes.

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APPENDIX

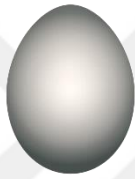
Appendix A: Vocabulary Achievement Test

Name - Surname :

Class :

A. Write the name of the pictures. (10x4= 40p.)

1.



=

2.



=

3.



=

4.



=

5.



=

6.



=

7.



=

8.



=

9.



=

10.



=

B. Draw a line and match the pictures. (5x4= 20p.)



11. Salt
12. Skirt
13. Duck
14. Grandmother
15. Cook

C. Choose the correct option. (10x4= 40p.)

16. How do you say this number “1st” ?
A. second C. first
B. third D. fourth
17. The girl _____ water .
A. eats C. has
B. drinks D. reads
18. An apple is _____.
A. purple C. white
B. black D. red
19. The boy _____ a book.
A. reads C. eats
B. drinks D. watches
20. The elephant is _____.
A. white C. gray
B. pink D. black
21. She is a _____ and I am a boy.
A. girl C. children
B. man D. women
22. There are 5 weekdays: Monday, Tuesday, Wednesday, Thursday and _____.
A. sunday C. may
B. december D. friday
23. I have _____ cats.
A. two C. first
B. third D. second
24. We read _____ in the mornings.
A. televisions C. sandwiches
B. newspapers D. milk
25. January and _____ are the months of the year.
A. winter C. monday
B. summer D. february

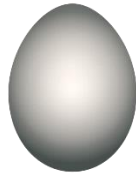
Appendix B: Vocabulary Achievement Test Answer Key

Name - Surname :

Class :

A. Write the name of the pictures. (10x4= 40p.)

1.



= egg

2.



= pasta

3.



= dress

4.



= shirt

5.



= doctor

6.



= policeman

7.



= horse

8.



= bird

9.



= father

10.



= mother

B. Draw a line and match the pictures. (5x4= 20p.)



- 10. Salt
- 11. Skirt
- 12. Duck
- 13. Grandmother
- 14. Cook

C. Choose the correct option. (10x4= 40p.)

16. How do you say this number “1st” ?
A. second C. first
B. third D. fourth
17. The girl _____ water .
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B. newspapers D. milk
25. January and _____ are the months of the year.
A. winter C. monday
B. summer D. february

Appendix C: Post-Treatment Questionnaire (Turkish)

Sevgili katılımcılar,

Bu araştırmanın amacı, ortaokul EFL öğrencilerinin bir mobil destekli dil öğrenme uygulaması olan Duolingo'ya yönelik tutum ve algılarını incelemektir.

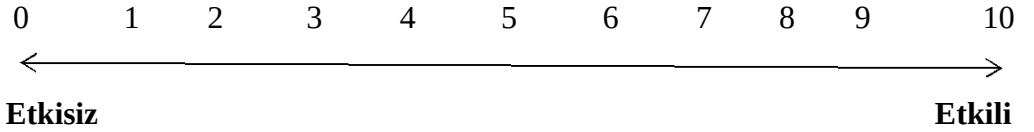
Anket bulguları yalnızca araştırma amacıyla kullanılacaktır.

Katkınız için şimdiden teşekkürler.

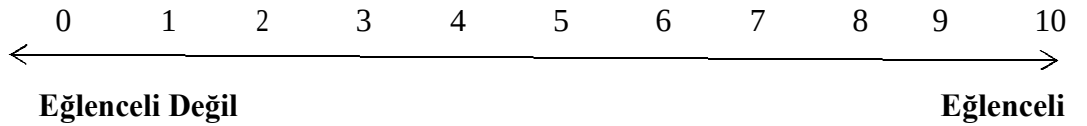
Bu soruların "doğru" veya "yanlış" cevabı yoktur, bu yüzden deneyiminiz ve duygularınız konusunda dürüst olmanız önemlidir.

Yönergeler: Aşağıdaki ifadelerin her biri hakkında ne hissettiğinizi düşünün ve tutumunuzu en iyi tanımlayan seçenekleri seçin.

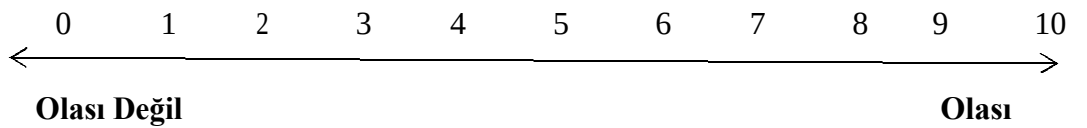
A. Genel olarak, İngilizce kelime öğreniminizde Duolingo ne kadar **etkili** oldu? Lütfen bir numarayı daire içine alınız.



B. Genel olarak, İngilizce kelime öğrenmenizde Duolingo ne kadar **eğlenceliydi**? Lütfen bir numarayı daire içine alınız.



C. Genel olarak, Duolingo'yu bir sınıf arkadaşınıza veya arkadaşınıza tavsiye etme **olasılığınız** nedir? Lütfen bir numarayı daire içine alınız.



D. Aşağıdaki anketi kendi fikrinize göre doldurunuz. Size uygun kutuya (✓) işareti yerleştiriniz.

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
1. Duolingo'ya erişmenin kolay olduğunu düşünüyorum.					
2. Duolingo'yu kullanımının kolay olduğunu düşünüyorum.					
3. Her zaman ve her yerde erişebildiğim için Duolingo ile pratik yapmak kolay oluyor.					
4. Duolingo özelliklerinin çeşitli ve kullanışlı olduğunu düşünüyorum.					
5. Duolingo'nun bana sınıf dışında İngilizcemi geliştirme fırsatları verdiğini hissediyorum.					
6. Duolingo'nun İngilizcemi geliştirmeye yardımcı olduğunu düşünüyorum.					
7. Duolingo'nun İngilizce pratik yapmak için yararlı olduğunu düşünüyorum.					
8. Duolingo'nun İngilizcemi geliştirmemde etkili olduğunu düşünüyorum.					
9. Duolingo'nun kelime bilgimi zenginleştirdiğini düşünüyorum.					
10. Duolingo kullanımından sonra başarımın arttığına inanıyorum.					

11. Duolingo ile İngilizce öğrenmeye olumlu bakıyorum.					
12. Duolingo ile ödev yapmanın geleneksel ödevlerden daha eğlenceli olduğunu düşünüyorum.					
13. Duolingo kendi kendine öğrenme becerilerini geliştirdiğini düşünüyorum çünkü Duolingo'da ilerlememizi ölçebiliyoruz.					
14. Duolingo'yu kullanmanın İngilizce öğrenmeyi kolaylaştırdığını düşünüyorum.					
15. Duolingo aracılığıyla İngilizce öğrenmekten keyif alıyorum.					

Appendix D: Post-Treatment Questionnaire (English)

Dear Participants,

The aim of this survey is to investigate the attitudes and perceptions of middle school EFL students towards a MALL app, Duolingo.

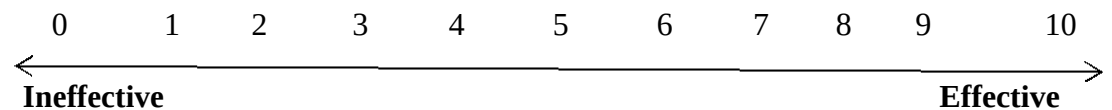
Survey findings will only be used for research and development purposes.

Thanks in advance for your contribution.

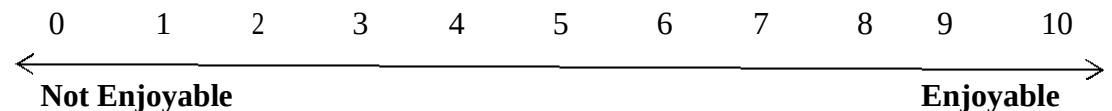
There are not “right” or “wrong” answers to these questions, so please be honest about your experience and feelings.

Instructions: Think about how you feel about each of the following statements and choose the choices that best describe your attitude.

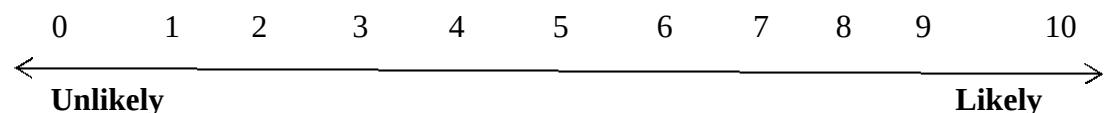
A. In general, how **effective** was Duolingo in your English vocabulary learning? Please circle a number.



B. In general, how **enjoyable** was Duolingo in your English vocabulary learning? Please circle a number.



C. In general, how **likely** are you to recommend Duolingo to a classmate or friend? Please circle a number.



D. Fill out the following survey according to your own opinion. Place the check mark (✓) in the box that is suitable for you.

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1. I think Duolingo is easy to access.					
2. I think Duolingo is easy to use.					
3. I think it is convenient to practice English through Duolingo since I can access it anytime and anywhere.					
4. I think Duolingo features are variative and useful.					
5. I feel Duolingo gives me opportunities to enhance my English outside the classroom.					
6. I think Duolingo is helpful to improve my English skill.					
7. I think Duolingo is useful to practice my English skill.					
8. I think Duolingo is effective to improve my English anytime and anywhere.					
9. I think Duolingo enrich my vocabulary.					
10. I believe that my achievement is possible to increase after the use of Duolingo.					
11. I have positive attitudes towards learning English through Duolingo.					
12. I think doing assignment through Duolingo is more fun than conventional way.					

13. I think using Duolingo develop self-learning skills because we can measure our progresses on Duolingo.					
14. I think using Duolingo makes learning English is easier.					
15. I enjoy when I am learning English through Duolingo.					



Appendix E: Semi-Structured Interview Questions (Turkish)

Aşağıdaki sorular bu çalışmada görüşme soruları olarak kullanılacaktır.

1. Duolingo uygulaması hakkında ne düşünüyorsun?
2. Duolingo uygulamasının avantajları sence nelerdir?
3. Duolingo uygulamasının dezavantajları sence nelerdir?
4. Duolingo uygulamasını kullanırken karşılaştığın güçlükler ve eksiklikler nelerdir?
5. Duolingo uygulamasının İngilizce kelime öğretimi konusunda faydalı olduğunu düşünüyor musun?

CURRICULUM VITAE

Name - Surname: Şenol SÖĞÜT

Nationality: Turkish

A. EDUCATION

2018-2021: Master in ELT Department of IZU, Istanbul (with thesis)

2008-2013: Bachelor in ELT Department of English Language Teaching, Atatürk Faculty of Education, Marmara University, Istanbul

B. PROFESSIONAL EXPERIENCE

2014 September- : English Teacher at the Ministry of National Education

C. PAPERS PRESENTED IN INTERNATIONAL CONFERENCES

Söğüt, Ş. (May, 2021). The Effect of a MALL as a Supplementary Tool on Vocabulary Learning. MEF University International Student Conference on Educational Sciences (MISCES), Istanbul, Turkey.

Söğüt, Ş. (May, 2021). The Effect of a MALL as a Supplementary Tool on Vocabulary Learning. IZU Social Sciences Graduate Students Congress, Istanbul, Turkey.