THE ROLE OF MOBILE-ASSISTED LANGUAGE LEARNING (MALL) IN VOCABULARY KNOWLEDGE, LEARNER AUTONOMY AND MOTIVATION OF PROSPECTIVE ENGLISH LANGUAGE TEACHERS

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PhD Thesis

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THE ROLE OF MOBILE-ASSISTED LANGUAGE LEARNING (MALL) IN VOCABULARY KNOWLEDGE, LEARNER AUTONOMY AND MOTIVATION OF PROSPECTIVE ENGLISH LANGUAGE TEACHERS

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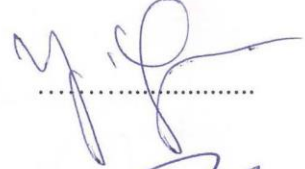
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Kübra OKUMUŞ DAĞDELER tarafından hazırlanan "The Role of Mobile-Assisted Language Learning (MALL) in Vocabuary Knowledge, Learner Autonomy and Motivation of Prospective English Language Teachers" başlıklı çalışması 26 / 06 / 2018 tarihinde yapılan tez savunma sınavı sonucunda başarılı bulunarak jürimiz tarafından Yabancı Diller Eğitimi Ana Bilim Dalı, İngiliz Dili Eğitimi Bilim Dalında doktora tezi olarak kabul edilmiştir.

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ABSTRACT

PhD Thesis

THE ROLE OF MOBILE-ASSISTED LANGUAGE LEARNING (MALL) IN VOCABULARY KNOWLEDGE, LEARNER AUTONOMY AND MOTIVATION OF PROSPECTIVE ENGLISH LANGUAGE TEACHERS

Kübra OKUMUŞ DAĞDELER

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Aim: This study aimed at identifying the effectiveness of mobile applications in vocabulary knowledge improvement and learner autonomy of prospective English language teachers, and motivation level of learners using mobile application(s).

Method: This study adopted a quasi-experimental design which consisted of an experimental and a control group formed through random assignment. The study group was 73 prospective English language teachers receiving education in two state universities. During the treatment which lasted for 14 weeks the experimental group tried to learn 40 collocations via CollocatApp while control group used worksheets. The data were gathered through four scales: a) Collocation Achievement Test (CAT) b) Vocabulary Knowledge Scale (VKS), c) Learner Autonomy Scale (LAS), and d) Mobile Learning Motivation Scale (MLMS). The data were analyzed through SPSS 21 with descriptive and inferential statistics.

Findings: It was found that use of mobile applications was an effective way of improving receptive vocabulary knowledge for only short term memory. Besides, it was seen that there was no difference between the use of mobile applications and worksheets in terms of productive vocabulary knowledge and learner autonomy. Finally, the findings showed that learners using mobile application were motivated and believed in the power of learning through mobile applications.

Results: Mobile application motivated learners and improved learners' receptive vocabulary knowledge. On the other hand, positive results were not found at the dimension of productive vocabulary knowledge and learner autonomy. Thus, some suggestions to the administrators, teachers and learners were uttered for the process of language learning.

Keywords: collocations, Mobile-Assisted Language Learning (MALL), learner autonomy, motivation, vocabulary knowledge.

ÖZ

MOBİL DESTEKLİ DİL ÖĞRENİMİ'NİN (MDDÖ) İNGİLİZCE ÖĞRETMEN ADAYLARININ KELİME BİLGİSİ, ÖĞRENEN ÖZERKLİĞİ VE MOTİVASYONUNDAKİ ROLÜ

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Amaç: Bu çalışma, mobil uygulamaların İngilizce öğretmeni adaylarının kelime öğrenimi başarısına ve öğrenen özerkliğine etkisini ve öğrenenlerin mobil uygulama kullanırken güdülenme düzeyini belirlemeyi hedeflemiştir.

Yöntem: Bu çalışmada, rastgele örnekleme yöntemiyle belirlenen bir kontrol grubu ve bir deneysel gruptan oluşan yarı deneysel desen kullanılmıştır. Çalışmanın katılımcıları, iki devlet üniversitesinde öğrenim gören 73 İngilizce öğretmeni adayıdır. 14 hafta süren uygulama sırasında, deney grubu 40 eşdizimsel sözcüğü araştırmacı CollocatApp ile öğrenmeye çalışırken kontrol grubu çalışma kâğıtlarını kullanmıştır. Veriler, Eşdizimsel Sözcük Başarı Testi (ESBT), Kelime Bilgisi Ölçeği(KBÖ), Öğrenen Özerkliği Ölçeği (ÖÖÖ) ve Mobil Öğrenme Motivasyon Ölçeği (MÖMÖ) olmak üzere 4 ölçek ile toplanmıştır. Elde edilen veriler SPSS 21 programında betimleyici ve kestirimsel istatistik yoluyla analiz edilmiştir.

Bulgular: Bulgular alıcı kelime öğrenimi bilgisi edinmede mobil uygulamanın kısa vadede etkili olduğunu göstermiştir. Ayrıca, üretken kelime bilgisi ve öğrenen özerkliği boyutlarında mobil uygulama ve çalışma kâğıdı kullanımı arasında bir fark olmadığı görülmüştür. Son olarak, mobil uygulamayı kullanan öğrencilerin güdülenmiş oldukları ve mobil uygulama ile öğrenmenin gücüne inandıkları görülmüştür.

Sonuç: Mobil teknolojinin öğrencileri motive ettiği ve öğrencilerin alıcı kelime bilgisini geliştirdikleri görülmüştür. Öte yandan, üretken kelime bilgisi ve öğrenen özerkliği boyutlarında olumlu sonuçlar bulunmamıştır. Bu yüzden, mobil teknolojinin dil öğrenme sürecinde kullanılmasında yöneticilere, öğretmenlere ve öğrenenlere önerilerde bulunulmuştur.

Anahtar Kelimeler: eş dizimsel sözcükler, Mobil Destekli Dil Öğrenimi (MDDÖ), öğrenen özerkliği, güdülenme, kelime bilgisi.

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ABBREVIATIONS

ARCS	: Attention- Relevance- Confidence-Satisfaction
CALL	: Computer-Assisted Language Learning
d-learning	: Distance Learning
ECML	: European Center for Modern Languages
e-learning	: Electronic Learning
ELP	: European Language Portfolio
EPOSTL	: European Portfolio for Student Teachers of Languages
ICT	: Information and Computer Technologies
IPAD	: Internet Personal Access Device
IPod	: Internet Pod
L1	: Native language
L2	: Second Language
MALL	: Mobile-Assisted Language Learning
m-learning	: Mobile Learning
MLMS	: Mobile Learning Motivation Scale
MMS	: Multimedia Message Service
PDA	: Personal Digital Assistants
PVK	: Productive Vocabulary Knowledge
RVK	: Receptive Vocabulary Knowledge
SDT	: Self-Determination Theory
SMS	: Short Message Service
u-learning	: Ubiquitous Learning
VKS	: Vocabulary Knowledge Scale
ZPD	: Zone of Proximal Development

CHAPTER ONE

Introduction

Background and statement of the problem

Learning and teaching a foreign language have been cul-de-sac for many years in Turkey. The curricula of foreign language teaching are constantly changing in order to teach English effectively but this change is not sufficient for solving the problem. Despite the many approaches and techniques that are proposed by the researchers and policymakers, level of foreign language is still low in Turkey. Turkey is the 26th country among 27 EU countries in English skills and labelled as very low proficiency according to the English Proficiency Index (https://www.ef.com.tr/epi/). New curricula adopt the suggestions of European Center of Modern Languages (ECML) but still the problem continues. One of the problems that forces language teachers and learners is related to learning and remembering long lists of vocabulary. In order to have a deep and wide knowledge of vocabulary, a considerable amount of effort is required as there are thousands of words in a language that are easily forgotten due to many factors. Chen and Chung (2008) list some of these factors as the difficulty of the learned material, its representation method and psychological factors such as stress and sleep quality. Considering the factors affecting the process of both acquisition and retention of the words, the way of presenting the vocabulary to learners gains much importance. Thus, many techniques such as using flashcards, demonstrations, realia, etymology, using the word in context etc. have been suggested in order to achieve effective vocabulary teaching. With the integration of technology into the educational process, learning vocabulary also gets a share from Information and Communication Technologies (ICT). The use of ICT in language learning has given birth to Computer-Assisted Language Learning (CALL). CALL aimed at developing language learners' learner capacity via computerized means (Cameron, 1999, cited in Grzeszczyk, 2016).

CALL penetrated into classes during the late 1950s in its most primitive version. In time, CALL improved and went beyond PLATO (Program Logic/Learning for Automated Teaching Operation) developed by University of Illinois and Control Data Corporation in 1959, and TESTMATER, GAPMASTER, CLOZEMASTERE which were used in the UK in the 1980s as a set (Jafarian, Soori, and Kifipour, 2012; Miftachudin, 2012). During this process, CALL has got some names which are structural, communicative and integrative.

During the 1970s and 1980s Structural CALL was influential as that time methods such as ALM and GTM were the leading language learning approaches. Thus, computers were used for repetition drills and were in "tutor" role. On the other hand, the 1980s and 1990s experienced Communicative CALL. At that time, computers were used for communicative exercises and computers played the role of "pupil". Lastly, after 1990s Integrative CALL where computers are used for making learners engage in 'meaningful, large-scale collaborative activities' (Gruba, 2004; p. 629) has been experienced.

Now, CALL has been widely accepted as important and effective approach by language education world as it contributes to experiential learning, motivation, enhanced student achievement, authentic materials for study, greater interaction, individualization, global understanding and independence from a single source of information (Lee, 2000). CALL can be adapted to nearly all areas of language learning. Many researchers have studied its effectiveness in different areas of language such as writing (Cunningham, 2000; Jafarian, Soori & Kifipour, 2012; Suh, 2002), speaking (Laggoun, 2014), listening (Han & Rensburg, 2014), reading (Abraham, 2008; AbuSeileek, 2008; Chun & Plass, 1997; Taylor, 2009;), grammar (Nutta, 1998), pronunciation (Carey, 2004; Kawai & Hirose, 1997; Lee, 2008) and vocabulary (Barani, 2013; Chujo, Utiyama & Nishigaki, 2005; Miles & Kwon, 2008; Oberg, 2011; Tozcu & Coady, 2004; Zapata & Sagarra, 2007). These studies indicated that CALL was an effective way of improving foreign language skills.

Despite these positive effects of CALL, there are also some limitations such as lack of access, lack of effective training, attitude of teachers, attitude of students, lack of time and technical support (Riasati, Allahyar & Tan, 2012). The fact that use of computers requires learner to study in isolation, they are not suitable for all kinds of activities and cannot deal with unexpected events, and reading from the computer is more tiring than printed papers are some other limitations (Gündüz, 2005). Moreover, continuously and rapidly changing technology has made computers less practical devices by presenting small and portable devices which are called as mobile devices. Thus, mobile devices have found a place in the field of education with the name of mobile learning (hereafter m-learning). The statistics of International Telecommunication Community is in the form of an evidence why the term of m-learning has emerged. Figure 1 shows that the biggest development in ICT has been experienced in mobile technology between 2000 and 2017.

Global ICT developments, 2001-2017*

Note: * Estimate
Source: ITU World Telecommunication /ICT Indicators database
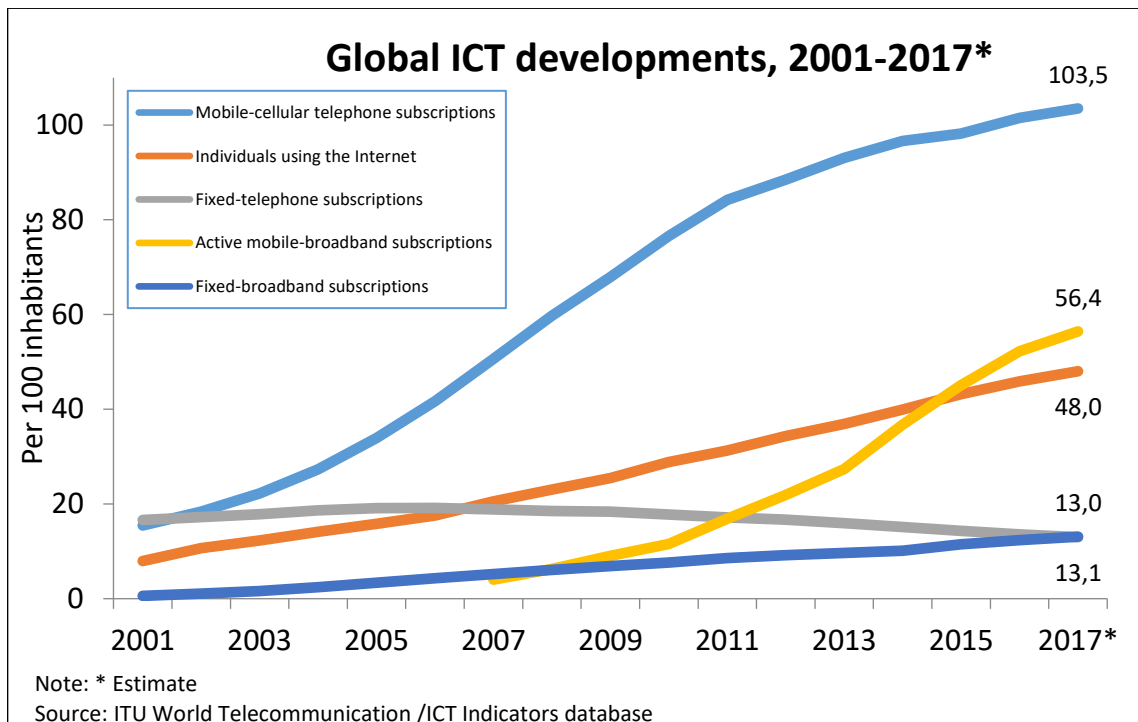
Figure 1. Global ICT developments (https://www.itu.int/en/ITU.../Stat_page_all_charts_2017.xls).

M-learning has been thought as an alternative to learning process due to its important features that provide independent learning and different kinds of fun activities that learners would be interested in. Mobile applications in language learning are being more popular day by day for some reasons. Firstly, they provide the learners with different and enjoyable educational activities. Secondly, they present the audio and visual materials. Thirdly, they are available anywhere and anytime. These features get researchers to think about the role of these small devices in language learning. Vocabulary learning is one of the areas where mobile devices are mostly used. Some mobile applications and mobile dictionaries have been developed in order to support an effective vocabulary learning.

M-learning gives the chance of learning independently from place, time, and teacher, so it is associated with learner autonomy with the hope that it will increase learners' autonomy. Thus, apart from the role of mobile devices in cognitive behaviors, its role in affective behaviors is also an enigma. However, this enigma has not fully met as there is lack of research on this subject. Moreover, changing and renewing technology requires the existing research studies on this subject be updated. Thus, this study used a mobile application that tried to teach collocations, and by doing this it searched if the mobile application affected knowledge of vocabulary, autonomy and motivation of learners.

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The Purpose of the Study

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 researcher to focus on this subject. Thus, the aim of this study was to determine the effectiveness of mobile applications in language learning in terms of vocabulary learning and learner autonomy. Besides, this study aimed toget an opinion about the motivation level of learners using mobile application. Thus, the research questions of this study were as follows:

1. To what extent are mobile applications effective in improving prospective English language teachers' (hereafter PELT) vocabulary knowledge?
   a. To what extent are mobile applications effective in improving PELT' receptive vocabulary knowledge?
   b. To what extent are mobile applications effective in improving PELT' productive vocabulary knowledge?
2. To what extent are mobile applications effective in improving PELT' learner autonomy?
3. To what extent are PELT motivated while using mobile applications for vocabulary learning?

Significance of the Study

This study tried to determine if the mobile applications were effective in vocabulary learning. In the related literature, there can be seen some studies that use m-learning with the aim of vocabulary learning. These studies generally used SMS as the 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 about the use of mobile applications in foreign language learning. Mobile applications differ from SMS and e-mails greatly, as many features that are included in applications do not exist in SMS. Mobile applications present a variety of games and activities that SMS cannot include. Furthermore, the interactivity and the quality and quantity of visual and audio materials in the mobile applications give them a privilege that separates them from SMS. Thus, considering these features of mobile applications and the role of these features in learning, this study developed a mobile application to teach collocations to

language learners. Moreover, it was aimed that with the use of mobile applications, some challenges of SMS such as storage problem were compensated as there is no storage problem in mobile applications. In the SMS studies, it was observed that although 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 CollocatApp which is a mobile application designed for this research, this distribution was not possible, as the learners studied in time and place they wanted and any notification was not sent. 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 was grounded so no intervention by any researcher or lecturer was used for the mobile learners.

In literature, there are some studies that encourage the use of mobile applications in language learning. However, these studies generally focused on the attitudes of the learners towards mobile applications (Deng & Shao, 2011; Nino, 2015; Steel, 2012) or reviewed some mobile applications such as Duolingo, Learn English and Vocab Lite (Cowan, 2015; Gangaiamaran & Pasupathi, 2017; Nushi & Eqbali, 2017). There are not many experimental studies that investigate if the mobile applications are really beneficial in language learning. Thus, this study tried to fill this gap in the literature. Furthermore, by developing an application that focused on collocations which Turkish learners had much difficulty in learning, this study helped them acquire this kind of words. Although there are some studies that make learning idioms that is another problematic area of vocabulary learning central to the research, there is no study that has focused on the use of mobile systems/applications in teaching collocations to our knowledge.

Learning collocation is more difficult than learning a noun or a verb. Knowing the meaning is not enough to learn collocations. It is important to know which word collocates with the other ones. Thus, the mobile application that aims to teach collocations, should consider these points. In Google Play store, there are some collocations applications such as Oxford Collocations, English Collocation, Collocations and Flax Collocation Matching. However, these applications are only matching or only dictionaries. There is no application that gives equal importance to both the meaning and form of the collocations. Hence, a mobile application that presents dictionary and different activities focusing on both meaning and form was developed by the researcher with the help of an expert in ICT within the scope of this study. It was hoped that this mobile application, called CollocatApp, would be an

example for app developers by showing which points should be considered while developing a collocation app.

Another significance of this study was that it tried to present if the mobile applications were helpful in improving learner autonomy and motivation of foreign language learners. This field is also a gap in the literature. There is a limited number of research studies focusing on the role of mobile technology in learner autonomy and motivation. Those researchers used, as above mentioned, SMS and similar systems. It is difficult to find studies dealing with the role of mobile applications in autonomy and also in motivation. It was expected that this study would try to be a point in the gap in the subjects aforementioned.

Limitations to the Study

It was well acknowledged that this study was not a perfect one. The first general subject about the limitations of this study was related to the definitions of both dependent and independent variables. M-learning, learner autonomy and motivation are the concepts that 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 day by day. Moreover, as technology is continuously and fast-changing, it is difficult to give a settled definition to m-learning. Thus, in this study, different definitions of m-learning were presented and based on these definitions a holistic definition was tried to be done in Chapter 2. As conducting the treatment, this definition was grounded. The other vague concepts which are autonomy and motivation are also discussed in Chapter 2 and the ones that have universal consent than the others were based on carrying out the implementation in this study. The definitions that were based on this study were presented at the section of "Definitions of Terms"

The second limitation was about the methodology. While the retention of receptive vocabulary knowledge was tried to be assessed through Collocation Achievement Test by conducting it for three times, Vocabulary Knowledge Scale which was used as pretest and posttest was not used as a delayed test. Thus, if the productive vocabulary knowledge was in learners' long-term memory was not measured.

Another limitation was that the frequency of the mobile applications usage was not measured through CollocatApp. Although with the question of "how often do you use mobile applications" in MLMS, an idea about the frequency of using mobile application was taken, it was not exactly known when and how much the learners used the CollocatApp.

Assumptions

It was assumed that the participants of control group studied with only worksheets and participants of the experimental group studied with only mobile application for learning target collocations.

Key Terminology

m-learning: learning process occurring anytime and anywhere by using mobile devices.

collocation: the occurrence of two or more words within a short space of each other in a text" (Sinclair, 1991, p.170).

receptive vocabulary knowledge: "receptive knowledge is being able to understand a word in its spoken or written form" (Pignot-Shahov, 2012; p.43).

productive vocabulary knowledge: "to be able to use a word correctly in a written work or a speech" (Pignot-Shahov, 2012; p.43).

learner autonomy: "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).

motivation: *the dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalized and (successfully or unsuccessfully) acted out."*(Dörnyei & Otto, 1998; p. 65).

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

Mobile Assisted Language Learning: any type of language learning that takes place with the help of portable devices" (Rahimi & Miri, 2014; p. 1471).

Mobile application: A mobile application is a computer program designed to run on a mobile device such as a phone/tablet or watch (https://en.wikipedia.org/wiki/Mobile_app).

CollocatApp: Mobile application developed by the researcher and an expert in ICT

Summary of the Chapter

Technology has made it impossible that people in any stage of education can be far from it. Thus, it has been used in educational settings, which leads to different concepts such as CALL, e-learning, d-learning, u-learning and m-learning. The center of this study was m-

learning. This study tried to determine what the effect of mobile applications was in learning vocabulary and learner autonomy. It also researched if learners using mobile applications were motivated. The literature lacks of use of mobile applications in language learning. The effect of some features of mobile devices such as SMS, e-mail and other specific systems on vocabulary learning was researched but the effect of mobile applications was not questioned adequately. Apart from their effects on vocabulary knowledge, their effects on learner autonomy and role in learner motivation were also addressed.

CHAPTER TWO

Literature Review

Introduction

Learning collocations may be one of the most problematic areas of foreign language learning. False collocations can be found even in the speech of native speakers of the language. Thus, developing collocational knowledge forces both teachers and learners. In this study, a learning approach was used for testing if it was effective in decreasing this difficulty. This approach was mobile learning gaining much importance in recent years. Even if they are not aware of it, most people are now engaged with m-learning. Use of mobile applications such as dictionaries and games for educational purposes and reading books or articles are beginning parts of our daily activities. Thus, more and more people are being m-learners. The characteristics of m-learning such as learning anytime and anywhere brings to mind autonomy as it can be labeled as a self-learning system independent of time, setting and a lecturer. Besides, some other characteristics such as multimedia and interactivity make people think about if m-learning will motivate learners. Before finding answers to the research questions, this part firstly introduced mobile learning. Then, a brief touch was made on collocation in terms of how it can be described. At the last phase of this chapter, a short overview of motivational theories and conceptualization of autonomy were addressed. The studies on the role of m-learning in vocabulary teaching, motivation and autonomy were presented at the last of related sections.

Mobile Learning

In order to talk about MALL, it is required to understand mobile learning. Thus, in this part, it was tried to understand m-learning by touching on its definitions from various researchers, characteristics and related theories. Later, the concept of MALL was presented. It would be helpful to make a note: Many researchers do not prefer the use of the term of MALL. Hence, in literature, it can be seen that there are many studies focusing on the use of m-learning in language learning but not addressing the concept of "MALL".

Defining mobile learning.

The rapidly changing technology has been affecting all fields including education. Like other fields, the field of education also embraces technology. With the new technology, learning also has been renewed. Like technology affects learning, learning also affects technology (see Table 1). For instance, collaborative learning has led to networked technology. On the other hand, mobile technology makes situated learning easier. Thus, there is a close and circular relation between two constructs.

Table 1. *Convergence between Learning and Technology (Sharples, Taylor &Vavoula, 2005)*

New Learning	New Technology
Personalized	Personal
Learner-centered	User-centered
Situated	Mobile
Collaborative	Networked
Ubiquitous	Ubiquitous
lifelong	Durable

One of the effects of technology on learning is that it has given birth to m-learning. When the term of "mobile learning" is first seen, it evokes learning with mobile devices. The early definitions of the mobile learning have focused on the use of mobile devices in education (Sharples et al., 2009). For example, Trifonova (2003) defines m-learning as any form of learning which occurs through a mobile device, or in a mobile environment. According to Colazzo et al. (2003), m-learning is any educational activity which is possible thanks to mobile devices or environments in which mobile tools are available. Ally (2009) defines m-learning as the process of using a mobile device in order to get learning materials. However, this view has changed as the concept of learning should also been focused. Besides, the concept of "mobile" should be dealt with in detail. According to Sharples et al. (2009), as explaining the concept of "mobile" in mobile learning five aspects meet us. These are mobility in physical space, the mobility of technology, mobility in conceptual space, mobility in social space, and learning dispersed in time. Similar to Sharples et al. (2009), El-Hussein and Cronje (2010) identify three interdependent areas of mobility. These areas are 1) *mobility of technology* which refers to use of mobile devices such as PDA (Personal Digital Assistant), smartphones and digital cameras, 2) *mobility of learning* referring to personalized, learner-centered, situated, collaborative, ubiquitous and lifelong learning, and finally 3) *mobility of learners* refers to a learner-centered and nomadic activity (see Figure 2).
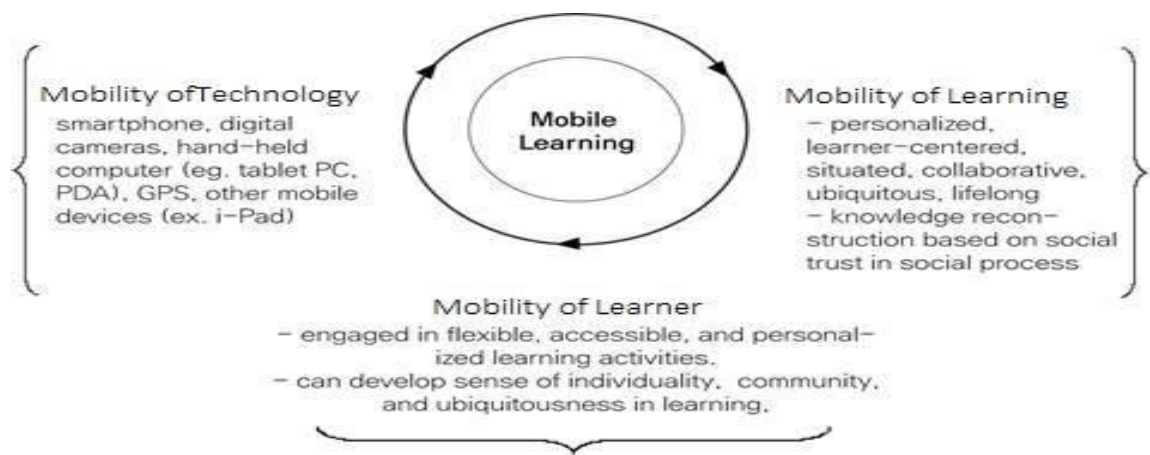
Figure 2. Three areas of mobility (explained with the figure by Kim & Kwon, 2012).

The findings of the MOBIlearn project, which was financed by the European Commission and conducted by 24 countries from Europe, USA, Australia, Switzerland and Israel, concluded that m-learning was beyond learning with mobile devices. The project listed following findings which enlighten the term of m-learning.

> ➢ It is the learner that is mobile, rather than the technology.
> ➢ Learning is interwoven with other activities as part of everyday life.
> ➢ Learning can generate as well as satisfy goals.
> ➢ The control and management of learning can be distributed.
> ➢ Context is constructed by learners through interaction.
> ➢ Mobile learning can both complement and conflict with formal education.
> ➢ Mobile learning raises deep ethical issues of privacy and ownership (cited in Sharples et al., 2005; p.7-8).

The recent research shows that the mobility of technology is not enough to talk about mobile learning. Although the use of mobile devices is still at the heart of mobile learning more recent definitions have included some other features such as time and place independency and interaction. Thus, the new definitions of the m-learning include:

"Learning mediated via handheld devices and potentially available anytime, anywhere" (Kukulska-Hulme & Shield, 2008; p.273).

"Learning across multiple contexts, through social and content interactions, using personal electronic devices (Crompton, 2013; p. 4).

"Learning that occurs when learners have access to information anytime and anywhere via mobile technologies to perform authentic activities in the context of their learning" (Martin & Ertzberger, 2013; p. 77).

"M-learning is a distance learning model which is designed to meet education needs with the help of mobile devices" (Korucu & Alkan, 2011; p. 1926).

Mobile learning is the "use of mobile or wireless devices for the purpose of learning while on the move (Park, 2011; p. 79).

Although new definitions focus on the mobility of learner not on the devices, it is the devices that provide this mobility. Thus, believing in both devices centered and learning-centered definitions, this part ended with researcher's own definition of m-learning as the 'learning process occurring anytime and anywhere by using mobile devices.'

e-learning, m-learning, u-learning.

With the use of technology-based environments in education, some letters such as e-, m-, d- and u- get ahead of the concept of learning. New terms with new letters have evolved as technology has developed. Thus, a shift from e-learning to u-learning has occurred (see Figure 3)
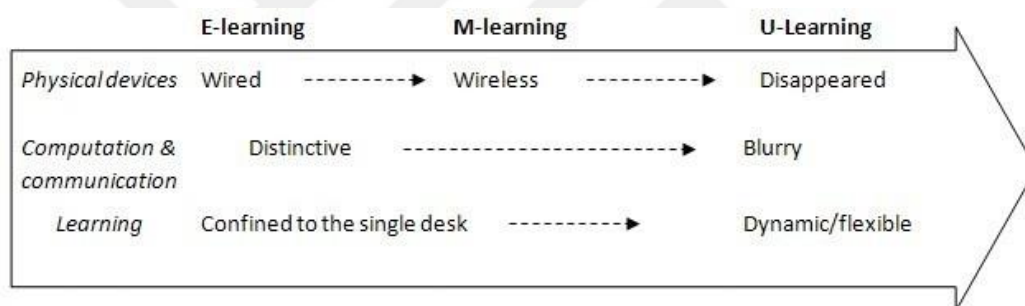
Figure 3. Comparisons and flow of e-learning, m-learning and u-learning (Park, 2011).

These terms are sometimes confused as all of them are related to technology-assisted learning and related to each other. Thus, it would be logical to both make distinctions among e-learning, m-learning and u-learning and show the similarities among them before going into detail about m-learning.

Electronic learning, abbreviated as e-learning, is acquiring knowledge which is distributed and facilitated by computer and communication technology (Behera, 2013). When it is regarded as a general term for technology supported learning, some researchers conceived m-learning is a subset or a form of e-learning (Behera, 2013; Georgiev, Georgieva & Smrikarov, 2004; Peters, 2007). Besides, some researchers define m-learning through and based on e-learning. For instance, Pinkwart. al. (2003) define m-learning as e-learning using mobile devices and wireless transmission. Similarly, Quinn (2000) defines m-learning as "e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone" (p. 1).According to these researchers, distance learning, which is "effort of

providing access to learning for those who are geographically distant" (Moore, Dickson-Deane and Galyen, 2011; p. 126) involves both e-learning and m-learning; and e-learning involves m-learning. Thus there is a hierarchical relation between e-learning and m-learning. The view of these researchers can be demonstrated in Figure 4.
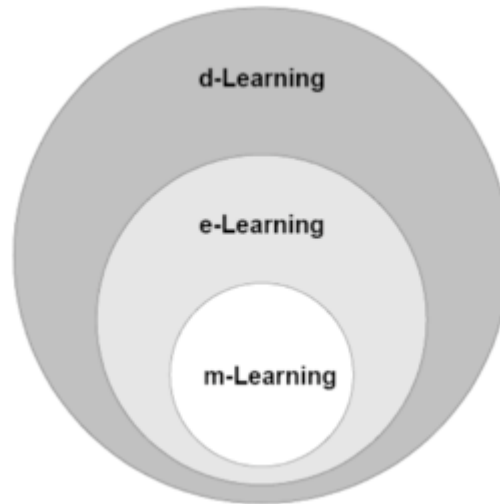
Figure 4. Relation among e-learning, m-learning and d-learning (Georgiev et al., 2004)

On the contrary to this belief, Korucu and Alkan (2011) state that m-learning is seen as an evolvement of e-learning; however, mobile technology is a different technology and has its own terminology. This terminology is compared with the terminology of e-learning by Laouris and Eteokleous (2005) as follows:

Table 2. e-learning and m-learning Terminology

e-learning	m-learning
Computer	Mobile
Bandwidth	GPRS,G3, Bluetooth
Multimedia	Objects
Interactive	Spontaneous
Hyperlinked	Connected
Collaborative	Networked
Media-rich	Lightweight
Distance learning	Situated learning
More formal	Informal
Simulated situation	Realistic situation
Hyperlearning	Constructivism, situationism, collaborative

As looking at the terminology used for m-learning and e-learning, one can see that they are in fact totally different learning paradigms. However, if e-learning refers to technology-assisted learning, then it would be natural to take m-learning as a new form of e-

learning. The most fundamental difference is that m-learning requires mobile devices and mobile learners. However, in e-learning, it is not necessary that the learner and devices be mobile.

Although the difference between e-learning and m-learning is clear, to see the difference between m-learning and ubiquitous learning is not easy. Ubiquitous learning, abbreviated as u-learning, is sometimes regarded as equal to mobile learning. When ubiquitous computing which gives the name of u-learning is defined as "the technology that can be used in anytime and at anywhere" (Zolkefley et al., 2015; p.81), it is so difficult to differentiate it from mobile technology. On the other hand, Yahya, Ahmad and Jalil (2010) defined u-learning as "is a learning paradigm which takes place in a ubiquitous computing environment that enables learning the right thing at the right place and time in the right way" (p.120). They based their definition on "right time and place" not "anytime and anyplace" as in mobile learning. In u-learning, all learners can access to various digital services and devices such as mobile devices and computers which have access to the Internet at the time and place when they are in need of them (van't Hooft, et al., 2007). In u-learning many technological devices can be utilized, it is not required that the devices be mobile. U-learning takes its name from ubiquitous computing meaning "process of seamlessly integrating computers into the physical world" (Bomsdorf, 2005; p.2). In that sense, it seems that u-learning is a broader term than m-learning. Casey (2005) supports this notion with his formulation "u-learning= e-learning+ m-learning". Ogata and Yano (2004) make the distinction between terms by focusing on learning environments which can be seen in Figure 5.
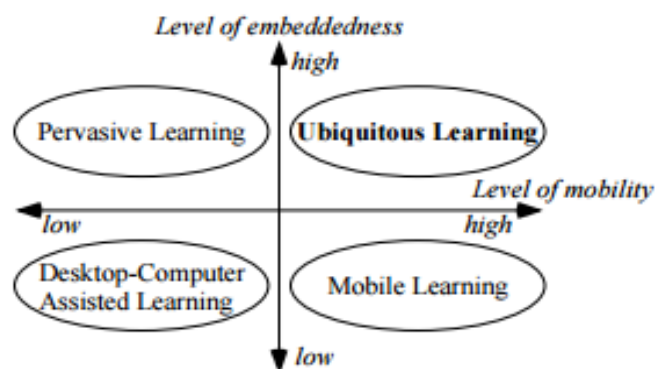
Figure 5. Comparison of learning environments by Ogata and Yano (2004).

According to Ogata and Yano (2004), m-learning enables learning at anytime and anywhere with lightweight mobile devices connecting Internet with wireless communication. In m-learning, there are no computers in learners' environment, which hinders learners from

obtaining information about their learning context. This barrier can be overcome with pervasive learning which can obtain this information by communicating between embedded devices and environment. However, in pervasive learning, the availability and usefulness are limited and highly localized. On the other hand, u-learning is "integrated high mobility with pervasive learning environment" (p. 2), which means that as learners learn with their mobile devices, the system promotes this learning by communicating with embedded computers in surroundings.

To sum, all the three concepts get benefit from technology, which makes them similar. On the other hand, all of them have different characteristics which make them separate approaches.

The characteristics of m-learning.

The literature shows that the dominant words in the definitions of m-learning are 'while on the move' or "anytime", and "anywhere". This implies that the most basic characteristics of mobile learning is portability. Portability of the mobile devices makes learning in anywhere and anytime possible. This feature of mobile learning distinguishes it from other learning theories. Klopfer, Squire and Jenkins (2002) list five characteristics of m-learning that are connectivity, portability, social interactivity, individuality and context sensitivity. On the other hand, Pea and Maldonado (2006) identify seven characteristics of mobile learning which are "portability, small screen size, computing power (immediate starting-up), diverse communication networks, a broad range of applications, data synchronization across computers, and stylus input device" (p. 428). Similarly, Özdamlı and Cavus (2011) demonstrate 7 characteristics of mobile learning which are 1) ubiquitous/spontaneous, 2) portable size of mobile tools, 3) blended, 4) private, 5) interactive, 6) collaborative, 7) instant information. When combining and summarizing these characteristics, the characteristics of m-learning can be demonstrated as follows:
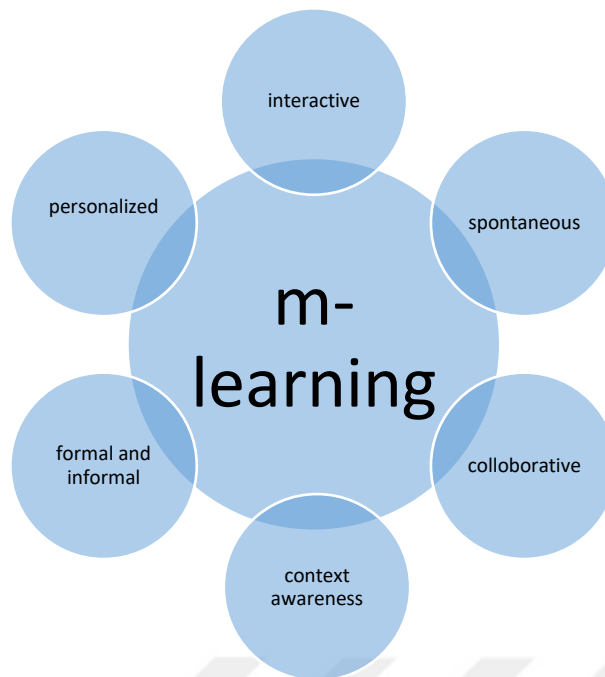
Figure 6. Features of m-learning

These features can be explained as follows:

Personalized: Personalized learning is "instruction in which the pace of learning and the instructional approach are optimized for the needs of each learner". (https://en.wikipedia.org/wiki/Personalized_learning). It is generally accepted that the use of technology enhances personalized learning (Al-Zoube, 2009). Mobile devices are private and students can adjust their own learning with their own speed, interests and needs with these devices so m-learning is personalized.

Interactive: Interactivity is one of the most important elements of technological devices. It is "the communication process that takes place between humans and computer software". (https://www.techopedia.com/definition/14429/interactivity). This feature is not peculiar to only computers, mobile devices are also interactive. Especially mobile games which involve the user and respond to it are the good examples of interactivity.

Formal and informal: MOBIlearn projects conclude that m-learning "can both complement and conflict with formal education (cited in Sharples et al., 2005; p. 8). Similarly, Kukulska- Hulme (2009) emphasizes that learners can cross the borders between formal and informal learning as they are not dependent on fixed computers. M-learning can be both formal and informal based on the ways of its adaptation. While teachers can make m-learning a part of their teaching in schools, students can learn independently form teachers and schools via mobile devices.

Collaborative: Mobile devices provide different opportunities for communication such as messaging, social network sites and applications. The variety of communication mediums makes collaborative learning possible.

Context awareness/sensitivity: Mobile devices gather information from the environment so that they measure what is currently going around both the user and the device (Naismith et al., 2004). This feature of m-learning is called context awareness or context sensitivity.

Spontaneous: Mobile devices have the feature of a wireless network so users get any information they wish to learn immediately (Güler, 2016). Learners can acquire knowledge without waiting for any reason, which makes m-learning appealing.

These features attract both learners' and teachers' attention. On the other hand, like many other learning paradigms, m-learning has also some shortcomings which were discussed in the next heading.

Why and not m-learning?

M-learning, which is more penetrating into our daily life day by day, has some both benefits and challenges. Although it removes the border of learning activity from a stable place and time, it is criticized due to small screen size and other technical problems with mobile devices. Nevertheless, it is mostly suggested owing to its advantages. One of the most important advantages of m-learning is that it presents the chance of learning anywhere and anytime. In order to minimize the dependency on determined time, place and teacher in traditional learning, technology has been involved in the educational system. Thus, some concepts such as electronic learning and distance learning evolved. E-learning has minimized dependency on places and time. However, it has not been adequate, as it still requires sitting in front of a computer screen. With mobile devices, especially with smartphones, these limits are at the lowest level. M-learning has provided learning while on the go such as in a hospital while waiting in a queue, or any other place and time. Some of the advantages of m-learning can be identified as a) learning independent time and location, b) learning in the time of need, c) learning inadvertently, d) life-long learning, e) learning adjusted according to location and circumstances (Bulun, Gulnar & Guran, 2004). The chance of feasibility of learning whenever and wherever it fits brings some other benefits which are portability and motivation. Hashemi and Ghasemi (2011) list the benefits of m-learning as interaction, portability, collaborative learning, engaging learners, increased motivation, bridging of the digital divide, just-in-time learning, and assisting learners with some disabilities. Some basic features of the mobile

devices provide that the learner can collaborate and interact with other learners as the main aim of the mobile devices is communication. Collaborative learning enhances learning by promoting social interaction, allowing for critical thinking, creating a positive learning climate, increasing interest among the participants, retaining information longer (Johnson & Johnson, 1994; Gokhale, 1995; Lin, 2015). Thus, by providing communication with other learners, m-learning contributes to learning and teaching activities. M-learning improves learning by facilitating cooperation like team works and group projects thanks to virtual collaboration (Ferdousi & Bari, 2015). On the contrary to collaborative learning, m-learning addresses also personalized learning. Despite the benefits of the collaborative learning, personalized learning also should be situated in education as some learners prefer this type of learning and not all of the learning activities go fit well with cooperative learning. M-learning serves to individual differences; it involves individuals with interpersonal intelligence with collaborative activities and individuals with intrapersonal intelligence with personalized activities. The other intelligence types of Gardner (1983), which have deeply affected educational systems all over the world, are also addressed in m-learning as mobile devices are equipped with visual and auditory features.

Despite these positive features, m-learning has also some challenges. Some of these challenges are due to features of mobile devices. Small screen size and the limited battery lives of the mobile devices are one of the most problematic situations in m-learning. Öz (2015) states that m-learning tools have some drawbacks such as accessibility, connectivity, cost of mobile devices, small screen sizes, limited battery lives, distractions and interruptions in the classroom. Moreover, when compared to the use of keyboard and mouse, the input mechanisms are also limited (Sandberg, Maris and Geus, 2011). Another limitation is some applications requiring an internet connection. Although the wide use of the network, there are still problems with speedy internet use. McQuiggan et al. (2015) summarize the benefits and challenges of m-learning as follows:

Table 3. *Benefits and Challenges of Mobile Learning*

Benefits	Challenges
learning on the move	differentiated access to devices and internet
accessing underserved children and schools	usage must be monitored
enhancing higher-order thinking skills	prevailing attitudes and prejudices against using technology for instruction
supporting alternative learning environments	limiting physical attributes
providing personalized learning	mobile tools are shared among a group
Motivating learners	The way in which the tools are used impact the effectiveness of them

Like many other learning theories, m-learning also contributes to learning problems and generates its own problems. However, it still promises hope for effective learning and teaching process with its own distinguishing features. Wu et al. (2012), who conducted a meta-analysis of 164 research articles on the m-learning, found that %86 of these studies have found positive outcomes. Thus, it would be logical to integrate mobiles in learning by minimizing its disadvantages by using it with other learning techniques.

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), Constructivism, Blended Learning, Collaborative Learning, Active Learning are the theories 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, Problem-based Learning, Socio-cultural Theory, Collaborative Learning, and Conversational Learning. Keskin and Metcalf (2011) add four more perspectives which are Cognitivism, Connectivism, Navigationism, and Location-based Learning 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, Constructivism, Situated Learning, Collaborative Learning, Informal and Lifelong 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:

Behaviorism: Behaviorism meets us as one of the earliest approaches to learning and teaching, with the studies of Pavlov, Skinner and Watson. According to Behaviorism, learning occurs with stimulus, a response to this stimulus and then repetition comes. Reinforcement is essential for sustaining the behavior which can be observed and measured in Behaviorism. 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-centered 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 21th century (Hake, 1999). Thus, technologies and learning strategies

that contribute to it are welcomed by these societies. The final report of Commission of the European Communities (2001) defines lifelong learning as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective" (p. 9) by drawing attention to the full range of formal, non-formal and informal learning activity. Informal learning is 'wideband' which means "it covers the whole spectrum of settings and means - family, school, workplace, company of friends, social events, museums, libraries, clubs, media, Web- to name just a few" (Theodosopoulou & Papalois, n.d.; p.1). 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).

The concept of "MALL".

Becoming more and more popular, educational technology has affected education systems profoundly. Language learning and teaching get their share from this effect. Technology-based language learning has been one of the most searched areas in foreign language education. As Larsen-Freeman and Anderson (2011) stated:

"There are two main ways to think about technology for language learning: technology as providing teaching resources and technology as providing enhanced learning experiences. On the one hand, if we think of technology as providing resources, then it is clear that technology has long been associated with language teaching. ...On the other hand, if we think of technology as providing enhanced learning experiences then implications are even greater" (p. 199).

It is possible to divide technology-assisted language learning subheadings as Computer-Assisted Language Learning, Ubiquitous-Assisted Language Learning and Mobile-Assisted Language Learning. CALL and technology-assisted language learning can be regarded as the same concepts. However, CALL focuses on the computer as the technological device and the computers do not have anywhere and anytime feature belonging to MALL. Thus, CALL cannot be seen as the same thing with technology-assisted language learning.

CALL can be defined briefly as "the search for and study of applications of the computer in language teaching and learning" (Levy, 1997, p.1) It was originally developed at big computers. Since computers were not tired and intolerant while presenting the same material continuously CALL was seen as an excellent way of language learning (Huang et al. 2012). As Hubbard (2009) states that the knowledge and skills of CALL should be renewed continuously in order to keep up with the field, as technology develops quite fast. Thus, MALL and ubiquitous language learning become prominent due to rapidly changing technology and problems with CALL such as the necessity of sitting in front of a computer at a specific time.

MALL is generally seen as the subset of CALL and m-learning. There is no doubt that it is a subset of m-learning. However, Kukulska-Hulme and Shield (2008) state that MALL is different from CALL as it uses personal and portable devices which provide alternative ways of learning and "continuity or spontaneity of access and interaction across different contexts of use" (p.273). MALL is applying m-learning to language learning. Rodriguez-Arancon, Arus and Calle (2013) define MALL as "a teaching and learning methodology that uses mobile phones or other handheld devices with some form of wireless connectivity, such as phones, PDAs and tablets, among others" (p.1190). O'Malley et al. (2005) defined MALL as "any sort of learning that happens when the learner is not fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies" (p.6).Rahimi and Miri (2014) define MALL as any language learning activity occurring through mobile devices. MALL is an innovative and interesting way of learning a new language (Azar & Nasiri, 2014). It is seen as a "convenient, practical and easy way of assisting ESL learners in enhancing their ESL learning". (Soleimani, İsmail &

Mustaffa, 2014; p. 457). MALL is seen an excellent solution to foreign language learning limitations related to time and place (Miangah & Nezarat, 2012).

The opportunities that mobile devices present for learning have made MALL popular in recent years. Thus, some researchers begin to be keen on the use of mobiles in language education. Applying m-learning to language learning can be seen in different parts of language learning. Duman, Orhon & Gedik (2015), who conducted a trend study in the area of MALL, analyzed the articles published between 2000 and 2012 in Social Sciences Citation Index (SSCI) indexed journals. They found that the topics that were investigated within the scope of MALL studies were vocabulary, grammar, listening, speaking/pronunciation, reading, writing, integrated skills, dictionary use, assessment/evaluation, multimedia use/design, instructional design, identity/sense of community, usability, potential uses/drawbacks, interaction/collaboration, perception/attitude, and academic achievement. Burston (2015) found that the MALL had been generally used in vocabulary, reading, listening and speaking. Darmi and Albion (2014) concluded in their review studies of m-learning that the most popular language area that learned with mobile devices was vocabulary. These trend studies and related literature show that vocabulary has been the most studied field in the area of MALL.

Teaching Vocabulary

The importance of vocabulary is beyond any doubt in language learning. Knowledge of vocabulary is essential to communicate in a foreign language. As Wilkins (1972) states that "without grammar very little can be conveyed, without vocabulary nothing can be conveyed" (pp. 111–112, cited in Alfaki, 2015). Similarly, Malvern 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 have defeated the others, so teaching vocabulary is still a tough job.

As the main focus of this study was collocation teaching and it is fact that millions of words can be said on teaching vocabulary, the concept of collocation was focused on here after short overview of lexical knowledge.

Lexical knowledge.

In order to teach vocabulary, it is important to know which aspects of the target word should be taught. In order to answer this question, Nation (2001) gives a detailed table of knowing a word (see Table 4).

Table 4. *Nation (p. 21)*

Form	Spoken	Receptive	What does the word sound like?
		Productive	How is the word pronounced?
	Written	Receptive	What does the word look like?
		Productive	How is the word written and spelled?
	Word parts	Receptive	What parts are recognizable in this word?
		Productive	What word parts are needed to express this meaning?
Meaning	Form & meaning	Receptive	What meaning does this word form signal?
		Productive	What word form can be used to express this meaning?
	Concept & referents	Receptive	What is included in the concept?
		Productive	What items can the concept refer to?
	Associations	Receptive	What other words does this make us think of?
		Productive	What other words can we use instead of this one?
Use	Grammatical functions	Receptive	In what patterns does this word occur?
		Productive	In what patterns must we use this word?
	Collocations	Receptive	What words or types of words occur with this one?
		Productive	What words or types of words must we use with this one?
	Constraints on use (register, frequency…)	Receptive	Where, when and how often would we expect to meet this word?
		Productive	Where, when and how often can we use this word?

As can be seen from the table, while teaching a word; its form, meaning and use should be addressed. Each of these elements has subcategories peculiar to the category and a general category of receptive and productive. Similarly, Henriksen (1999) proposes three dimensions of vocabulary knowledge as a) partial to precise knowledge, b) shallow to deep knowledge, and c) receptive to productive knowledge. Many researchers (Henriksen, 1999; Laufer, 1998; Laufer & Paribakht, 1998; Nation, 2001; Read, 2000; Schmitt, 2014) categorize lexical knowledge as receptive and productive vocabulary knowledge. This categorization can be also called as passive and active vocabulary knowledge as receptive knowledge is a passive process while productive vocabulary knowledge requires the user to be active. Thus, the skills of reading and writing are associated with receptive knowledge while skills of speaking and writing are associated with productive one. Pignot-Shahov (2012) defines these terms as receptive vocabulary knowledge means ability to comprehend a word in its written or spoken form while productive vocabulary knowledge is ability to use a word accurately in a speech or written work. Stating that the distinction between these two concepts is not clear, Laufer and Goldstein (2004) suggest 4 degrees of knowledge in lexical knowledge based on two distinctions which are form versus meaning and recall versus recognition. According to these researchers, ability to supplying the word form is active knowledge and supplying the word meaning is passive knowledge. Moreover, recalling a word form or meaning and recognizing word form or meaning are different things. A short description of four degrees which are an active recall, passive recall, active recognition and passive recognition was presented in the table below.

Table 5. *Degrees of Vocabulary Knowledge (Laufer & Goldstein, 2004; p. 407)*

	Recall	Recognition
Active (retrieval of form)	Supply the L2 word	Select the L2 word
Passive (retrieval of the meaning)	Supply the L1 word	Select the L1 word

Another vagueness about vocabulary knowledge meets us as measuring it. Assessing vocabulary knowledge can be done through two different tests which are size/breadth tests and depth tests. Size tests which are also called as breadth tests are related to the number of words that the learners know. On the other hand, depth tests focus on various aspects of a word such as its syntactic, morphemic and collocational features. The question of which one of these tests are measuring vocabulary knowledge well is not agreed upon. Laufer and Goldstein (2004) point out that size/breadth tests measures the item superficially and in-depth tests the number of item measured is limited. On the other hand, Read (2000) states that even if size tests seem superficial they are more representative than in-depth tests in terms of

learners' overall vocabulary knowledge. Both of tests have also challenges. Thus, it is logical to assess learners' vocabulary knowledge with two kinds of tests.

Definitions of collocation and approaches to collocation.

When talking about vocabulary teaching, the Lexical Approach most likely will be the first approach that comes to mind. Proposed by Lewis (1993), Lexical Approach, as its name suggests, focuses on lexis. The sentence of Lewis (1997) "Language is grammatically lexis, not lexicalized grammar" (p. 13) forms the core of the Lexical Approach. As Lewis states (2008) the conventional approaches divide language into vocabulary (words) and grammar (structure) but Lexical Approach proposes that language consists of chunks producing continuous coherent text when combined. These chunks have four main types which are words, collocations, fixed expressions and semi-fixed expressions. "Words" is a broad term that implies single words; they are not combinations like the other three. While fully fixed expressions, which are generally often verbless expressions in the spoken language are rare, semi-fixed expressions are widely used in written and spoken language (Lewis, 2008). Finally, the collocations which are the subject of this study are defined in different ways by different scholars. Lewis (2008) defines collocation as "combinations of words which occur naturally with greater than random frequency" (p. 25). The term of collocation was firstly used by Firth (1957), who defines collocation as "actual words in habitual company" (p. 99 cited in Zhou, 2016 p. 42). There are two approaches to collocation which are frequency based also known as Firthians and phraseological tradition. Frequency-based approach, as its name suggests, deals with collocations' frequency of co-occurrence. Halliday (1961), who is one of the representatives of frequency-based approach, defines collocation as...

> "*The syntagmatic association of lexical items, quantifiable, textually, as the probability that there will occur, at n removes (a distance of n lexical items) from an item x, the items a, b, c ...*" (p. 276).

Sinclair (1991), who is another supporter of frequency-based approach, defines collocation as "the occurrence of two or more words within a short space of each other in a text" (p. 170). Both Halliday's and Sinclair's definitions show that span and statistics are important in frequency-based approach. The distance of the words that form collocation is emphasized by both Halliday and Sinclair. However, Halliday did not attempt to give exact number about 'n removes' which is dealt by Sinclair who firstly delimits the number as two but then as 4 (Gyllstad, 2007).

While collocation is the 'co-occurrence of words in a certain span' in frequency-based approach, it 'denotes a type of word combination' in phraseological tradition (Nesselhauf,

2003, p. 224). Cowie (1981), who is the representative of phraseological tradition, divides word combinations into two as formulae and composites. Formulae are at the sentence level and carry pragmatic functions. On the other hand, composites have syntactic functions. According to Cowie (1981), collocations are under composites and defined as units "which permit the substitutability of items for at least one of its constituent elements (the sense of the other element, or elements, remaining constant)" (p. 224).

Another representative, Howarth (1996), divides composites into two groups as grammatical and lexical and then lexical composites into two groups as non-idiomatic and idiomatic and ranging from free collocation to pure idioms (Gyllstad, 2007). While in free collocations, the word that forms collocation can be substituted with other words, the words cannot be substituted in pure idioms.

Table 6. *A Collocational Continuum, after Howarth (Cited in Gyllstad, 2007)*

Category	Free collocations	Restricted collocations	Figurative idioms	Pure idioms
Definition	Combinations of two or more words where the elements are used in their literal sense. Each component may be replaced without affecting the meaning of the other.	Combinations where one element is used in its literal meaning, while the other one is used in a specialized sense. The specialized meaning of one component can be figurative, delexical or in some way technical and is an important determinant of limited collocability at the other. These combinations are completely motivated.	Combinations that have a figurative meaning in terms of the whole. They may permit arbitrary synonymous replacement of one or more elements. They have current literal interpretation and are clearly motivated.	Combinations which have a unitary meaning which cannot be derived from the meanings of the components. They do not permit any replacement and are not motivated.
example	Blow a trumpet	Blow a fuse	Blow your own trumpet	Blow the gaff

Nesselhauf (2003), another proponent of phraseological approach, firstly describes the word of 'restricted' in order to categorize word combinations. She sets two criteria for regarding a word as 'restricted' which are:

Criterion 1

The sense of the verb (noun) is so specific that it only allows its combination with a small set of nouns (verbs).

Criterion 2

The verb (noun) cannot be used in this sense with all nouns (verbs) that are syntactically and semantically possible. (p.225).

Based on these criteria, she identifies three major types of word combinations which are free combinations, collocations and idioms. In free combinations, both noun and verb are unrestricted while in idioms both are restricted. On the other hand, in collocations, the noun is unrestricted but the verb is restricted. These definitions are based on noun+ verb collocations. It is unclear how the situation is in other types of collocations such as noun+ noun or adjective + noun collocations.

Nation (2001) identifies ten criteria to call an item as collocation. These criteria are: a) frequency of co-occurrence, b) adjacency, c) grammatically connected d) grammatically structured e) grammatical uniqueness f) grammatical fossilization g) collocational specialization h) lexical fossilization, I) semantic opaqueness, j) uniqueness of meaning. In these criteria, each criterion has a scale.

a) frequency of co-occurrence: frequently occurring together ⟶ infrequently occurring together.

b) adjacency: next to each other ⟶ separated by several times

c) grammatically connected: grammatically connected ⟶ grammatically unconnected

d) grammatically structured: well structured ⟶ loosely related

e) grammatical uniqueness: grammatically unique ⟶ grammatically regular

f) grammatical fossilization: no grammatical variation/changes in part of speech

g) collocational specialization: always mutually co-occurring ⟶ all occurring in a range of collocations

h) lexical fossilization: unchangeable ⟶ allowing substitution in all parts

I) semantic opaqueness: semantically opaque ⟶ semantically transparent

j) uniqueness of meaning: one meaning ⟶ two or more meaning

Although Nation (2001) lists these criteria for calling a combination for collocation, he also states that some collocations that are accepted as collocations do not meet all of these criteria.

Apart from these researchers, there are some who dealt with collocations with a statistical approach. One of them is Church and Hanks (1990), who proposed Pointwise Mutual Information (PMI). PMI is formulated as:

$$l(x, y) = log^2 \frac{P\ (x,y)}{P(x)P(y)}.$$

In this algorithm, P(x) is the number of times in which x is present in corpus while P(y) shows the number of times when y appears in the corpus. $P\ (x, y)$ is the number of times of co-occurrence of two words (Recchia and Jones, 2009).

All of these approaches show that it is not easy to understand what collocation is. In research studies, both frequency-based approach and phraseological approach have found places. Thus, there is not a determined definition and one single truth about collocations.

Types of collocation.

Collocations have been tried to be categorized by different researchers. Benson et al. (1997, cited in Alsulayyi, 2015) divide collocations into two groups: grammatical and lexical collocations.

Collocations of the first type which are grammatical ones are distinguished by the following 8 categories:

1-Noun + preposition e.g. blockade against

2-Noun + to- infinitive e.g. He was a fool to do it.

3-Noun + that–clause e.g. He took an oath that he would do his duty.

4-Preposition + noun e.g. by accident, in advance.

5-Adjective + preposition e.g. fond of children, keen on studying.

6-Adjective + to – infinitive e.g. it was important to work.

7-Adjective + that- clause e.g. she was afraid that she would fail.

Lexical collocations, on the other hand, include:

1-Verb (which means action) + noun /pronoun/ prepositional phrase e.g. inflict a wound, come to an agreement.

2-Verb (which means eradication or cancellation) + noun e.g. reject an appeal, crush resistance.

3-Adjective + noun e.g. a crushing defeat, strong tea.

4-Noun + verb e.g. storms rage, bees sting

5-Quantifier + noun e.g. a piece of advice

6-Adverb + adjective e.g. hopelessly addicted, deeply absorbed.

7-Verb + adverb e.g. appreciate sincerely, apologize humbly

On the contrary to this categorization of Benson, O'Dell and McCarty (2008) call the collocations such as verb+ noun as grammatical categorization and in this grammatical categorization, there are a) verb+ noun, b) noun+verb, c) noun + noun, d) adjective+ noun, e) adverb + adjective, f) verb + adverb or prepositional phrase and g) more complex collocations. O'Dell and McCarty (2008) classify collocations also as strong, fixed and weak collocations. *Strong collocations* are the ones where the words are "very closely associated with each other" (p. 8). They give the example of "auburn hair" where the word of "auburn" collocates only with the words related to hair to strong collocations. *Fixed collocations* are the ones where we cannot see any change or replacement such as in "to and fro". On the other hand, *weak collocations* in which many changes can be seen; in another word, the words in it can collocate with many other words (e.g. have a break, have a cold, have a shower etc.) A similar taxonomy belongs to Hill (2000; p. 63-64.)

o   Unique collocations: the verb is not used with any other nouns

o   Strong collocations: verb is most commonly used with that noun

o   Weak collocations: completely free combinations

o   Medium-strength collocations: neither free nor completely fixed

In this study, the grammatical categorization of O'Dell and McCarty (2008) which is more common was based.

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. 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. However, there were some problems. One of these problems was related to the nature of technology (e.g. phone's memory was not sufficient for many messages, phonetic symbols were not properly displayed). Another problem was that the students felt distributed or distracted as they received continuous messages at the specific period of the day. 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 posttest. 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 posttest 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. It was found that the students believed that instant vocabulary text message system was a supporter of autonomous learning. They were able to exploit their fragmented time and to learn anywhere. Similarly, Lu (2008), who sent SMS to vocational high school students, found that the students had positive attitudes towards the use of mobile phone in vocabulary learning 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 posttest. However, in the delayed test, there was no significant difference between 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 pretests and post-tests, the data was collected through a survey with a small number of participants. Thus, it is difficult to say 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 indicated that the vocabulary level of students increased with the mobile-assisted learning environment.

These studies indicate that vocabulary learning with mobile devices have been carried out with the help of SMS, e-mail and some specific programs developed by the researchers. As for the mobile applications which have attracted attention in the field of language learning in recent years, there are some studies that investigate the perceptions of language learners on use of mobile applications in language learning. For instance, Deng and Shao (2011) used a mobile application which was Remword in order to learn students' attitudes towards use of mobile applications in vocabulary building. They found that all students had positive opinions about the application. They concluded that some benefits of applications such as autonomy, flexibility and low costs of internet access helped students learn vocabulary in a self-directed way. Steel (2012) also searched the attitudes of learners towards use of mobile applications in language learning. It was found that mobile applications were useful as they provided practice in language anywhere and anytime. Moreover, some characteristics such as the convenience, portability and easy-to-use of mobile applications were the reasons of using these applications. Nino (2015) also found that characteristics such as convenience, interactivity, immediate feedback and use of authentic resources were the advantages of the mobile applications. In both studies (Nino, 2015; Steel, 2012) it was found that vocabulary was the most used part of language structures in mobile applications. Rezaei, Mai and Pesaranghader (2014) found that the learners believed that using mobile applications (Busuu and Interactive English in this study) helped them feel more confident and had positive effect on their class participation. The researchers also conducted a pretest and a posttest and observed that the learners were more successful in posttest than pretest. However, there was no control group in the study so it cannot be reliably said that the difference was due to mobile applications. Wu (2015) using a JAVA application (Word Learning) for vocabulary learning conducted an

experimental study with experimental and control group consisting of college students. The results showed that the experimental group outperformed control group significantly in the post-test. Rahimi and Miri (2014) also integrated mobile dictionaries into the course. While experimental group used mobile dictionaries, control group used printed dictionaries. At the post-test there was significant difference between two groups in the favor of experimental group.

The previous studies show that the language learners have positive attitudes towards the use of mobile devices in language learning. Mobile learning helps language learners get use of their fragmented time, provides audio and visual materials, and motivates them. However, it is open to debate if it has an effect on the success of the learners. The SMS and e-mail based studies have found significant differences between learning vocabulary with traditional way and mobile learning. However, in the tests of retention which is crucial in vocabulary learning, most of the studies have not observed any difference. Furthermore, there were some problems bothering students in this kind of studies. Lastly, the treatments in the studies were teacher-led while m-learning stresses the importance of learner-led learning. Thus, this study tried to use an application which aimed at reducing these problems and teaching collocations to college language learners.

Motivation and Autonomy in Mobile Learning

"Autonomous learners are by definition motivated learners"

(Ushioda, 2011; p.223)

In this part, learner autonomy and motivation were addressed together as these two terms are interrelated despite the fact that they are different concepts. In literature, there is much research showing that these concepts are highly related (Dickinson, 1995; Dörnyei & Csizer, 1998; Knowles, 1975; Lamb, 2001; Noels, Pelletier & Vallerand, 2000; Sakui, 2002; Spratt, Humphreys & Chan, 2002; Ushioda, 2011). This relation is clearer in Self-Determination Theory of Deci and Ryan (1985) that was addressed on the following pages. Being one of the most accepted concepts of motivational theories, intrinsic and extrinsic motivation is a justification for this relation. Thus, here firstly concepts of motivation and autonomy were mentioned in summary as a detailed approach to these concepts would make hundreds of books and these concepts were the secondary dimensions of this study. Then, the studies showing the role of m-learning in motivation and learner autonomy were tried to be summarized.

Understanding learner autonomy.

The term of autonomy is complicated as it has not been defined in one way. Dickinson (1987) defines learner autonomy as the condition where the learners are completely responsible for making and implementing all of the decisions related to their learning. Little (2010) mentions two versions of learner autonomy. The first version belongs to Holec (1981), who introduced the concept of 'learner autonomy' to education literature. He defines learner autonomy as:

"To take charge of one's learning is to have, and to hold, the responsibility for all the decisions concerning all aspects of this learning, i.e.: determining the objectives; defining the contents and progressions; selecting methods and techniques to be used; monitoring the procedure of acquisition properly speaking (rhythm, time, place, etc.); evaluating what has been acquired." (p. 3).

As to the Version 1, the teacher has two goals which are to assist learners in acquiring 'the linguistic and communicative abilities he has defined for himself' and 'autonomy' (Holec 1981: 23). The teacher should help learners to be autonomous. Thus, in providing autonomous learners, we need again teachers. This shows that although autonomy calls self-directed learning, it is not entirely independent from the teacher.

According to Little (2010), who forms Version 2 based on Version 1 and Constructivist Approach, learners know how to be autonomous and the task of education is to help learners develop the inbuilt capacity for autonomy in Version 2 whereas in Version 1 the task of education is to get learners self-directed by removing the teacher-centered education. Version 2 adds terms of social-interactive-collaborative to Version 1 which is individual-cognitive and organizational in its orientation. Another difference is in language learning. While Version 1 differs language learning from learner autonomy, Version 2 proposes that learner development of autonomy cannot be detached from the development of foreign language proficiency. It suggests the use of more integrated elements for successful language learning. On the contrary to this approach that includes teachers in learner autonomy process, the learner autonomy is sometimes understood as the process where an instructor has been excluded and the learners are totally alone. Even, it has been asserted that formal education suppresses the autonomy capacity of learners. According to Benson and Voller (1997), autonomy has been used in five ways some of which summarizes these ideas:

- situations in which learners study entirely on their own,
- an inborn capacity which is suppressed by institutional education,
- a set of skills which can be learned and applied in self-directed learning,
- the right of learners to determine the direction of their own learning,

- the exercise of learners' responsibility for their own learning. (p. 2).

These ways indicate the different view of points. It is not easy to understand the term of learner autonomy. In order to enlighten this vagueness, Sinclair (2010) (cited in Borg & Al-Busaidi, 2012; p.5) proposes 13 aspects of autonomy which are:

➢ Autonomy is a construct of capacity

➢ Autonomy involves a willingness on the part of the learner to take responsibility for their own learning

➢ The capacity and willingness of learners to take such responsibility is not necessarily innate

➢ Complete autonomy is an idealistic goal

➢ There are degrees of autonomy

➢ The degrees of autonomy are unstable and variable

➢ Autonomy is not simply a matter of placing learners in situations where they have to be independent

➢ Developing autonomy requires conscious awareness of the learning process – i.e. conscious reflection and decision-making

➢ Promoting autonomy is not simply a matter of teaching strategies

➢ Autonomy can take place both inside and outside the classroom

➢ Autonomy has a social as well as an individual dimension

➢ The promotion of autonomy has a political as well as psychological dimension

➢ Autonomy is interpreted differently by different cultures

Among these proposals, the one which is 'there are degrees of autonomy' is supported by some other researchers by proposing some level or stages of learner autonomy. For example, Nunan (1997) suggests a model in which there were five levels where learner actions, contents and process were explained. These levels are awareness, involvement, intervention, creation and transcendence. In *transcendence,* the learner becomes the teacher whereas in *awareness* s/he is only aware of his/her personal needs and learning strategies (see Table 7).

Table 7. *Five-Model of Learner Autonomy (cited in Dang, 2012)*

Level	Learner Action	Content	Process
1	Awareness	Students are made conscious of the educational aims and content of educational materials.	Students determine strategy implications of educational tasks and determine their own favorite learning styles/strategies.
2	Involvement	Students are included in choosing their own aims from some alternatives on offer.	Students select among stream of options
3	Intervention	Students are involved in modifying and adapting the aims and contents of the learning program	Learners modify/adapt tasks.
4	Creation	Students build their own goals and objectives.	Students build their own tasks.
5	Transcendence	Students move beyond the classroom and make connections between the content of classroom learning and the world	Students become teachers/researchers.

Similarly, Scharle and Szabao (2000) propose three stages which are raising awareness, changing attitudes and transferring roles. As in Nunan's model, *awareness* is the lowest level of learner autonomy and *transferring roles* is the highest level of learner autonomy.

Here, the model of Tassinari (2012) was addressed as her descriptors were based on this study in the learner autonomy scale. Tassinari defines learner autonomy as "the meta-capacity, i.e. the second order capacity, of the learner to take control of their learning process to different extents and in different ways according to the learning situation" (p. 28). She states that there are four essential components of autonomy which are a) cognitive and meta-cognitive component b) affective and a motivational component, c) action-oriented component d) social component (ibid). Based on these components, she developed a comprehensive model of learner autonomy which she called as "dynamic model of autonomy".

The model has 10 sub-dimensions which are managing my own learning, cooperating, evaluating, planning, monitoring, completing tasks, structuring knowledge, dealing with my feelings, motivating myself, choosing materials and methods.
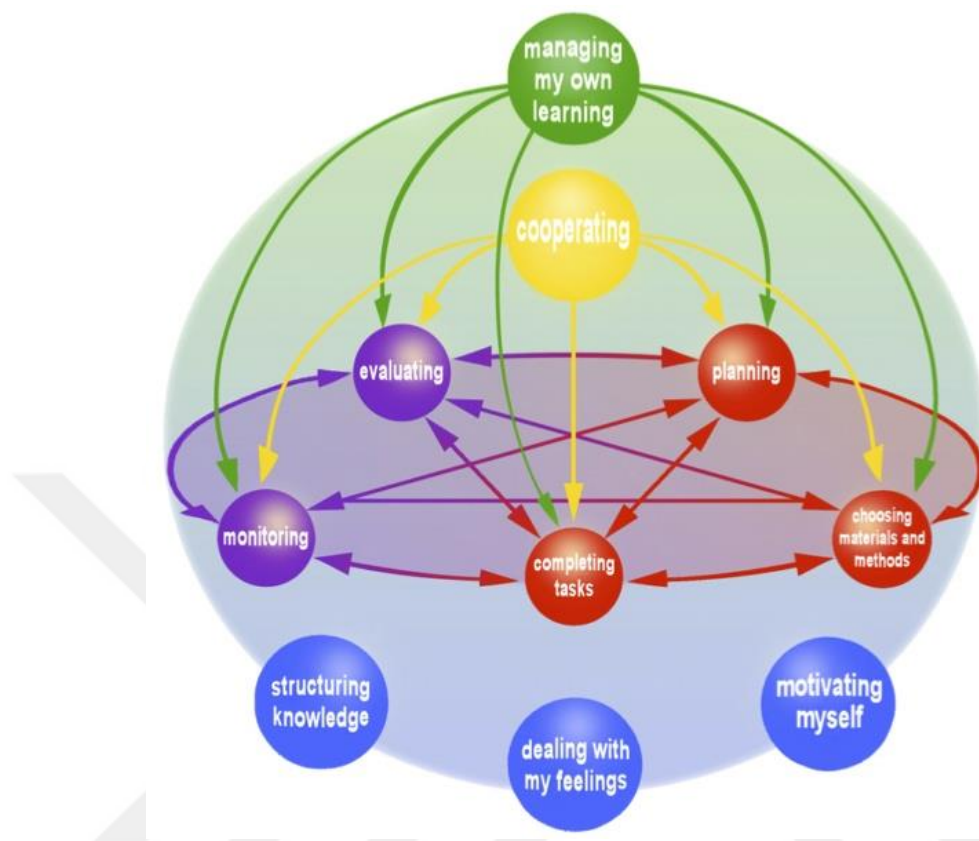
Figure 7. Dynamic model of learner autonomy (Tassinari, 2012).

In this model, there are 118 self-report descriptors. The descriptors are in the form of can-do statements. 33 of these descriptors are in a macro level and 85 of them are in micro level in that these 85 descriptors are sub-descriptors of 33 main descriptors. The reflection of the students on such a model was positive as it was a form of self-reflection and self-assessment (Tassinari, 2012).

Studies on the role of MALL in fostering learner autonomy.

M-technology does not only provide learning anytime and anywhere, but it also enhances learner autonomy by presenting a rich and multi-model content, and remarkable opportunities (Lyddon, 2016). Due to these opportunities that m-learning present, some studies researched role of m-learning in learner autonomy, but the number of these studies is limited. Most of these studies found positive results about the role of MALL in enhancing learner autonomy although there were some other ones contradicted with them.

Nunez (2018) carried out an action research study where 62 students used blogs on their smartphones for learning French. The data was gathered through classroom observations

and questionnaire. The findings showed that although %80 of the learners demanded self-assessment, most of the participants still believed that their learning process was based on listening to the teacher. Besides 1/3 of the participants would feel more comfortable if the lesson was a traditional one. Like Nunez, Ardi (2017) also conducted a qualitative study where he researched if Schoology m-learning platform would help to promote learner autonomy. He conducted his research in an EAP class with 21 students. Students' reflection and observations were used as data collection tools. The findings were significant as they showed that Schoology helped learners to take control of their learning management, cognitive processes and learning content. Schoology provided collaboration and interaction and learning at learners' time, place and pace, which assisted students' exercise autonomy.

Some experimental studies also showed that MALL was effective for enhancing learner autonomy. For example, Leis, Cooke and Tohei (2015) found that the participants of the experimental group were more inclined to study outside the class than the control group. In the study of Leis et al. (2015), 140 Japanese university students were divided as experimental and control group. Control group was prohibited to use m-technology during class. On the other hand, the experimental class used smartphones during class. The findings showed that meta-cognitive skills and intrinsic motivation level of the experimental group were higher than the control group which was regarded as a sign of enhanced autonomy. Another experimental study which found positive results in terms of the effect of MALL on learner autonomy belongs to Gaber (2015), who used a MALL-based program on tablets with 80 participants receiving education in a secondary stage school. The findings showed that posttest scores of the experimental group were significantly higher than the control group in terms of autonomy. Contrary to positive findings of the role of MALL in learner autonomy, there are also some studies finding negative results. Sato, Murase and Burden (2015) conducted an experimental study to see the effect of MALL on automatization and learner autonomy. They studied with 97 undergraduate students from the faculty of engineering. The participants tried to learn 100 phrases mostly used in academic writing. While control group used paper-based vocabulary list, the experimental group used Quizzlet in their smartphones. The findings showed that posttest scores of both groups were higher than their pretests. On the other hand, no difference was found between both groups in terms of learner autonomy.

The literature related to the relation between MALL and learner autonomy generally state that MALL is an important way of promoting learner autonomy. However, it also indicates that learners are not so ready for mobile autonomous learning. Thus, in order to use

technology-based approach for autonomy, both physical and psychological substructures for educational settings should be well prepared.

A brief overview of motivation in second language learning.

Motivation theories periods

In contemporary language learning and acquisition theories, it is a crystal-clear fact that learners' motivation is one of the most important factors in learning. Motivation has been defined comprehensively by Dörnyei and Otto (1998; p. 65) as:

> *"the dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalized and (successfully or unsuccessfully) acted out."*

Dörnyei (2005) identified three phases in motivation theories which are social psychological, cognitive-situated and process-oriented periods.

The social psychological period beginning in 1959 and lasting to 1990s, was mainly characterized by the integrative and instrumental concepts of Gardner (1985), the linguistic self-confidence of Clement (1980, 1986) and intergroup model of Giles and Byrnes (1982). This period focuses on the social aspects of language learning. Firstly emphasizing that language learning motivation is different from other learning motivation due to learners' willingness to be included in the community of target language, Gardner and Lambert (1972) then stated that cognitive factor was not sufficient to explain motivation. Thus, Gardner (1985) explained motivation with its three components which were effort, cognition and affect. The other important contributions of Gardner to this period are the concepts of integrative orientation and instrumental orientation. While the first one is 'the willingness to be like valued members of the language community' (Gardner & Lambert, 1959; p. 271), the second one refers to pragmatic gains in which learning a foreign language is an instrument e.g. getting a job. This distinction seems similar to another dichotomy of motivation which is intrinsic and extrinsic motivation. Intrinsic motivation is one's own desire to achieve a goal while extrinsic motivation is performing an act to avoid a punishment or to be rewarded.

Another motivational theory that focuses on social dimension is the *intergroup model* of Giles and Byrnes. Giles and Byrne*s* (1982) suggest five propositions where the conditions are provided motivation will occur. These five propositions are:

- in-group identification is weak and/or L1 (native language) is not a salient dimension of ethnic group membership

- quiescent inter-ethnic comparisons exist (e.g. no awareness of cognitive alternatives to inferiority)
- perceived in-group vitality is low
- perceived in-group boundaries are soft and open
- strong identification exists with many other social categories, each of which provides adequate group identities and a satisfactory intra-group status (pp. 34-35 cited in Hall and Gudykunst, 1986; p.291)

Lastly, the *linguistic self-confidence of Clement* (1980, 1986) suggests that in multiethnic contexts more frequent and pleasant the contact between different language users is, the more self-confidence in L2 use will develop. (Clement, Dörnyei & Noels, 1994). As to this theory, this contact in such a multiethnic context is the major motivational factor in learning L2.

The cognitive situated period, pertaining to 1990s, argues that the social psychological period should be revised with more focus on practice and situated analysis. After this criticism, Tremblay and Gardner (1995) revised their model with concepts of expectancy-value and goal theories by forming a sequence of language attitudes motivational behavior and achievement. (Dörnyei & Ushioda, 2012) (see Figure 8). In this revised model, there are three mediating variables which are goal salience, valence and self-efficacy between language attitudes and motivational variable. While goal salience means both goal specificity and goal-setting strategies frequency, valence refers to attitudes towards and desire to learning second language. Finally, self-efficacy refers to language learning anxiety and performance expectancy.
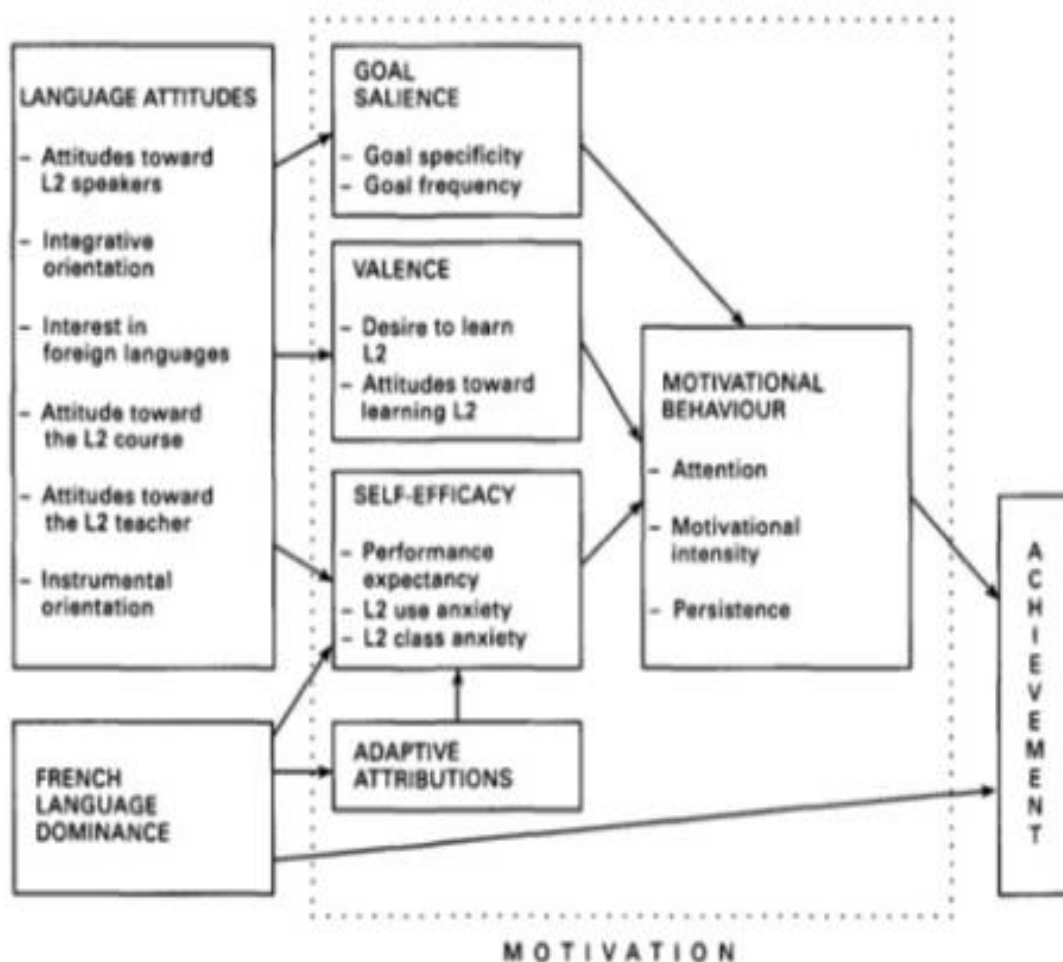
Figure 8. Model of L2 motivation of Tremblay and Gardner (1995) (cited in Dörnyei and Ushioda, 2012).

As talking about cognitive situated period, Keller's model of Attention-Relevance-Confidence-Satisfaction (ARCS) which was addressed in the following pages, Dörnyei's three-level framework of L2 motivation, Social-constructivist Model of Williams and Burden, and Self-Determination Theory of Ryan and Deci (2000) (addressed in the following pages) meet us. Dörnyei (1994) suggests three levels of foreign language learning motivation. These levels are learner level, learning situation level and language level. The *learner level* includes affects and cognitions which mould characters of people. In this level, there are two components which are a need for achievement and self-confidence. The component of self-confidence involves four L2 aspects that are language use anxiety, perceived L2 competence, causal attributions and self-efficacy. *Learning situation level* involves motivational conditions related to three areas. These areas are a)course-specific motivational components which are interest, relevance, expectancy and satisfaction, b) teacher-specific motivational components including affiliative drive, authority type and direct socialization of motivation, c) group-specific motivational components consisting of goal-orientedness, group cohesion, norm and reward system and classroom goal structure. Lastly; the *language level* is the most general

one and has two subsystems which are integrative and instrumental motivational subsystems. This level, dealing with various aspects of L2, determines basic learning goals and describes language choice.

Williams and Burden (1997) define motivation with four items which are "a state of cognitive and emotional arouse, which leads to a conscious decision to act, and which gives rise to a period of sustained intellectual and/or physical effort, in order to attain a previously set goal (or goals)" (p. 23). As to this definition, interest arises, then becomes an act and this act goes on. Thus, there are three aspects of motivation which are reasons for doing something, deciding to act and sustaining the effort or persisting. According to this theory, as deciding to perform an act, there are some factors which may be internal or external. Another important point belonging to this theory is that it highlights that initiating motivation is different from sustaining it so teachers should be aware of this distinction.

The process-oriented period: In this period, motivation is seen as a process and it should be researched over time. The representative of this period is the Process Model of L2 Motivation developed by Dörnyei and Otto (1998) based on the Action Control Theory of Heckhousen and Kuhl (1985). Dörnyei and Otto identify three reasons for developing a process model. Firstly, the existing models were narrow and in terms of providing a comprehensive summary of motivational influences on classroom behavior. Secondly, the previous theories underestimated the importance of motivational sources of goal-oriented behavior by focusing only how and why individuals choose the action. Finally, the existing theories were oriented to see that motivation was a statistic state. However, it should be acknowledged that motivation was a dynamic process. Based on these rationales and Action Control Theory of Heckhousen and Kuhl (1985) which is central to the concepts of intention and action control strategies consisting of selective attention, encoding control, emotion control, motivation control, environment control and parsimony of information processing, the Process Model of L2 Motivation was developed.

As Figure 9 shows that Process Model of L2 motivation consists of two main dimensions which are motivational influences and action sequences and three phases which are pre-actional, actional and post-actional phases.
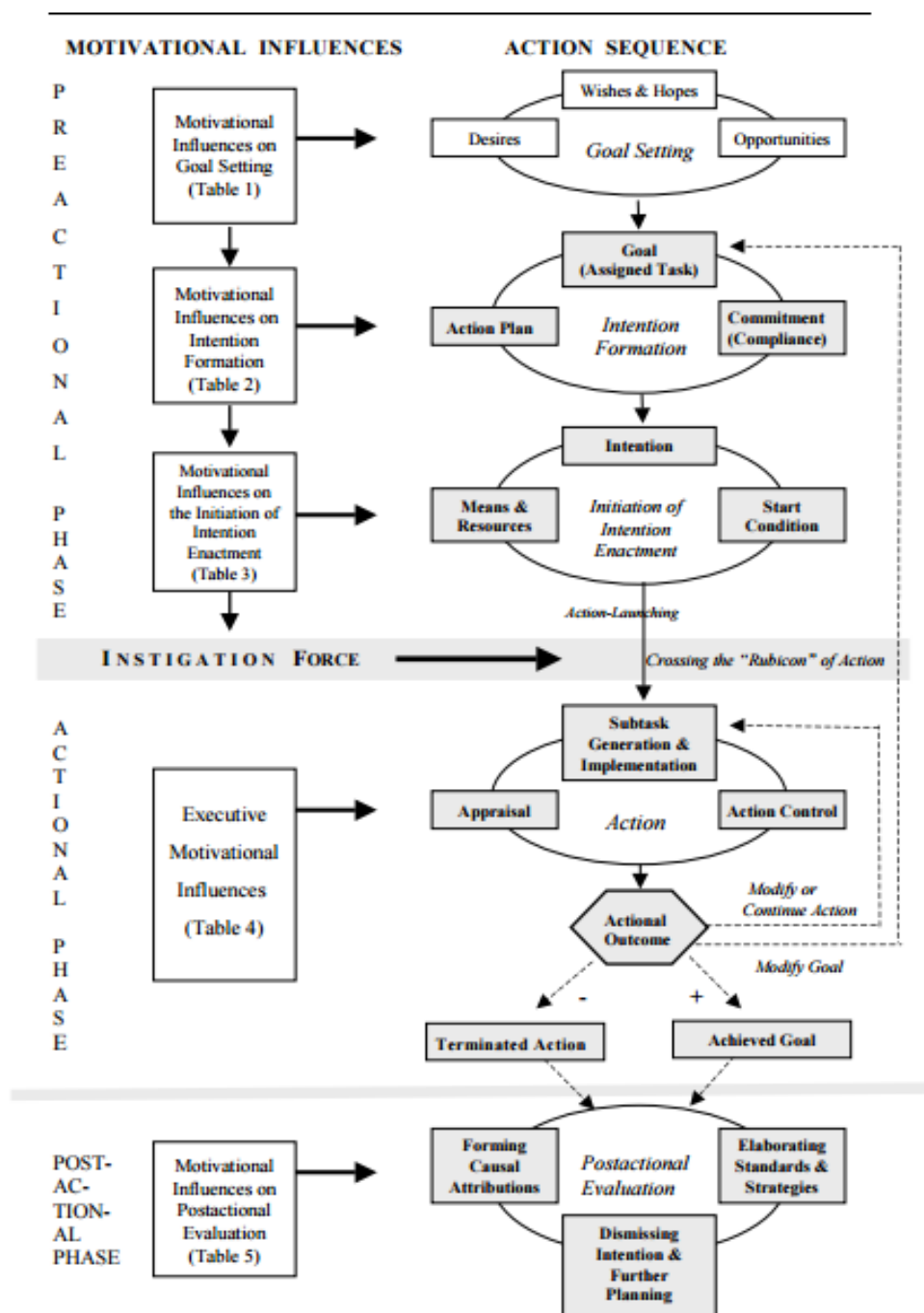
Figure 9. Process model of L2 motivation.

The Self-Determination Theory: a bridge between motivation and learner autonomy.

The SDT could be summarized basically as the difference between autonomous motivation and controlled motivation (Gagne & Deci, 2005); that is why this title (A bridge between motivation and autonomy) was used here. It would be logical to explain the theory with the definition of the Ryan and Deci (2000) who brought the theory to the literature. According to Ryan and Deci (2000), SDT is a motivation and personality theory using conventional empirical methods and organismic metatheory which makes emphasis on the importance of behavioral self-regulation.

SDT suggests that there are three basic needs of people which are autonomy, competence and relatedness. When these needs are satisfied, people experience more motivation and wellness. However, if these needs are not satisfied sufficiently, then there will be less motivation and well-being.

SDT categorizes motivation as intrinsic and extrinsic motivation. While intrinsically motivated person performs an act for the satisfaction that the activity gives to the person, the extrinsically motivated person does the action for a/ an external/separable outcome. While at the first phases of the SDT, the terms of intrinsic and extrinsic motivation were used and the distinction was made between them, later the terms of autonomous motivation and controlled motivation were used and the distinction between them was done. It can be thought that intrinsic motivation is equal to autonomous motivation and extrinsic motivation is equal to controlled motivation, however, autonomous motivation includes intrinsic motivation and integrated regulation of extrinsic motivation which were explained in the following page.

SDT has six mini-theories in it. These theories are: Cognitive Evaluation Theory (CET), Organismic Integration Theory (OIT), Causality Orientations Theory (COT), Basic Psychological Needs Theory (BPNT), Goal Contents Theory (GCT), and Relationships Motivation Theory (RMT).

Cognitive Evaluation Theory (CET) focuses on the intrinsic motivation. This sub-theory was introduced in order to specify *"factors that explain variability in intrinsic motivation"* (Deci & Ryan, 2000; p. 70) by Deci and Ryan in 1985. These factors can be social or environmental and can facilitate or undermine intrinsic motivation. CET also deals with key needs for autonomy and competence. Based on CET, some experiments were done and it was found that social-contextual events such as feedback or reward could facilitate intrinsic motivation.

Organismic Integration Theory (OIT) focuses on extrinsic motivation. Extrinsic motivation has subtypes which are external regulation, introjected regulation, identified regulation, and integrated regulation. These subtypes are in a continuum of internalization (see Figure 10). Internalization can be defined as "people taking in values, attitudes, or regulatory structures, such that the external regulation of a behavior is transformed into an internal regulation and thus no longer requires the presence of an external contingency" (Gagne &Deci, 2005; p. 334).

In the continuum, the least autonomous motivation is *external regulations*. People with external regulation do the action for an external outcome such as for being rewarded or not being punished. With this side, it can be associated with operant conditioning in which the

learning happens instrumentally; in other words, via reinforcement and punishment. External regulation is the most controlled type of motivation. *Introjected regulation* controls person. People behave in order to avoid guilt or feel worthy. It is more about ego enhancements. Being more autonomous than introjected regulation, the *identified regulation* is the one in which person agrees that the action is personally important as it is appropriate for his/her own goals and personality. *Integrated regulation* is the most autonomous one in the extrinsic motivation subtypes. It shares many features with intrinsic motivation in common. However, they are different due to their goals. While a person with intrinsic motivation does the action for his/her personal internal joy, a person with integrated regulation does the action for an outcome. In integrated regulations, person accepts that the action is an integral part of his/her own identity.

As looking at the continuum, it is seen that there are amotivation and motivation at the opposite sides of the continuum. Amotivation is the lack of motivation and amotivated person has no intention to perform the action while motivated person has this intention.
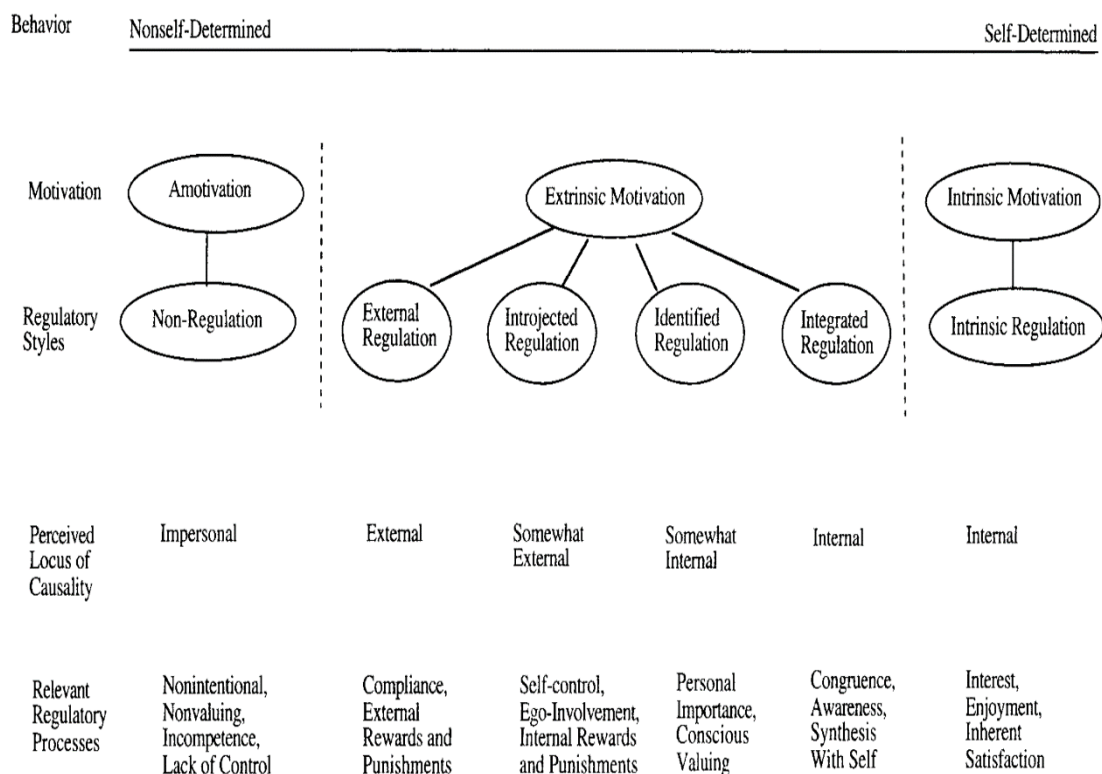
Figure 10. SDT continuum (Ryan and Deci, 2000 January).

Causality Orientations Theory (COT) focuses on individual differences which are in people' tendencies to orient towards various aspects of the environment and to regulate behavior in different ways. According to the theory, there are three types of causality orientations which are autonomy orientation, control orientation and impersonal/amotivated

orientation. Control-oriented people act as they think that they should do it and dependent on the events such as deadlines (Deci& Ryan, 1985). Autonomy oriented act is characterized by the interest of the person in the action. Lastly, the person with impersonal/amotivated orientation "*focuses on their lack of personal control or competence*" (Ryan, 2009; p. 2).

Basic Psychological Needs Theory (BPNT), as its name suggests, focuses on how basic psychological needs (autonomy, competence and relatedness) are related to psychological health. As to this sub-theory, these three basic needs are crucial in psychological well-being. As these needs are universal, the theory uses cross-developmental and cross-cultural settings for validation (http://selfdeterminationtheory.org/)

Goal Contents Theory (GCT) deals with the discrepancy between internal and external goals and with the way of how these two types of goals affect people's motivation. While extrinsic goals such as financial success, fame etc. do not satisfy people's need and so not improve their well-being. On the other hand, intrinsic goals such as close relationships and personal growth satisfy people's needs and improve their wellness (Ryan, 2009).

Relationships Motivation Theory (RMT) is about how relationships are fundamental to people's wellness. Thus, it focuses on "relatedness", which is one of the basic needs as to the SDT. As to this theory not only the relatedness is satisfied in a high-quality relationship but also the needs for autonomy and competence are satisfied.

ARCS Model of Keller.

The motivation theory that is mostly referred in mobile learning studies is the ARCS model. The reason is the applicability of ARCS model to m-learning. Mobile applications can be designed based on Attention, Relevance, Confidence and Satisfaction and so can motivate learners. There are some studies that use these characteristics of ARCS as program factors of the mobile systems. Before digging on these studies, it would be logical to touch briefly on what ARCS is.

ARCS model was developed by Keller (1987) as a motivation theory based on Expectancy-Value Theory. It is a perspectivatilist approach (Wheelwright, 1962) in which truth should be contextualized and relative. Keller (1987) defines his approach as "a method for improving the motivational appeal of instructional materials" (p. 2).

Keller (1987) explains the reason for why he developed this model as the lack of macro models that directly deal with creating instruction stimulating learner motivation. Although there were application-oriented theories, they were inadequate as they did not

incorporate some important elements such as curiosity and intrinsic motivation into the theory and they did not provide strategies for teachers about how to motivate.

The theory consists of three parts that are a) four categories including concepts and variables which form the motivation b) strategies that would be used to promote the motivational appeal of instruction c) motivational design (Keller, 1987). The theory explains the motivational design and categorizes design as person-centered, environmentally-centered interaction-centered and omnibus models.

The theory has four basic elements abbreviated as ARCS. For motivating students, a lesson firstly should gain *Attention* of the learners through different tactics which will arise their curiosity. Secondly, in order to sustain attention, the content should be *Relevant* to students' interests and learning styles. Thirdly, building *Confidence* is required and it can be provided by making the objectives clear and presenting examples of achievement. When these three requirements are provided, motivation can be observed. However, it is important to keep this motivation alive. This can be achieved with *Satisfaction* in which students can be rewarded or their intrinsic motivation can be supported (Keller, 2000). ARCS has its own categories which can be seen in Figure 11.
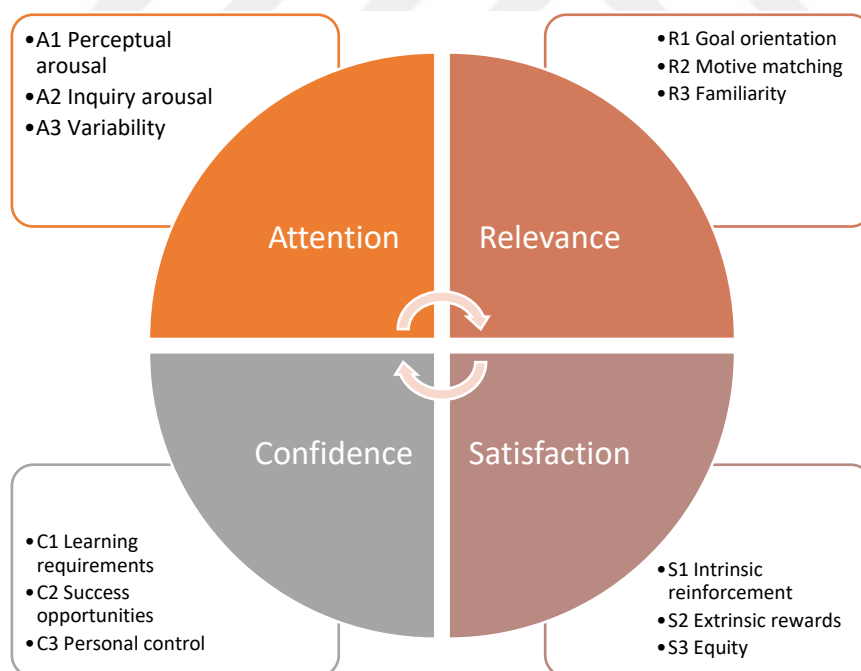
Figure 11. ARCS categories.

The subcategories of Attention are perceptual arousal, inquiry arousal and variability whereas Relevance has the subcategories of goal orientation, motive matching, and familiarity. Learning requirements, success opportunities and personal control are involved in

Confidence. Finally, Satisfaction has intrinsic reinforcement, extrinsic rewards and equity. All of these subcategories propose strategies to provide the ARCS.

The studies on the role of mobile learning on motivation.

Stockwell (2013) proposes two dimensions of why language learners are motivated by technology. The first one is the language learning motivation (called as L2 learning utility in Lawrence, 2015) that causes the learner to explore the new technology to learn the target language. The second one is inherent device motivation (as called in Lawrence, 2015) is the interest in technology which would prompt learner to discover the benefits of technology in language learning and then use it for learning. As both language learning and technology interests will lead the learner, it is expected that technology results in higher motivation. Another reason of why there is much expectation that mobile learning promotes motivation is that some developing mobile applications pay attention to motivational factors. For example, it can be seen that some researchers proposed developing mobile applications based on motivational theories. Bae, Kim and Lee (2005) were one of those researchers. They proposed applying the ARCS model of Keller to m-learning by matching motivational factors with program factors as follows:

Table 8. *Utilizing the ARCS Model (p. 601)*

Motivation factors	Program factors
Attention	Use of images
	Question and answer boards
	Different appearance of the same characters
Relevance	Unified learning areas
	Awarding points
Confidence	Presentation of the number of books learners have read
	Selection of the starting point with optional button
	Encouragement by recommendation
Satisfaction	Making a graded list
	Rewarding an offline

Program factors can be various as there are many ways of taking attention in a mobile application. Another reason for the expectation is the charming characteristics of mobile devices. Martin, McGill and Sudweeks (2013) found in their study that mobility (highest frequency), study anytime, access to learning resources, entertainment, note taking, working on assignment, being organized, communication with lecturers, multiple uses, connecting with friends, using the internet, online discussions, researching, using software and writing

were the motivators of the students. According to Malone and Lepper (1987), six elements make the activities motivating for the learners. These elements are challenge, curiosity, control, cooperation, competition and recognition. While challenge, curiosity and control are addressed as intrinsic motivators, cooperation, competition and recognition are the part of extrinsic motivation. Ciampa (2013) based on Malone and Lepper's categorization, tried to find out if this taxonomy fits well with mobile learning. She discussed that these motivating factors were also key aspects of successful mobile learning systems. Mobile technology can provide challenge, competition, control etc. via different mobile applications such as game-based app. Similarly, Jones and Issrof (2007) addressed the question if m-technology was motivating by correlating between motivational factors and the features of m-technology. They stressed that six factors that could be found in mobile devices (which are freedom, ownership, communication, fun, context and continuity) could motivate students.

The feasibility of learning anytime and anywhere can motivate learners. It is expected, but it is open to question if the facts approve it. Some studies in the literature tried to determine the fact with experimental studies. In these studies, a mobile device/or system used in experimental groups and pre/post-test were taken to see the impact. On the other hand, some other studies surveyed students about their opinions on the role of m-learning in increasing motivation. This categorization was taken a base here as touching on the related literature.

Some of the experimental studies showed that m-learning did not have any effect on learner motivation. For instance, Lin et al. (2014) were curious about if m-learning and game-based learning would affect students' motivation. Thus, they developed a mobile game-based application. They used it in the experimental group and for control. Although game-based learning had a positive effect on students, there was no difference between control and experimental groups in the posttest. Thus, mobile learning did not differ from computer-based learning in terms of motivation. Another study that showed that m-learning had no effect on motivation belongs to Rau, Gao and Wu (2008) who formed four groups which are SMS group, e-mail group, online forum group and control group. The study showed that there was no significant difference between pretest and posttest results and also between the results of the control group and SMS group. This result was valid also for the online group and e-mail group. Nikou and Economides (2015) also compared computer-based, mobile-based and traditional methods in terms of their effect on motivation and also on achievement in STEM education. The results showed that both mobile and computer-based learning increased students' motivation and accordingly their achievement. The increase of motivation was

observed mostly in low achievers. Mobile and computer-based learning affected low achieving students' motivation and performance mostly.

Huang et al. (2016) used m-technology in teaching vocabulary. They developed a mobile system and used 5-steps vocabulary learning strategy in the experimental group. For control group, they used the same vocabulary strategy but with traditional methods. For data collection, they used ARCS questionnaire and learning performance for vocabulary learning achievement. The results showed that there was a significant difference between two groups on the behalf of the experimental group at the dimensions of Attention and Satisfaction. The students in the experimental group find m-learning interesting, enjoyable and useful. Although the study did not show a concrete result for the effect on motivation, it showed that m-technology was effective in learning vocabulary. The study of Chantorn and Vaatcharaporn (2013) also showed that mobile communication tools were effective in increasing the motivation of students, especially the attention and the engagement variables. They found that the mobile devices were consistent with the ARCS model and so these devices improved learners' motivation. Aliion and Delialioğlu (2017) found that there were significant differences between pre-test and post-test especially at the dimensions of self-regulation, students' cognitive strategy use, students' intrinsic value and self-efficacy.

On the contrary to these studies showing that m-learning is not effective for increasing motivation, there are some studies finding that m-learning increased motivation of the learners. One of these studies belongs to Sandberg et al. (2011) who used an experimental study in which experimental group used an application for learning English vocabulary. The findings indicated that the application increased the students' motivation as using the applications also in their spare time.

The survey studies generally found that the learners were motivated when engaged in m-learning. Danesh and Amiri (2015) tried to find out if there was a relationship between learner motivation and use of mobile applications in the learning process with a questionnaire belonging to Binnur (2011). The results showed that most of the students (n=60) took part in the study believed that they were more motivated when mobile application was used in the class. Lawrence (2015) studying with 159 college students collected data with a questionnaire to see that Korean college students were receptive to MALL. The results showed that while the half of participants were positive about using m-technology both inside and outside the classroom, a small proportion was against and the rest of them was hesitant. Mockus et al. (2011) also surveyed students about their opinions about the motivation and m-learning relation. More than half of the college students (n=13) stated that the content in mobile

51

devices could motivate them. Similarly, Asplund (2014) conducted a questionnaire to 77 students who did their assignments through their smartphones. The participants of the survey believed that doing assignments on mobile devices was a "refreshing change" (p. 16). A problem with these studies is that the sample was not adequate to make a generalization.

The study of Olasina (2012) addressed the tendency of learners to m-learning and e-learning. On the other hand, these students did not demand that m-learning and e-learning replace face-to-face learning. The study of Hashim, Tan and Rashid (2014) indicated that the adults were willing to adopt m-learning. This adoption was demanded especially when the medium was for interaction. According to the findings, social, affective and cognitive needs of adults should be paid attention during adaptation of m-learning.

The related literature shows that learners are in the opinion of that m-learning motivates them. Learners are willing to use mobile technology while learning. On the other hand, literature also shows that the experimental studies that are done to see if m-learning really increases motivation contradict with the survey studies. The general results of experimental studies state that m-learning is not different from traditional learning approaches in terms of motivation.

Summary of the Chapter

The difficulty of portability of computers has led to small computers that function as computers such as smartphones and PDAs. These mobile devices have been used for educational purposes so m-learning emerged. M-learning has been firstly defined as the use of mobile devices for educational purposes. However, these definitions have seemed inadequate so new definitions have focused on learning anytime and anywhere. Being seen as a subset of CALL, MALL has been prominent in recent years in especially vocabulary learning. Mobile dictionaries have been used more than printed dictionaries in recent years. In literature, it can be seen that some studies researched the effectiveness of MALL in vocabulary learning. These studies generally used SMS to teach target words. The other MALL researchers developed their own systems. The general result was that use of mobile devices was an effective way of learning vocabulary.

The charming face of mobile devices and its popularity among children, young and adults may motivate learners to learn the language through these mobile devices. Compatible with the ARCS model of Keller (1987), and SDT of Ryan and Deci (1985), mobile devices may improve learners' motivation and learner autonomy. However, this contribution is a question mark as the literature lacks of answers to questions of whether m-learning is

effective in increasing autonomy and learner motivation. Thus, this study tried to fill these gaps. The following chapter described the method of attempting to fill gaps.

CHAPTER THREE

Methodology

In this chapter, the method carried out in this study was described. Beginning with research design of the study, participants of the study, the instruments used to collect data, the process of the treatment, and the analysis of obtained data were explained. Then, the validity of the study was discussed.

Research Design of the Study

This study adopted a quantitative approach as it tried to answer the questions beginning with "what", and quantitative studies focus on getting answers to the questions such as "what, which, how much etc. The quantitative research is the research whose main paradigm is post positivism believing in one objective reality independent of us. Quantitative research is "a type of educational research in which the researcher decides what to study, asks specific, narrow questions, collects numeric (numbered) data from participants, analyzes these numbers using statistics, and conducts the inquiry in an unbiased, objective manner" (Creswell, 2005; p. 39). The clearest principle of quantitative research is grounding the study on hypotheses and testing these hypotheses (Ekiz, 2009). This study used hypotheses and numerical data to answer the research questions, so a quantitative approach was adopted.

Quantitative research can be dealt with mainly under two categories which are experimental and non-experimental studies. In this study, an experimental study was carried out due to its characteristics which are a), theory-driven research hypotheses, b) statistical equivalence of subjects in intervention and control and/or comparison groups, c) researcher controlled interventions independently and uniformly applied to all subjects, d) measurement of each dependent variable, e) use of inferential statistics, and f) rigorous control of conditions and extraneous variables" (McMillan & Schumacher, 2014, p. 278). Experimental studies are one of the most effective ways of gathering data when the target is determining a cause-effect relation. This study tried to determine the effect of mobile applications (independent variable) on vocabulary knowledge and learner autonomy (dependent variables) by applying an intervention.

The experimental studies can be categorized as true experimental designs, quasi-experimental designs and poor experimental designs (Fraenkel & Wallen, 2006). In true experimental designs, each of the participants is randomized to treatment while in quasi-

experimental designs the groups, not the individuals are assigned randomly. Quasi-experimental designs are used when a convenience sample is possible and the researcher has to use formed groups (Creswell, 2009). According to the Seliger and Shohamy (1989), quasi-experimental studies are carried out under conditions similar to those which are normally seen in educational contexts, which makes them more valid in terms of external validity. This study was quasi-experimental as it used existing groups and assigned them randomly while participant sampling. Among the quasi-experimental designs, this study was nonequivalent groups pretest-posttest control group design. In this design "the researcher uses intact, already established groups of subjects, gives a pretest, administers the treatment condition to one group, and gives the posttest" (McMillan & Schumacher, p. 273-274) (see Figure 12).
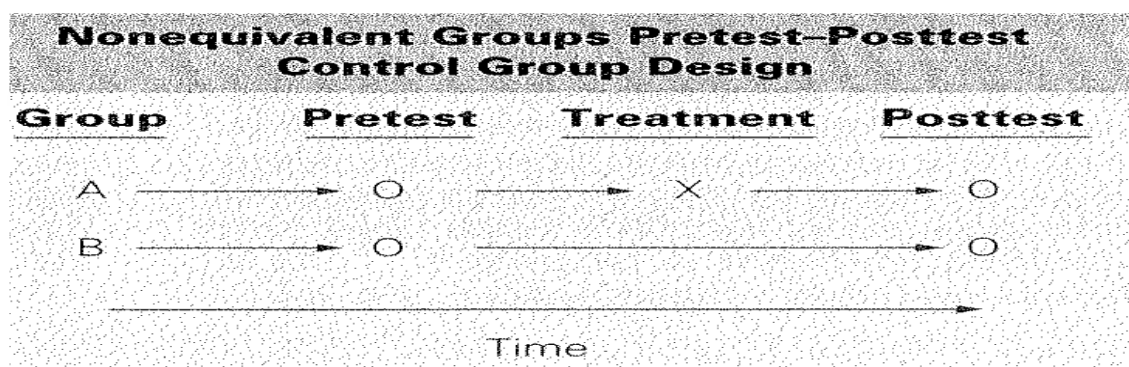
Figure 12. Nonequivalent groups pretest-posttest control group design (McMillan & Schumacher, 2006).

In this study, two pre-formed groups were used. One of these groups was taken from Gazi University and the other one was from Cumhuriyet University. In order to provide groups be intact, university students from two different universities were selected. The implementation required a self-study approach so any treatment that would be implemented by a researcher or practitioner was not conducted. Thus, there was not any problem related to selecting participants from two different universities. The selection of which university would be experimental group was decided based on random selection. Based on random selection, the experimental group consisted of students of ELT department in Cumhuriyet University while the control group was Gazi University. The experimental group used a mobile application in order to learn new words while the control group was given worksheets. The content of the worksheets and mobile application were the same. The researcher developed both the app and the worksheets. The duration of the experiment was 14 weeks.

Study Group

This study used a quasi-experimental design. As it is nearly impossible to conduct a true experimental design in education due to nature of the educational system, this one was

quasi-experimental. In quasi-experimental design, sampling is not fully random and randomization is done among the existing group. With random assignment, the experimental group was PELT receiving foreign language teacher education at Cumhuriyet University and the control group consisted of PELT at Gazi University. As diffusion of treatment is an important threat to internal validity and a mobile application would easily spread among the participants, two different universities were preferred in order to hinder a possible interaction among them.

The study took place in the spring semester of 2016/2017 academic year at Gazi University and Cumhuriyet University. The participants of this study were 73 university students. 36 of them were in the experimental group and 37 of them were in the control group.

The mean of age in the experimental group, consisting of mostly female students, was 20,43. Control group also consisted of mostly female students and the mean score of the age of the group was 19,33.

The profile of both groups was presented below:

Table 9. *Participants of Experimental Group*

		f
Gender	Female	25
	Male	11
	Total	36
Age	18-20	25
	21-26	6
	32	1
	Missing	4
	Total	36

Table 10. *Participants of Control Group*

		F
Gender	Female	28
	Male	9
	Total	37
Age	18-19	21
	20	13
	22	2
	Missing	1
	Total	37

Data Collection Tools

The data of the study were gathered through four different scales which were Collocation Achievement Test (CAT), Vocabulary Knowledge Scale (VKS), Mobile Learning Motivation Scale (MLMS) and Learner Autonomy Scale (LAS). Three scales were developed by the researcher except for the VKS. VKS, which was originally developed by Wesche & Paribakht (1996), was adapted based on the collocations used in the study. Two scales were used for the first research question which was on the effect of mobile application on vocabulary knowledge. Schmitt (1998) states that it is difficult to measure both receptive and productive vocabulary knowledge by paying balanced attention to both of them in a scale due to the fact that "beginning levels of a scale usually focus on receptive knowledge and the more advanced levels on production" (p. 285). Due to this difficulty two different scales, one of which focused on receptive vocabulary knowledge and the other one addressed productive vocabulary knowledge were used in this study. For the second research question, about the effect of mobile application on learner autonomy, LAS was used. Finally, in order to see the motivation level of mobile application users, MLMS was conducted. More detailed information about scales and the process of developing scales were addressed in the part of "Procedure".

Procedure

Before conducting treatment, it was required to develop CAT, LAS and MLMS and adapt VKS. Furthermore, CollocatApp for experimental group and worksheets for control group were designed. The process of making these necessary tools ready for the treatment was addressed here.

Collocation Achievement Test (CAT).

To see if there was any significant difference between receptive vocabulary knowledge of experimental and control groups, an achievement test which was used as both pre-test and post-test was developed by the researcher. Firstly, 42 multiple choice questions were written by the researcher. The questions were reviewed by 3 experts. With the opinions of the experts, 2 questions were removed and 5 questions were revised. Then, the 40 questions were piloted with 63 university students who were similar to the target group. Based on the results, 8 items were removed as their item discrimination levels were under .19. Thus, the final version of the test consisted of 32 questions. The item discrimination and difficulty levels of the remaining items were presented in Table 11. The K21 reliability of the test was found to be 0, 76.

Table 11. *Collocation Achievement Test*

Item	P	R
m02	.53	.13
m03	.22	.94
m05	.22	.30
m07	.33	.75
m08	.38	.43
m09	.39	.60
m10	.24	.49
m11	.37	.78
m12	.32	.29
m17	.28	.41
m18	.62	.13
m19	.55	.25
m20	.59	.27
m21	.68	.52
m22	.84	.14
m23	.29	.08
m24	.49	.46
m25	.35	.63
m26	.74	.17
m27	.54	.46
m28	.46	.41
m29	.22	.52
m30	.34	.73
m31	.41	.49
m32	.57	.27
m33	.41	.35
m34	.23	.40
m35	.42	.37
m36	.57	.11
m37	.61	.30
m38	.30	.79
m40	.52	.35

Vocabulary Knowledge Scale (VKS).

VKS, developed by Wesche and Paribakht (1996), is now probably one of the best-known instruments assessing both receptive and productive vocabulary development (Bruton, 2009).Wesche and Paribakht (1996) state that VKS is a depth test while Laufer and Goldstein (2004) point out that VKS is "an indirect test of word meaning" (p.403). By using VKS it was aimed to see if the learners learned the meanings of target collocations in this study. Moreover, as VKS requires learners to use target words in a sentence it addresses the productive vocabulary knowledge. In this study, both receptive and productive vocabulary knowledge were tried to be assessed. While Collocation Achievement Test was used for RVK, VKS was used with the aim of measuring PVK.VKS is a self-report instrument in which learners assess themselves by giving a number between 1 and 5. The meaning attributed to the numbers is as follows:

I. I don't remember having seen this word before.
II. I have seen this word before, but I don't know what it means.
III. I have seen this word before, and I think it means _____ (synonym or translation).
IV. I know this word it means _____ (synonym or translation).
V. I can use this word in a sentence: _____. (Write a sentence)

As this scale has the characteristics of self-report, the researcher evaluated the answers of participants based on the VKS scoring of Wesche and Paribakht (1996) Inter-reliability of researchers' evaluations was tried to be provided through another rater. Thus, two raters scored pretests and posttests of experimental and control groups based on the VKS scoring (see Figure 13). After seeing that the reliability between raters was high (see Part 4/Findings), the analysis was done by taking averages of the raters.

The VKS scoring proposed by Wesche and Paribakht (1996) is different from the scoring of the scale participants. If the participants know the meaning of the word and write a sentence, they mark "V". However, if the meaning is wrong the option of "II" is given by raters. If the word is not used semantically appropriate, then the option of "III" is given. If the sentence including target word is semantically appropriate but not grammatically appropriate, then "IV" is marked by raters. The option of "V" is given only when the meaning of the word is true and the sentence is both semantically and grammatically appropriate. The raters in this study made the evaluations based on this scoring.
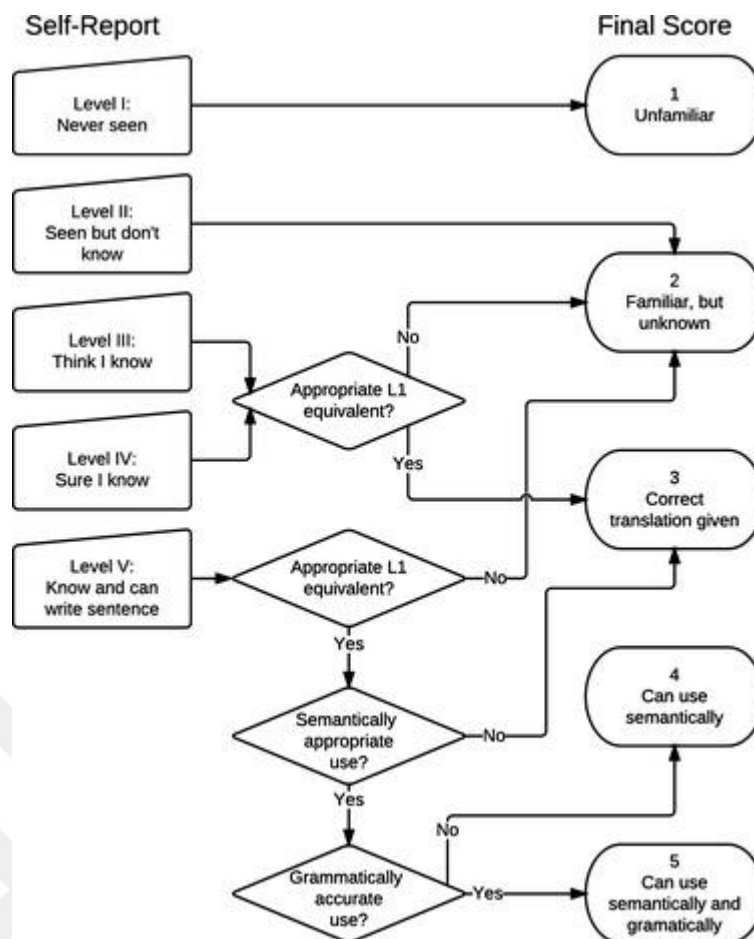
Figure 13. Flowchart of VKS scoring.

Mobile Learning Motivation Scale (MLMS).

There are some scales trying to measure motivation towards technological devices in education such as Instructional Technology and Material Development Scale/ITMDS (Beydogan, 2011), Instructional Material Motivation Scale/IMMS (Keller, 1987), Motivation and Self-regulation towards Technology Learning/MSRTL (Liou & Kuo, 2014). However, as each technological device has different characteristics, these scales may not be appropriate for each measurement. Mobile devices accordingly mobile learning has its own characteristics such as portability so the scales that are devised for other digital technology were not suitable for this study. Thus, there was a need to develop a new scale. For this, firstly the literature was reviewed and an item pool which had 46 items was formed by being inspired by Keller's (1987) Instructional Materials Motivation Survey and Gardner's (1985) The Attitude/Motivation Test Battery. This item pool was presented to 6 experts who were expert in language teaching, motivation and digital technologies for content validity. The expert opinion form was analyzed based on Lawshe (1975) content validity ratio. The CVR is calculated with the formula:

$$CvR = \frac{ne - N2}{N2}$$ n$_e$: number of experts stating that the item is "essential"

N: is the total number of experts

According to Lawshe (1975), when the number of experts is under 8, the CVR should be .99 and up. As the number of experts in this study is 6, "0.99" was taken as base, which means that all of the experts should state that the item is essential in order that item remains in the scale. As .99 is a very high level, 8 items were removed from the scale and the other items were revised based on expert opinions.

The remaining 38 items were shown to 8 English Language Teaching department students and the students were asked to read the items and say if there was an item difficult to understand. As all of the students stated that 2 items were unnecessary as they were very close to other existing items, these items were removed. Then, the items difficult to understand were revised.

At the fourth step, the scale was piloted with 213 participants who had education in English Language Teaching departments of both Atatürk and Cumhuriyet universities. Firstly, the mobile application was piloted with the students for one week and then the scale was handed in. The obtained data was analyzed with factor analysis (see Table 12). The Kaiser Meyer-Olkin score verified that the sampling was adequate for the analysis (KMO= .94). According to Field (2009), this score is "superb". In the exploratory factor analysis done to form a scale which measures most features with least items, the items whose factor load is under .30 and the interwoven items removed from the scale. The factor loads of 17 items seemed higher than .59 under one dimension. Based on the results, the scale finally consisted of 17 items with one dimension. The cumulative total variance explained of scale with one dimension was found to be % 48, 97, which is higher than the lower limit (.30). The Cronbach Alpha reliability of the scale was found to be .93.

Table 12. *Factor Analysis Results of Mobile Learning Motivation Scale*

Items	Factor Loadings
Item 1	.76
Item 2	.62
Item 3	.59
Item 4	.74
Item 5	.66
Item 6	.62
Item 7	.72

Table 12. *Factor Analysis Results of Mobile Learning Motivation Scale (Cont.)*

Item 8	.78
Item 9	.70
Item 10	.68
Item 11	.65
Item 12	.61
Item 13	.68
Item 14	.78
Item 15	.73
Item 16	.75
Item 17	.70

Learner Autonomy Scale (LAS).

Learner autonomy is one of the most related variables when the subject is self-study. As mobile learning is a self-study approach, it was aimed to see if there was any change in learners before and after treatment in terms of learner autonomy. To achieve this, a simple but useful autonomy scale was developed as the existing scales did not serve to the aim of this study. As developing, firstly the literature was reviewed, and the descriptors of Tassinari (2012) were benefited by getting permission. In the model of Tassinari (2012), there are 10 sub-dimensions which are interwoven. The same descriptor is seen under different dimension, which is not a preferred case in a scale. Thus, by minimizing the number of descriptors that would not be compatible with a scale, item pool consisting of 36 items was formed in a 5 points Likert scale format. These items were shown to 3 experts in the field and some amendments were made. Following expert opinions, the scale was applied to 106 ELT students in Cumhuriyet and Atatürk University. The data were analyzed with factor analysis. The Kaiser Meyer-Olkin score which was .83 verified the sampling adequacy. The results showed that the items were gathered mostly under one dimension. Thus, the scale was developed as with one dimension. In order that the scale includes one dimension, it is required that the cumulative score in total variance explained table should be above .30. This score was 44, 83 when the learner autonomy scale was assumed as one dimension. 11 items whose factor load was higher than .59 seemed under the same dimension (see Table 13). Thus, the final version of the scale consisted of 11 items with .87 reliability.

Table 13. *Factor Analysis Results of Learner Autonomy Scale*

Items	Factor Loadings
Item 1	.64
Item2	.75
Item 3	.62
Item 4	.72
Item 5	68
Item 6	.66
Item 7	.59
Item 8	.68
Item 9	.61
Item 10	.68
Item 11	.67

The corpus.

Before beginning the development of the mobile application, the collocations were chosen. As choosing the collocations, the collocations in "English Collocations in use: Advanced" book of Cambridge Publishing were used as a base by getting permission from Cambridge Publishing. As known, there are seven grammatical types of collocations. Of these types, verb+noun, adjective+ noun and noun+noun collocations are the ones mostly used. Thus, in order to form variety and teach the most needed types of collocation, collocations under these categories were included to the corpus. As forming corpus, the frequency of the collocations was searched in Corpus of Contemporary American English (COCA) and collocations between the scores of 40-1011 were included. Very high-scored collocations were not included lest the students would be familiar with them. The selected collocations and their frequency level (according to the COCA) were presented below.

Table 14. *The Corpus*

Types of collocations	Collocations	f
Verb+ Noun	get the message	582
	wreak havoc	491
	take issue with	410
	foot the bill	271
	break the news	220
	produce results	208

Table 14. *The Corpus (cont.)*

	pass judgment on	139
	disseminate information	125
	withdraw troops	123
	bring stability	100
	face the facts	91
	spell disaster	76
	restore peace	74
	give an account of	60
	give reason	50
Adjective+ Noun	infectious disease	927
	concerted effort	527
	tough question	316
	poor judgment	249
	premature death	247
	joint effort	173
	physical exertion	141
	empty promise	123
	modest increase	99
	considerable experience	89
	vain hope	71
	fragile peace	63
	uneasy truce	59
	opening gambit	46
	bold experiment	40
Noun + Noun	sigh of relief	1011
	sense of purpose	561
	glimmer of hope	288
	flurry of activity	172
	stroke of luck	160
	burst of energy	122
	clap of thunder	90
	sense of achievement	64
	thirst for knowledge	63

The development of the CollocatApp for experimental group.

There are lots of mobile applications focusing on teaching vocabulary. Some of them are only dictionary and some include different activities or games that appeal to learners. However, the applications which focus only collocations are limited. Besides, the existing ones are mostly dictionaries or include only matching activities. Thus, there was a need to develop a new application which would be used by the experiemental group.

After the corpus was determined, the design and content of the mobile application were prepared. The mobile application consisted of both dictionary and activities. As both receptive and productive skills are important in vocabulary learning, activities based on these skills were developed. The mobile application consisted of five sections which were Dictionary, True/False, Test, Writing, and Making Your Own Sentences (see Figure 14).
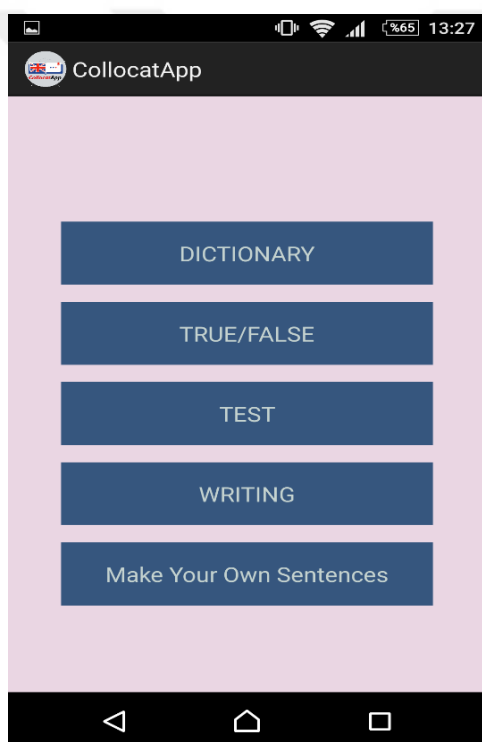
Figure 14. The activities.   *Figure 15.* Main page of the app.
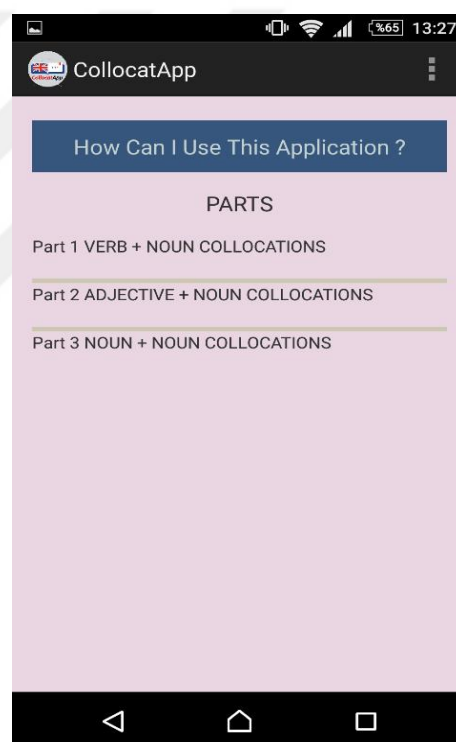
The sections of the True/False and Dictionary focused on the meaning of collocations. These sections addressed receptive vocabulary learning as there was no production (see Figure 16 and 17).
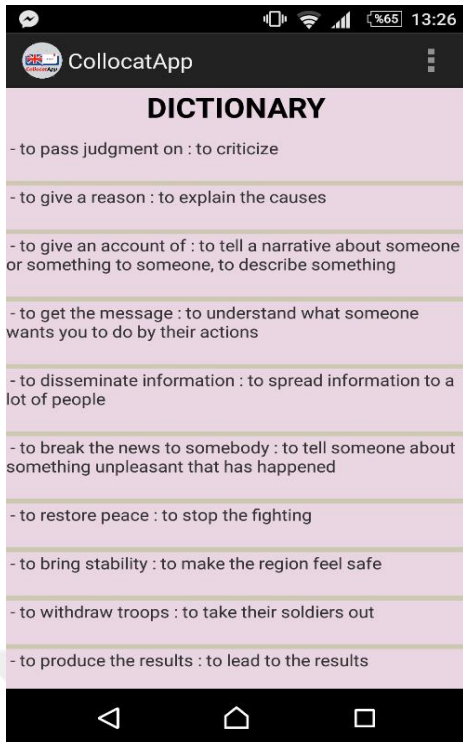
Figure 16. Dictionary.
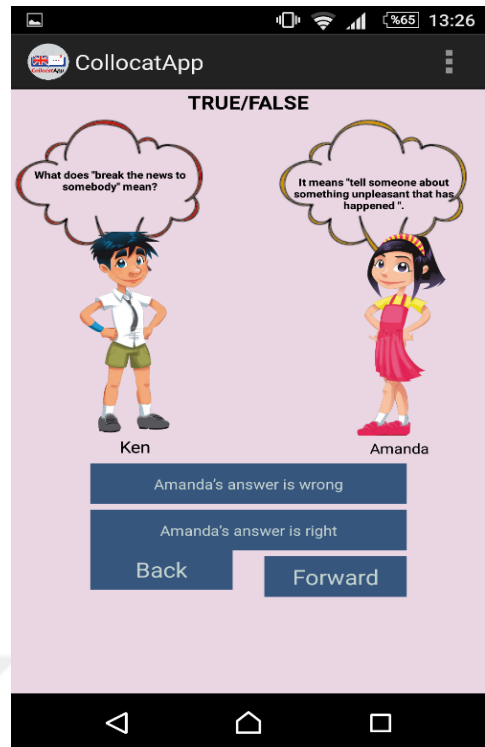
Figure 17. True/False.

The section of Writing focused on the sequence of the words. The sections of Test and Making Sentence focused on both meaning and sequence. While Test addressed receptive vocabulary knowledge, Writing and Making Your Own Sentences helped students to produce an outcome (see Figure 18, 19 and 20).
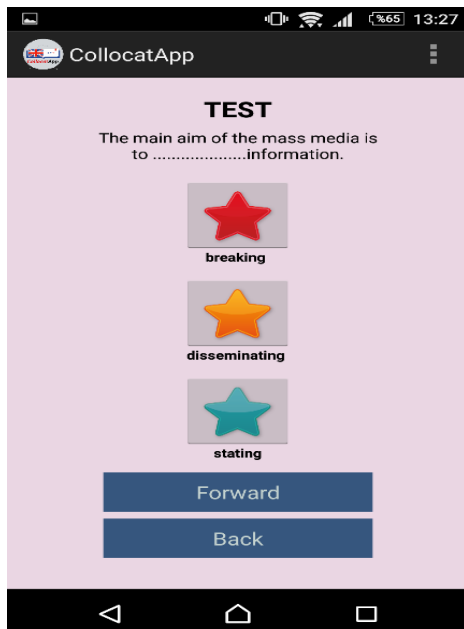
Figure 18. Test

Figure 19. Writing

As error correction is important in education, when the answer is wrong the learner was directly directed to dictionary to see the right meaning and sequence of the collocation. Another important feature of the app was the interactivity. Grounded on Interaction Hypothesis (Long, 1983), interactivity also added to the mobile applications. As to this hypothesis, meaningful negotiations are conducive to second language acquisition (Brandl, 2012). Many studies show that negotiation facilitates comprehension (Ellis, 2003). Thus, at the section of the making sentences, the learners both make their own sentences using the target words and give feedback on the sentences made by other users (see Figure 20). In order to provide this interactivity, user records were provided.
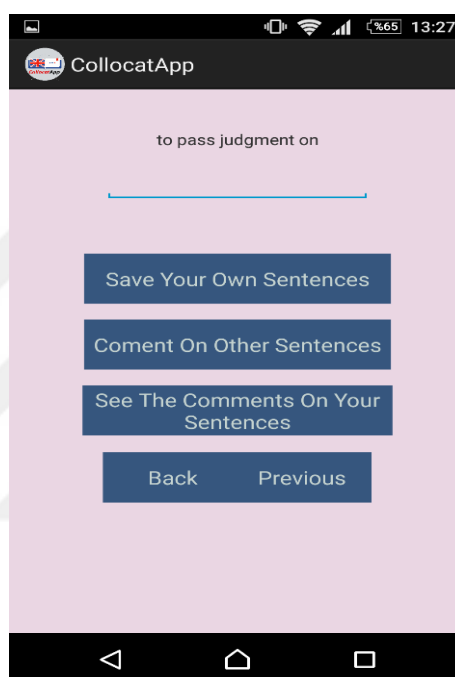
Figure 20. Make your own sentences.

Worksheets for control group.

Worksheets were designed by the researcher for the control group. The content of the worksheet was the same with mobile application. The same collocations and questions were used in the worksheets. The activities were also the same except for the last activity which requires interactivity. Interactivity is a technical feature so this activity was not included in the worksheets. These worksheets were grouped into three as in CollocatApp. Thus, there were three worksheets which were a) verb+ noun collocations, b) adjective+ noun collocations, and c) noun+noun collocations. These all worksheets were given together at the same time as in mobile application where learner reaches all parts and activities at the same time. A sample worksheet can be seen in Appendix E.

The treatment process.

After the preparation of scales, CollocatApp and worksheets; the treatment was launched at the second term of the 2016-2017 academic year. The treatment lasted during the spring semester with the tests. At first, CAT, VKS and LAS were applied to both experimental and control group as pretests. Then, the treatment which lasted 9 weeks was given. After the posttest, in 3 weeks treatment was not conducted for measuring the retention of the learned words. Then, the delayed tests were given. Thus, the whole implementation lasted for 14 weeks. During 9 weeks, the experimental group tried to learn collocations via CollocatApp. The researcher or any other lecturer did not intervene in the learning process, as mobile learning is a kind of self-study approach that is independent of any location or time. However, the researcher introduced how to use the application and asked if there was any problem with the application from time to time. While the experimental group was engaged in mobile application, the control group used worksheets consisting of same activities in the mobile application except for making sentences. Then, CAT, VKS and LAS were re-applied to both experimental and control group as posttests. Furthermore, MLMS was applied to the only experimental group to see if mobile learning motivated the learners. Three weeks later, CAT was applied to both experimental and control group as delayed test. The process can be summarized as follows:
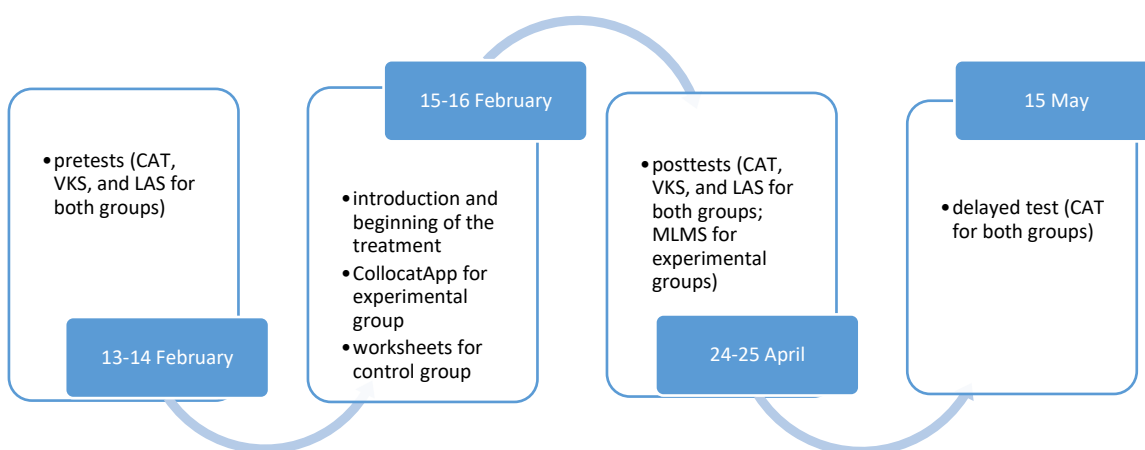
Figure 21. Treatment process.

Data Analysis

In order to analyze the quantitative data obtained from scales, SSPS 21 program was used. Both descriptive and inferential statistical tests were calculated. Before analyzing the data, firstly the normality of scales was tested in order to decide which test would be used. The normality of tests can be understood with different ways such as measures of central

tendency, level of kurtosis and Skewness, histogram, Q-Q plots, Kolmogrov-Siminov/ Shapiro-Wilks. As looking at these scores, one test can be regarded as normal if:

- Measures of central tendency (mean, median, mode) are equal or near to each other
- Kurtosis is the between -1 and + 2 (-1 <x<+2)
- Skewness is between -1 and +1 (-1 < x <+1)
- Significany is higher than 0,05 in Kolmogrov-Siminov/ Shapiro-Wilks (p>0,05)

In order to decide whether the tests would be parametric or nonparametric, the normality of tests was determined based on these criteria. Presenting all of these findings related to normality would not be possible and logical, the results of Shapiro-Wilks were presented. As the participants of the tests were under 50, Shapiro-Wilks was used (if n<50, Shapiro-Wilks should be used, Seçer, 2013).

Analysis of CAT.

This test was conducted three times as pretest, posttest and delayed test to both groups. The results of Shapiro-Wilks test can be seen in Table 15.

Table 15. *Shapiro Wilks Results of CAT's Results.*

	Statistics	df	p
Experimental Group Pretest	.961	33	.275
Experimental group Posttest	.943	35	.069
Experimental group delayed test	.952	35	.127
Control Group Pretest	.951	44	.058
Control Group Posttest	.912	36	.067
Control Group delayed test	.982	40	.746

The table shows that significance was higher than 0,05 in all tests, so parametric tests were preferred (p>0,05). Paired sample t-test, independent sample t-test and ANCOVA were conducted to analyze CAT data. The inter analysis of groups (e.g. pre and posttest of the control group) was done through paired sample t-test. ANCOVA was used based on the assumption that the groups were not equal in the pretests for analysis between groups (e.g. post-tests of control and experimental group). This assumption was supported by the results of independent sample t-test.

Analysis of VKS.

Normality.

The results of Shapiro-Wilks which was conducted to see the normality of VKS tests were presented below.

Table 16. *Shapiro Wilks Results of VKS's Results*

	Statistics	df	p
Experimental Group Pretest	.939	31	.075
Experimental group Posttest	.932	31	.049
Control Group Pretest	.981	29	.863
Control Group Posttest	.911	29	.018

The Table 16 shows that posttest scores did not indicate a normal scatter in control group (p<0,05). Thus, Man Whitney U and Wilcoxon Signed Rank tests were conducted to analyze the data. Although ANCOVA was used for analyzing CAT, it was not preferred for analyzing VKS as the scatter was not normal and the pretests of experimental and control groups did not show a significant difference.

Inter-reliability analysis.

In order to determine the inter-reliability between raters, analysis of Kappa and correlation were used. Together with Kappa analysis which shows the concordance between raters, the high correlation between raters is a sign of consistency. Kappa analysis, which was introduced by Cohen (1960), is a statistical analysis method determining the reliability on the concordance between raters. Kappa (K) Coefficient evaluation Criteria was presented below:

Table 17. *Kappa (κ) Coefficient Evaluation Criteria (Landis & Koch, 1977)*

Kappa(κ)	Meaning
< 0	Poor
0.0 — 0.20	Slight
0.21 — 0.40	Fair
0.41 — 0.60	Moderate
0.61 — 0.80	Substantial
0.81 — 1.00	Almost Perfect

For the pretest, the concordance between Rater 1 and Rater 2 was found to be significant (Kappa (κ) =0,622; p=0,000<0,05). The correlation between two raters in pretests was positive with the value of %98,6 (p=0,000<0,05).

For the posttest, the concordance between Rater 1 and Rater 2 was found to be significant (Kappa (κ) =0,640; p=0,000<0,05). The correlation between two raters in pretests was positive with the value of %99,9 (p=0,000<0,05).

Analysis of LAS.

The tests done to see whether the results of groups in Learner Autonomy Scale showed that the results did not scatter in a normal way in all tests (see Table 18). Thus, nonparametric tests were conducted to see the autonomy level of learners.

Table 18. *Shapiro Wilks Results of LAS*

	Statistics	**df**	**p**
Experimental Group Pretest	.960	78	.016
Experimental group Posttest	.853	73	.000
Control Group Pretest	.927	43	.010
Control Group Posttest	.806	37	.000

Comparison of pretest and posttest scores of groups was done through Wilcoxon Signed Ranks test. Besides, Mann-Whitney U test was used for seeing whether the posttest of groups differed from each other.

Analysis of MLMS.

The normality of motivation scale results was given in below tables. Both tables showed that the results scattered in a normal way, which lead parametric tests such as independent-sample t-test and ANOVA.

Table 19. *Shapiro-Wilks Results of MMLS' Results*

	Statistics	**df**	**P**
Experimental Group	.959	35	.210

Validity of the data

There are four types of validity in quantitative studies which are statistical conclusion validity, construct validity, internal validity and external validity. In order to provide external validity which represents the generabilizity of results, more participants were tried to be included in each group. For construct validity, which can be defined as measuring the

construct that was aimed to measure adequately, the definitions of the concepts were determined before the intervention. As mentioned in Chapter 1/ part Limitations, m-learning, learner autonomy and motivation have different definitions and vague concepts so one definition for each of them was based on this study. These definitions were given in Chapter 1. Secondly, for assessing vocabulary knowledge of learners two different scales were used to reduce the threats of mono-method bias. On the other hand, this was not possible for motivation and learner autonomy as the literature lacks these scales and researcher developed the ones used in this study. In order to provide statistical conclusion validity, the precautions of data collection instruments with high reliability, homogenous groups, larger sample and accurate analyses were tried to be realized.

The threats to internal validity and the precautions (based on the suggestions of Büyüköztürk et al., 2013) that were taken in this study were presented below:

Table 20. *Threats to Internal Validity and Precautions against Them*

Threat	Definition	Method of reducing threat used in this study
History	Threats of concurrent events.	Not applicable
Selection	Threats related to participant characteristics	Similar groups were tried to be found with same graders taking the same course with similar ages and genders.
Statistical Regression	Scores of extreme groups move closer to the mean	Random selection between groups was done.
Pretesting	Effect of the pretests on intervention results	ANCOVA was used as the same tests were used as pretest and posttest
Instrumentation	Effect of variations in measurement	The same tests were conducted to both group at the near time with the same duration
Attrition	Loss of participants	The larger group was tried to be included in the study.
Maturation	Natural and biological changes	Random selection between groups was done. The duration of the experiment was not so long that would lead to biological changes.
Diffusion of Intervention	The spread of the effect of the intervention	Students of different universities were selected to ban interaction between groups.
Experimenter Effects	Influence of the researcher on the results	As the approach is self-study, experimenter met the participants when only conducting tests. During this time, the researcher was objective to both groups.

Despite these precautions, there were some limitations of the study which was mentioned in Chapter 1.

Summary of the Chapter

This chapter gave information about the methodology of the study. A quasi-experimental research with 73 PELT in two state universities in Turkey was carried out. While experimental group used a mobile application control group used worksheets for learning collocation. The treatment lasted for 14 weeks. In order to measure the vocabulary knowledge of learners an achievement test developed by the researcher and VKS were used. For measuring learner autonomy and motivation, LAS and MMLS were developed by the researcher. CAT, VKS and LAS were used as pretests and posttests. Additionally, achievement test was also used as the delayed test for assessing learners' retention of targeted collocations. The data were analyzed with SPSS 21. Parametric tests such as paired sample t-test, independent sample t-test and ANCOVA were used for the test which scatters in a normal way. On the other hand, for the tests which did not show normal scatters, nonparametric tests such as Mann-Whitney U test and Wilcoxon Signed-Ranks test were used. The results of these tests were presented in the following section.

CHAPTER FOUR

Findings

In this chapter, the results of data analysis were presented. The findings were presented based on the order of research questions. Thus, it would be beneficial to remember the research questions of the study. The research questions of the study were that:

1. To what extent are mobile applications effective in improving PELT' vocabulary knowledge?
    a. To what extent are mobile applications effective in improving PELT' receptive vocabulary knowledge?
    b. To what extent are mobile applications effective in improving PELT' productive vocabulary knowledge?
2. To what extent are mobile applications effective in improving PELT' learner autonomy?
3. To what extent are the PELT motivated while using mobile applications for vocabulary learning?

In order to provide traceability and make reading easier, the graph in Figure 22 was designed. This figure reminds the research questions and shows the headings at this section.

Figure 22. Presentation of findings based on research questions.

The effect of mobile applications on vocabulary learning

The success of learners in learning collocation was measured with two scales which were VKS and CAT. The results of these two scales were analyzed independently and then the results were commented together in the part of Discussion.

Findings related to receptive vocabulary knowledge.

The data related to receptive vocabulary knowledge were obtained through CAT. The findings of this test were presented in this part.

Paired sample t-test results for CAT.

In order to see if there was difference between pretest and posttest of groups, paired sample t-test was used. The findings were presented in Table 21.

Table 21. *Paired Sample t-test Results for Experimental and Control Group in CAT*

Group	Test	N	$\overline{X}$	S	sd	t	p
Experimental	Pretest	33	15.15	.096	32	3.154	.009
	Posttest	33	28.31	.320			
Control	Pretest	36	26.94	2.61	35	2.009	.052
	Posttest	36	25.16	4.51			

According to Table 21, there was a significant difference (t $_{(32)}$ = 3.154, p<0.05) between the pretest scores ($\overline{X}$ =15.15) and the posttest scores of the experimental group ($\overline{X}$ =28.31). In other words, posttest scores were statistically higher than the pretest scores of this group. When the size of this effect was calculated, it was found that it was in high level (η2=0.77). Hence, it can be commented that use of mobile application was effective for learning collocations receptively. On the other hand, the difference between the scores of pretest ($\overline{X}$ =26.94) and posttest of the control group ($\overline{X}$ =25.16) was not significant (t $_{(35)}$ = 2.009, p<0.05). In other words, use of worksheets for learning collocations did not improve receptive vocabulary knowledge of language learners.

ANCOVA results for CAT.

Independent sample t-test was used in order to identify if there was a significant difference between the pretest scores of experimental and control group. The findings were presented below:

Table 22. *Independent Sample t-test Results for Pretests in CAT*

	N	$\overline{X}$	S	sd	T	P
Control G.	36	26.67	.247	75	-3.017	.000
Experimental.	33	15.15	.096			

The findings showed that there was a significant difference (t $_{(75)}$ = -3.017, p<0.05) between the pretests of the control group ($\overline{X}$ =26.67) and experimental group ($\overline{X}$ =15.15). Due to a significant difference, ANCOVA was used as ANCOVA eliminates the differences identified at pretest scores of experimental and control group at the beginning of the treatment in experimental studies (Seçer, 2013). The posttest scores of experimental and control groups were compared with controlling the pretest scores of both groups through ANCOVA. The findings were shown in Table 23.

Table 23. *Posttest Scores of Experimental and Control Groups*

Group	N	Mean	Corrected Mean
Control G.	36	25.16	21.75
Experimental	33	28.31	32.65

Table 23 showed that the uncontrolled mean scores of posttest were 25.16 for the control group and 28.31 for the experimental group. When the pretest scores were controlled, it was seen that there were changes in post-test scores. The controlled posttest mean score was 21.75 for the control group and 32.65 for the experimental group. The results of ANCOVA were presented below.

Table 24. *ANCOVA Results for Posttest Scores of Groups*

Source	Sum of squares	sd	Mean square	F	p
Pretest	.731	1	.731	-6.706	.012
Group	1.655	1	1.655	-15.179	.000
Error	7.417	68	.109		
Total (Corrected)	9.121	70			

Table 24 indicated that there was a significant difference between the posttest of both groups when the pretests were controlled F $_{(1-68)}$ = -15.179, p<0.05). In other words, posttest scores of the experimental group were found significantly higher than the posttest scores of the control group. The size of this effect was found to be η2=0, 18'dir.

Independent sample t-test results for retention in CAT.

Independent sample t-test was conducted with the aim of identifying the difference between the post-tests and delayed tests of groups. Table 25 showed the results of this analysis.

Table 25. *Independent Sample t-test Results for Experimental Group for Retention*

Group	Test	N	$\overline{X}$	S	sd	t	p
Experimental	Posttest	35	28.31	.347	34	1.373	.000
	Delayed test	35	21.02	1.092			
Control	Posttest	36	25.16	.708	35	1.344	.000
	Delayed test	36	21.40	.322			

It was observed that there was a significant difference between the posttest mean scores ($\overline{X}$=28.31) and delayed test mean scores ($\overline{X}$=21.02). The effect size was found to be medium (η2=0.32). This shows that the collocations learned by students were forgotten in three weeks.

A similar result to the experimental group was observed in control group. Table 25 indicated that there was a significant difference between the posttest ($\overline{X}$=25.16) and delayed test ($\overline{X}$=21.40). The effect size was found to be small (η2=0.23).

Findings related to productive vocabulary knowledge.

The data on PVK were obtained through VKS. The findings of this test were presented in this part.

Wilcoxon signed rank test results for VKS.

In order to see if there was any difference between the pretest and posttest scores of groups, Wilcoxon Signed Ranks test was carried out. The findings were presented below:

Table 26. *Wilcoxon Signed Rank test results for VKS*

Group	Test	N	Mean Ranks	Sum of Ranks	z	P
Experimental	Pretest	29	179.690	25.0	-4.164	.000
	posttest	29	215.552	410.0		
Control	Pretest	29	183.516	140.50	-1.893	.058
	posttest	29	196.807	324.50		

The findings showed that the increase in the posttest scores was significant (p=.000<0.05). In other words, use of mobile application affected learners' productive vocabulary knowledge positively. However, as to the Wilcoxon test, there was no significant difference between pretest and posttest scores of the control group (p=.058>0.05) meaning that use of worksheets did not improve learners' productive vocabulary knowledge.

Mann-Whitney U test results for VKS.

In order to see if there was any difference between the posttest scores of two groups Mann- Whitney U test was conducted after seeing that the there was no statistically significant difference between pretest mean scores of control and experimental groups (Mann-Whitney U=446.000; p=.959>0.05). The finding was presented in Table 27.

Table 27. *The Pretest and Posttest Scores of Groups Mann Whitney*

	Control		Experimental			
	$\overline{X}$	Ss	$\overline{X}$	Ss	MW	p
Pretest	183.516	37.003	179.690	21.706	446.000	.959
Posttest	196.807	42.874	215.552	39.087	318.500	.053

Table 27 indicated that posttest scores of groups did not indicate significant difference (Mann Whitney U=318.500; p=.053>0.05). In other words, using mobile applications did not differ from using worksheets for gaining productive vocabulary knowledge.

Findings related to Learner Autonomy

Wilcoxon-signed ranks results for LAS.

As the normality analysis done for LAS showed that the results were not normal, Wilcoxon-Signed Ranks test was conducted with the aim of observing the difference between the pretests and posttests of control and experimental groups in LAS whose findings were presented in Table 28.

Table 28. *Wilcoxon-Signed Ranks Results for the Control Group in LAS*

Groups	Tests	N	Mean Rank	Sum of Ranks	Z	p
Experimental	Pretest	36	36.31	581.00	-1.599	.110
	posttest	36	24.59	959.00		
Control	Pretest	37	42.23	3.95	-.472	.637
	posttest	37	40.68	8.20		

According to Table 28, there was no significant difference between pretest and posttest scores of the experimental group (Z=-1.599, p>0.05). Similarly, the findings showed that there was no significant difference between two tests (Z=-.472, p>0.05).

Mann- Whitney U test results for LAS.

The data gathered through LAS was analyzed with Mann-Whitney U to find out whether there was a significant difference between the posttest scores of control and experimental groups. The findings were shown in Table 29.

Table 29. *Mann-Whitney U for Pretests in LAS*

	Control		Experimental			
Test	**Mean Rank**	**Sum of ranks**	**Mean Rank**	**Sum of Ranks**	**U**	**p**
Pretest	57.15	2114.5	58.40	4555.5	1411.5	.850
Posttest	50.86	1882.0	215.552	4223.0	1179.0	.276

After seeing that there was no significant difference between groups (U=1411.5, p>0.05), Mann-Whitney U test was conducted. The test results showed that there was no significant difference between groups (U=1179.0, p>0.05). In other words, mobile application and worksheets had a similar impact on learner autonomy.

Findings related to Motivation

Descriptive statistics related to the first part of MLMS.

Level of use of mobile applications.

The questions of whether learners in experimental group used mobile applications in daily life and whether they used them for educational purposes were answered through descriptive statistics. The results were presented below.

Table 30. *Descriptive Statistics for use of Mobile Applications*

Use of mobile applications		**f**	**%**
Use of mobile applications	Yes	34	97.1
	No	1	2.9
	Total	35	100.0
Use of mobile applications for educational purposes	Yes	33	94.3
	No	2	5.7
	Total	35	100.0

Table 30 showed that the majority of learners use mobile applications. Among 35 participants, only 1 of them did not use mobile applications. The table shows that the participants in experimental group used mobile applications for educational purposes. There were only two students who do not use mobile applications for educational purposes. When this finding was reviewed with the first finding which indicated that there were 2 students did not use mobile applications, it was observed that only one of them used mobile application for purposes other than educational ones.

Frequency of use of mobile applications.

The findings of how often learners in experimental group used mobile applications were presented below.

Table 31. *Descriptive Statistics for Frequency of Using Mobile Applications*

Frequency of mobile applications usage	f	%
1-2 hours in a day	5	14.3
3-4 hours in a day	2	5.7
5 and more hours in a day	1	2.9
1-2 hours in a week	16	45.7
3-4 hours in a week	5	14.3
Other	5	14.3
Missing	1	2.9
Total	35	100.0

According to the table, the general tendency of use of mobile applications was 1-2 hours in a week. The percentage of learners who used mobile applications 1-2 hours in a day, 3-4 hours in a week and others were equal. 2 students use mobile applications 3-4 hours in a day. There was only one student who used mobile applications 5 and more hours in a day.

The areas where mobile applications are used.

The educational areas that learners use mobile applications were asked with an open ended question in MLMS. The answers were presented below:

Table 32. *Descriptive Statistics for the Areas Where Mobile Applications Used*

Areas	f	%
Foreign languages	1	2.9
Language	6	17.1
Linguistics	1	2.9
Vocabulary	13	37.1
Vocabulary-listening	3	8.6
vocabulary-grammar	1	2.9
vocabulary-reading-listening	1	2.9
vocabulary-reading	1	2.9
Dictionary	3	8.6
dictionary-general	1	2.9
dictionary-chat	1	2,9
dictionary-writing	1	2,9
speaking-listening	1	2.9
Missing	1	2.9
Total	35	100.0

Table 32 shows that all of the learners used mobile applications for learning a language. Among them, the majority used mobile applications for learning vocabulary. The other fields of language reading, listening, grammar, speaking and writing were also preferred as studying with mobile applications. On the other hand, there was no student who used mobile applications specifically for pronunciation.

The descriptive statistics on the motivation level of the experimental group.

Item-based analysis of MLMS was presented below.

Table 33. *Descriptive Statistics related to MLMS*

	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		$\overline{X}$	sd
	f	%	f	%	f	%	f	%	f	%		
Mobil uygulamayı kullanmaktan zevk aldım.	1	2.9	1	2.9	10	28.6	18	51.4	4	11.4	3.68	.843
Mobil uygulama üzerinde çalıştıkça içeriği öğreneceğime dair inancım arttı.	0	0	1	2.9	6	17.1	23	65.7	4	11.4	3.88	.640
Mobil uygulamada merak uyandıran şeyler vardı.	0	0	4	11.4	11	31.4	17	48.6	2	5.7	3.50	.788
Mobil uygulamada yer alan etkinlikleri tamamladığımda kendimi başarılı hissettim.	0	0	3	8.6	3	8.6	22	62.9	7	20	3.94	.802
Etkinliklere verilen geri dönütler çalışmalarımın karşılığını aldığım hissini arttırdı.	0	0	4	11.4	10	28.6	18	51.4	3	8.6	3.57	.815
Mobil uygulamadaki etkinlik çeşitliliği öğrenmeye olan ilgimin devamlılığını sağladı.	0	0	3	8.6	9	25.7	20	57.1	3	8.6	3.66	.765
Mobil uygulamanın zaman ve mekân sınırlaması olmaması çalışma isteğimi artırdı.	0	0	3	8.6	7	20	19	54.3	6	17.1	3.80	.833
Mobil uygulamadaki etkinlikleri başarılı bir şekilde tamamlamak öğrenme hevesimi arttırdı.	0	0	5	14.3	5	14.3	21	60	4	11.4	3.69	.867
Mobil uygulama ile istediğim hızda çalışabildiğimden mobil uygulama ile öğrenmeye devam etmek istedim.	1	2.9	4	11.4	11	31.4	15	42.9	4	11.4	3.49	.951
İçeriğin organizasyonu uygulamada aktarılanları öğreneceğime dair olan inancımı arttırdı.	0	0	5	14.3	9	25.7	19	54.3	2	5.7	3.51	.818
Mobil uygulamanın dikkat çekici bir materyal olduğunu düşündüm.	0	0	3	8.6	9	25.7	19	54.3	4	11.4	3.69	.796
Mobil uygulamada aktarılanlar öğrenme ihtiyacımı karşıladı.	0	0	2	5.7	12	34.3	19	54.3	2	5.7	3.60	.695
Mobil uygulama ile yeni bilgiler öğrendim.	0	0	1	2.9	3	8.6	25	71.4	6	17.1	4.03	.618
Mobil uygulama içerisindeki etkinlikleri yapmak eğlenceliydi.	0	0	3	8.6	9	25.7	19	54.3	4	11.4	3.69	.796
Mobil uygulamanın içeriğinin niteliği dikkatimin devamlılığını sağladı.	0	0	3	8.6	10	28.6	20	57.1	2	5.7	3.60	.736
Mobil uygulama ile iyi öğrendim.	0	0	2	5.7	8	22.9	21	60	4	11.4	3.77	.731
Mobil uygulamanın içinde yer alan alıştırmaları başarılı bir şekilde tamamlamak benim için önemliydi.	1	2.9	5	14.3	7	20	17	48.6	5	14.3	3.57	1.008

It can be seen from the table that the mean score of items was high. The choice of "strongly disagree" was not marked in 13 items. The highest frequencies and percentages could be seen in the choice of "Agree". According to Table 34, the highest mean score was related to the contribution of mobile applications to learning. 25 of 35 students believed that they gained new knowledge thanks to mobile applications. Only one student disagreed with this situation and 3 of them hesitated. The second highest mean score showed that students felt successful when they completed the activities in mobile applications. 29 students felt this success while 3 of them did not believe so and 3 of them were neutral. The third highest mean score was observed in Item 2 which was "My belief that I could learn the content increased as I studied with mobile applications." 27 students agreed /strongly agreed that mobile applications made them believe in learning the target subject. On the other hand, 1 student did not believe that mobile applications increased his/her belief that s/he could learn and 6 of students were neutral. The lowest mean score can be seen in Item 9 which was "I wanted to continue to learn with mobile applications as I can study as to my own speed". 4 of students strongly agreed and 15 of them agreed on this item. 11 of them were neutral.

The motivation levels of learners were evaluated also based on the Lickert scale measurement suggestions of Kırcaali İftar (1999). Based on this suggestion, the table below was formed.

Table 34. *Limits and Levels related to Options*

Options	Limits	Levels
Strongly disagree (1)	1.00-1.80	Low Level
Disagree (2)	1.81-2.60	
Neutral (3)	2.61- 3.40	Medium Level
Agree (4)	3.41-4.20	High Level
Strongly agree (5)	4.21-5.00	

As determining the level of motivation of an experimental group, firstly, upper and lower limits of choices were identified as to the interval factor (4/5=0,80) which was calculated for each interval (5-1=4) based on the assumption of intervals are equal. Then, these ratings were gathered under three levels with the aim of interpreting data which were obtained through the opinions of learners in the motivation scale and identifying in which level the means were. These levels were high, medium and low. As Table 35 shows that the choice of "strongly disagree" and "disagree" were in a low level, "neutral" was in medium level, and "agree" and "strongly agree" were in high level. Based on this categorization, the findings of Mobile Learning Motivation Scale were presented below:

Table 35. *Descriptive Statistics on the Motivation Level of Experimental Group*

	Low Level		Medium Level		High Level	
	f	%	f	%	f	%
MLMS	1	2.9	9	25.7	25	71.4

The table shows that one participant was found to be in low level (% 2,9), 9 participants (% 25,7) were found to be in medium level and 25 participants were found to be in high level (% 71,4).

Results of independent sample t-test related to use of mobile technologies.

Independent sample t-test was conducted in order to see if there was a difference in terms of using mobile technologies in mobile learning motivation level of participants. The results of this analysis were presented in the following table.

Table 36. *Findings of t-test on the Variable of use of Mobile*

Scale	Use of m-devices	N	$\overline{X}$	S	Sd	t	p
MLMS	Yes	33	63.36	8.648			
	No	2	51.02	15.597	33	1.895	0.06

From the table, it is seen that the mean score of learners who use mobile applications was 63,36 (S=8,64) while this score was 51,02 (S=15,59) for the learners who do not use mobile applications. In this regard, although there was a small difference between the mean scores of both groups, this difference was not statistically significant (t $_{(33)}$ =1,895, p>0,05).

ANOVA results based on the variable of the frequency of mobile applications usage.

ANOVA (One-way factor analysis) was conducted with the aim of identifying if the frequency of mobile applications usage was a factor in the level of learners' motivation. The results were presented in Table 37.

Table 37. *ANOVA results Based on the Variable of the Frequency of Mobile Applications Usage*

Scale		Sum of Squares	df	Mean Square	f	p
MLMS	Between groups	475.061	5	95.012	1.385	.260
	Ingroups	1920.228	28	68.580		
	Total	2395.289	33			

Based on Table 37, it was seen that the mean scores of learners who use mobile applications a) 1-2 hours in a day was 62,80 (S=9,25), b) 3-4 hours in a day is 62,00 (S=18,38), c) 5 hours and more in a day was 71,00, d) 1-2 hours in a week is 63,81 (S=7,11), e) other was 56,00 (S=10,72). In this regard, no significant differences were found between the level of motivation of the learners and their frequency of mobile applications use ($F_{(5-28)}$ =1,385, p>0,05).

Summary of the Chapter

This chapter presented the results of data analysis with tables. The analysis showed that experimental group achieved more than the control group in tests measuring RVK. However, the groups did not differ in terms of PVK. Besides, neither mobile application nor worksheets did have any effect on learners' autonomy. Finally, the experimental group was motivated towards the use of mobile applications in language learning. These findings were discussed in relation to literature in the next chapter.

CHAPTER FIVE

Discussion and Conclusion

Discussion of the Findings

To what extent are mobile applications effective in improving PELT' vocabulary knowledge?

Both receptive and productive vocabulary knowledge is essential to linguistic ability. Hence, both of them were tried to be improved through CollocatApp and then measured through CAT and VKS in this study. The findings of CAT showed that the use of mobile application affected receptive vocabulary knowledge of language learners positively for short term memory. On the other hand, use of worksheets did not have an effect on receptive vocabulary knowledge of learners. When the groups were compared, it was seen that the participants of the experimental group were more successful than the control group in posttests. This finding was parallel with other research studies that use different features and tools of mobile technology such as SMS, mobile applications, and other mobile systems generated by the researchers. Studies of Liu and Chen (2014), Başoğlu and Akdemir (2010), Rahimi and Miri (2014), Wu (2015), Zhang et al. (2011), Lu (2008) and Saran et al. (2012) also showed that experimental groups using mobile technologies got higher scores in the posttest than control groups who studied vocabulary based on paper.

When the results of posttests and delayed tests were commented together it was concluded that using mobile technologies was an effective way of learning vocabulary receptively but for only short term memory as the same affect was not found in delayed test. The findings showed that in both groups there were significant differences between posttest and delayed test in a negative way. Reinforcement in terms of continual review is required in order to store the vocabulary in long term memory (Bornstein, n.d.). However, there was no use of mobile application and worksheets during 3 weeks accordingly there was no repetition which is important for vocabulary learning. Thus, there were problems in retention of learned collocations for both groups. When the effect size of groups was compared it was observed that forgetting was less in control group than experimental group. The findings of this study about the retention of words were parallel with the findings of some studies while it was vice versa for some other studies. For example, the studies of Zhang et al. (2011) and Lu (2008) showed that mobile technology was effective in learning vocabulary but not in retention of these words. On the other hand in the study of Alemi et al. (2012) experimental group using

m-technology achieved higher scores in the delayed test than control group while there was no difference between two groups in terms of posttest scores. Saran et al. (2012) also concluded that mobile technology was effective in the retention of words. However, the experimental group of that study achieved more in also in posttest than control group.

Although the contents and activities of mobile application given to experimental group and worksheets given to control group were the same, experimental group achieved more for receptive vocabulary knowledge for short term memory. The reason for this may be due to the characteristics of mobile application which are visuality, feasibility, interactivity and immediate feedback. Technology provides many auditory and visual elements to learners. Besides, CollocatApp has the features of input, interaction and feedback which are three main benefits of mobile technologies (Jee, 2011). Another feature of CollocatApp that differentiated it from worksheets was its feasibility. The students may not want to carry their worksheets continuously with them, but it is clear that in the era of technology, especially the young carry their smartphones with them. Thus, they have the opportunity of studying anywhere at any time. This place may be a queue or a bus where learners can deal with their m-technology to pass the time. As the activities on mobile applications are like games, or many applications include games this boring time gets funny. Another feature of CollocatApp was interactivity which enabled learners to give feedback to the other users. This feature enabled students to see other users' sentences, which is important in terms of seeing many linguistic examples. The users commented on those sentences about if they were wrong or true, which requires a more advanced level of learning. Lastly, the app involves automatic feedback in the first three parts which provided immediate feedback to the learners. Immediate feedback is important as it enhances learning and corrects the first wrong responses (Epstein et al., 2002). Titova and Samoylenko (2017) also found that immediate feedback which was given through PeLE (a mobile-testing system) was quite supportive and encouraging in terms of learning.

On the contrary to the findings of RVK, the groups did not show a significant difference in PVK. The posttest of the experimental group was significantly higher than its pretest whereas there was no difference in both tests in the control group. The participants using mobile applications achieved higher scores in their posttest. On the other hand, control group using papers did not show improvement in their posttest. Despite this finding, both groups were statistically the same in posttests when they were compared. The effect that was seen in the experimental group was not so high that it would reflect on Mann Whitney U test which was done to see the difference between groups.

When the results of CAT and VKS were commented together, it was concluded that use of mobile application was more effective for RVK for short term memory. The CollocatApp included activities both for receptive and productive vocabulary knowledge. Nevertheless, PVK and RVK analysis showed significant difference for the experimental group while this difference was not seen in the control group. The reason can be that the users of mobile application may focus on more receptive activities. However, as there was no record of which activities the learners dealt with more it was not right to defend this prediction. Moreover, gaining productive vocabulary knowledge may take more time than gaining receptive vocabulary knowledge. Webb (2008) mentions four problems about measuring RVK and PVK by addressing Vocabulary Levels Test (VLT) used for measuring receptive vocabulary knowledge and Productive Vocabulary Levels Test (PVLT) used for productive vocabulary knowledge. The first one is that while VLT has %17 chance of guessing the word correctly, in PVLT guessing is not possible or there has been very little chance, which leads that the scores in VLT may be higher than PVLT. The second problem is about the format of the tests; VLT is in the format of recognition while PVLT is a recall test. Thirdly, whereas it is enough to know the meaning and form of the word for passing VLT, learners should also know the grammatical functions of the words in order to pass PVLT. Finally, PVLT can also be regarded as a test that measures receptive vocabulary knowledge. It is so difficult to make a strict discrimination between the tests as the difference between receptive vocabulary knowledge and productive vocabulary knowledge is not clear. As Schmitt (2014) states "the exact nature of lexical knowledge has always perplexed researchers and teachers" (p. 913).

While the findings of this study supported some of the similar studies in literature, they contradicted with some other ones. There are many kinds of m-learning and these tools such as SMS or mobile application or other systems developed by the researcher are different from each other as they have different technical features. Moreover, as m-learning is learning anytime and anywhere, the time and place which are crucial factors in learning differ significantly from each other. Thus, it was difficult to get the same findings on the effectiveness of m-learning from the research studies.

To what extent are mobile applications effective in improving PELT' learner autonomy?

According to Benson (2011), there are six different approaches towards fostering learning autonomy: resource-based, technology-based, learner-based, classroom-based, curriculum-based and teacher-based approaches. In this study, the technology-based approach

was included in the study and its effect on learner autonomy was researched. The analysis that was done to see this impact of mobile application on learner autonomy showed that mobile application did not affect the autonomy of the learners. Similarly, use of worksheet had no effect on the autonomy level of learners. As a self-learning tool, it was expected that use of mobile applications had a positive effect on the autonomy level of learners. However, the results of the data analysis did not support this expectation. The finding of this study was parallel with the study of Sato et al. 2005. They also found that experimental group which used Quizlet in their smartphones did not differ from control group that learned target words with paper list in learner autonomy survey. On the other hand, Leis et al. (2015) and Ardi (2017) found that use of smartphones promoted learner autonomy by providing learners to control their own learning. MALL was beneficial to promote learner autonomy of secondary stage students also in the study of Gaber (2015).

In this study, both control and experimental groups did not see any effect of the treatment on their learner autonomy level. The reason of this finding may be the duration of the treatment. It is difficult to have an impact on affective behaviors. Much time is required to change them. Being one of these affective behaviors, autonomy does not change in an easy and fast way. It requires time. As Little (2004) stated, "our capacity for autonomous learning gradually expands as our knowledge and skill expand" (p.106). The knowledge and skill refer to the content of learning and the process of planning, monitoring and evaluation (Little, 2004). Thus, developing learner autonomy is a process that 'gradually' improves. Besides, it has phases of awareness, involvement, intervention, creation, transcendence (Nunan, 1997). Moreover, autonomy is a general affective behavior which the learners start to develop when they first begin their academic life. Thus, being an autonomous learner is a long process. In this study, the duration was 9 weeks (except for the applications of the pretests and posttests). This duration can be an insufficient time to make changes on the autonomous behaviors of learners.

According to Nunez (2018), if two important things are not achieved, MALL will not be beneficial for fostering learner autonomy. Firstly, teachers should give up their role of instructor. Secondly, students should give up being passive and be aware of the benefits of MALL. Although the first condition was met in this study, it was not known if the second condition was met as learners' awareness of MALL was not measured. Moreover, the frequency of using m-technology is important to meet these conditions but it was seen that most of the participants used mobile applications 1-2 hours in a week according to the MLMS results. This frequency shows a limited use of mobile application. Limited use of m-

technology will not foster learner autonomy as it will only serve to get knowledge of the target language (Djoub, 2015), which is compatible with the findings of this study partially.

To what extent are the PELT' motivated while using mobile applications for vocabulary learning?

Language learning is a complex process which includes many different variables. There are some direct and important factors in English learning such as motivation, attitude, interests, age, methods, will and character apart from the factor of intelligence (Kong, 2009). By taking these factors into consideration, a more effective and fast way of language learning can be achieved. One of the most important of these factors is, in an indisputable way, motivation. Thus, the dimension of motivation was included in this study.

The survey that was designed to get the opinions of learners' about the mobile learning motivation indicated learners believed that they learned and they would learn through mobile application. M-learning could more easily involve students in the learning process (Wang et al., 2009). The learners also think that mobile application made them feel successful as they were engaged in the activities in the app. It was concluded that the motivation level of the learners using mobile application was found to be at a high level. Learning with m-technology is motivating for learners who are full time engaged with technology. This finding is compatible with some other survey studies such as the ones belonging to Danesh and Amiri (2015), Olasina (2012) and Asplund (2014) who found that the motivation levels of learners learning through m-learning were high. Olasina (2012) found that 78% of the learners was motivated to study in the courses where m-learning and e-learning devices were used. On the other hand, this level was neither high nor low in the study of Lawrence (2015).

The findings of this study contradict with some experimental studies. The experimental studies of Lin et al. (2014) and Rau et al. (2008) indicated that there was no significant difference between experimental and control group in terms of their motivation levels. While survey studies show that m-learning increases motivation of learners, experimental studies in literature does not support that finding.

On contrary to the expectations, ANOVA results showed that use of mobile technologies and mobile application usage frequency were not significant variables for mobile learning motivation in this study. It was expected that use of mobile technologies would create a difference in terms of motivation. This expectation was not met in this study. However, there was only one student who did not use mobile applications. Besides, the number of participants was 35, which was not fully adequate for survey studies. Thus, it cannot be fully asserted that

the motivation level of ones using mobile application and the ones do not use are the same, and the frequency of mobile application usage does not differ in motivation.

Conclusion

Summary of the study.

Learning English as a foreign language experiences both advantages and disadvantages of rapidly developing technology like many other educational fields. Some disadvantages of CALL (Computer-Assisted Language Learning) and the new technology created the approach of MALL (Mobile-Assisted Language Learning). Having benefited from the effectiveness of using technology in education and from the also shortcomings of CALL such as forcing learner to be in a settled time and place, MALL has recently taken places in research studies and educational settings. Thus, this study concentrated on MALL to see if it was effective in teaching collocation and in learner autonomy. The study also aimed to determine the motivation level of learners using m-technology. To achieve this aim, a quasi-experimental design was carried out in this study. Consisting of total 73 students of English Language Teaching Department, the study had an experimental group using a mobile application called "CollocatApp" and a control group using the worksheet to learn 40 collocations. CollocatApp and the worksheets which were designed by the researchers were used for 9 weeks by the participants. The total duration of study took 14 weeks.

The content of the applications and worksheets were the same and it was designed by the researcher. 40 collocations were selected from the book of "English Collocations in use: Advanced". While choosing the collocations, three types of collocations which were more common were chosen: verb+noun, non+noun and adjective+noun. The frequency of collocations was searched in COCA. The collocations in the interval between 40 and 1011 were selected as the most common ones would be known by the students and the least common ones would not be beneficial for the students. While designing activities it was considered that activities for RVK and PVK be included in the application and worksheets. Thus, five parts consisting of three receptive and two productive activities were prepared. For the activities, immediate feedback and interactivity were added in applications.

The data were gathered through different scales.CAT, LAS and MLMS were developed by the researcher based on the scale development validity and reliability study. After the process of forming item pools, taking expert opinions, the first pilot, the second pilot and factor analysis, the scales were found to be reliable. At the final step, CAT consisted of

32 items with the value of .76 K21 reliability. The Cronbach Alpha value of MLMS consisting of 17 items was .93. Lastly, LAS had 11 items with the value of .87. VKS, CAT and LAS were given as pretest and posttest to both experimental and control group while MLMS was conducted only to the experimental group after treatment. In order to see the retention of learned vocabulary, CAT was re-conducted three weeks after posttest to both group.

While analyzing data, both descriptive and inferential statistics including both parametric and nonparametric tests were used. Nonparametric tests for analysis of VKS and LAS were preferred while parametric ones were conducted for MLMS and CAT based on the normality analysis.

The findings showed that mobile applications were more effective than worksheets for RVK. On the other hand, for PVK, there was no significant difference between two groups. Experimental group got higher scores in posttests than pretests. However, the findings of the control group showed that use of worksheets did not improve both RVK and PVK of learners.

This study also examined if the level of learner autonomy would change after using mobile applications. This research question was tried to be answered with LAS that was conducted to both the control and experimental groups before and after treatment. The findings showed that neither mobile application nor worksheets had an effect on learner autonomy level of learners. This finding was interpreted by taking the duration (9 weeks) of treatment into consideration.

The last dimension of the study was motivation. The participants of experimental group filled MLMS after posttests. The analysis showed positive findings. It was observed that the motivation level of learners was high and they were of opinion that they learned through mobile application.

Pedagogical implications.

This study studied the role of mobile applications in language learning and found positive results in terms of achievement and motivation. On the other hand, the results were not positive in terms of autonomy. These results led to some suggestions for educational policy makers, school administrators, teachers and learners.

Today, use of mobile technology during the course is forbidden in many schools. One of the reasons for this is that use of these devices may distract students 'attention to the course. Another reason is that the purpose of these devices is not clear, which can lead the misuse of these devices (Lyddon, 2016). On the other hand, many studies have indicated that

these devices are effective in the learning process. Thus, instead of banning these devices totally, an effective and a clear way of adapting this technology to the course should be found. At this point, policymakers, school administrators and teachers should work in collaboration as this situation cannot be dealt with only teachers. Mobile devices can be benefited in the learning process in its dosage. Thus, they will not distract and hinder the learning process but will help learners to learn.

The usage of mobile devices for educational purposes can be both at schools and home. Use of some mobile applications related to the course can be regarded as homework. Thus, the learner will do their homework anytime and anywhere they wish. Moreover, such homework will get more attention of the learners. Apart from the use of mobile devices outside the school, they can also be used in school during the lesson. Instead of asking language learner to carry heavy dictionaries, mobile dictionaries can be used during the course. Or various activities or games can be done during the course through mobile applications.

As adopting m-devices, some points should be paid attention. There are thousands of mobile applications so it is difficult to choose one. Although many of them can get the attraction of learners, their relevance to the course may be inadequate. Thus, the mobile applications may be a game only for fun. Hence, it is important to find the right application. Teachers should help learners at this point. Collecting information about mobile and computer literacy of students and regulating both learning process and applications as to the educational needs and abilities of students are the role of teacher (Czerska-Andrzejewska, 2016).

For learners, it is suggested that the learners search and find the most appropriate applications and use them whenever and wherever they are available in order to enhance their learning. Digital learners are good followers of mobile applications. The language learners can improve their linguistic abilities such as vocabulary knowledge through m-devices. They can utilize these devices in order to both develop personal communication resources that will be benefited for whole life and face daily language challenges (Kukulska-Hulme, Lee & Norris, 2017).

Further research.

Research shows that MALL is a promising and fertile field (Barcena et al., 2015). Thus, it is suggested that this promising field should be discovered more due to both its benefits to education system and the lack of the studies in the area. There are some studies on the role of m-learning in vocabulary knowledge and motivation. However, most of these

studies used SMS, MMS or e-mail. Mobil applications are different from these systems. Thus, it is suggested that the effect and role of m-learning on language learning process are investigated also through mobile applications which are very popular in recent years.

At the dimension of the motivation, the effect of m-learning on motivation was not researched in an experimental way in this study. The students were surveyed at the end of the treatment. Thus, experimental studies related to the effect of mobile applications on motivation can be conducted in order to see if they are really effective in motivation.

Lastly, the literature is lack of qualitative studies in terms of MALL. Thus, qualitative studies can be conducted in order to get opinions about the results that are obtained in quantitative studies.

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APPENDICES

APPENDIX-A. Vocabulary Knowledge Scale

Name- Surname:

VOCABULARY KNOWLEDGE SCALE

Look at the following list of words and give each one a number rating 1-5 based on how well you know the word.

Look at the VKS (Vocabulary Knowledge Scale) below:

1. I don't remember having seen this word before.

2. I have seen this word before, but I don't know what it means.

3. I have seen this word before and I think it means...

4. I know this word: it means...

5. I can use this word in a sentence, e.g., ...(Underline the target word in your sentence.)

Please have a look at the example.

Table (n)	4, 5 (This means that you both know the word and can use it in a sentence.)	Masa (You write the Turkish equivalent here.) A table is a tool used to eat or study at. (Your sample sentence here.)
eligible	3	Write the Turkish form here even though you are not sure of its meaning if you write "3" in the secon column.

English Word	1-5	Turkish Word/English Sentence
pass judgment on		
disseminate information		
give a reason		
break the news		
give an account		
foot the bill		
get the message		
bring stability		
withdraw troops		

restore peace		
face the facts		
take issue with		
produce the results		
spell disaster		
wreak havoc		
premature death		
infectious disease		
uneasy truce		
fragile peace		
physical exertion		
modest increase		
joint effort		
bold experiment		
concerted effort		
vain hope		
poor judgment		
tough questions		
opening gambit		
empty promises		
considerable experience		
sense of purpose		
sigh of relief		
burst of energy		
sense of achievement		
thirst for knowledge		
flurry of activity		
glimmer of hope		
source of income		
clap of thunder		
stroke of luck		

Wesche, M., and Paribakht, T. S. (1996). Assessing second language vocabulary knowledge: depth versus breadth. Canadian Modern Language Review, 53, 1-28.

APPENDIX-B. Collocation Achievement Test

COLLOCATION TEST

Dear test taker,

This test was designed to evaluate your knowledge of collocations. The results will be kept confidential and used only for research. Thanks in advance. Good luck.

Research Assistant Kübra OKUMUŞ

Name- Surname:

Please choose the option that correctly completes each sentence.

1) The lnternet is a powerful means of ………... information.

a) breaking c) disseminating

b) throwing d) extending

2) I asked why she didn't trust him but she couldn't …… me a reason.

a) give   b) take

c) state   d) make

3) Ralph had to………an account of his trip to the Maldives to her manager as she went there without informing him.

a) give c) express

b) tell d) take

4) He wasn't aware of how he broke my heart so I gave him a cold look. I hope he has …..……the message this time.

a) got c) forwarded

b) kept d) sent

5) At last the treaty has .... stability to the region.

a) imported c) produced

b) brought   d) fetched

6) In 2007, USA began to …………… its troops from Iraq.

a) back out c) withdraw

b) retract d) redesign

7) The aim of the ceasefire is to ………..……. peace.

a) restore   c) rest

b) return   d) review

8) You're never going to run in the Olympics. You should ....the facts.

a) face   c) confirm

b) ignore d) dismiss

9) I .... issue with some of the points made in the speech.
a) bring c) do
b) take d) make

10) As there was a/an………disease in the hospital, the hospital was quarantined.
a) rare c) streaming
b) infectious d) epidemic

11) The …………. truce came to an end when the rebels attacked the capital.
a) uneasy c) poor
b) effective d) uphill

12) There is a .... peace in the area but people hope it will soon strengthen.
a) stable c) fragile
b) weak d) strong

13) I'm very exhausted; I'm not used to so much physical …………………...
a) attempt c) sport
b) exertion d) injury

14) The workers demanded a/an ……… increase. I think the company had enough budget to meet that demand.
a) hard c) difficult
b) modest d) imaginary

15) I couldn't have done it on my own-it was truly a/an ....effort.
a) physical c) joint
b) applied d) multiple

16) He has no experience in managing. It will be ………………experiment to promote him to management.
a) courageous c) brave
b) bold d) appropriate

17) We made a/an ……….effort to meet all our deadlines this week, and we did it.
a) unnecessary c) reliable
b) reluctant d)concerted

18) He waited in the ……………hope that the Minister would meet him.
a) blank c) empty
b) thin d) vain

19) Drinking can lead to ....judgment and a risk of doing things that are regretted later.
a) poor c) loose
b) bit d) weak

20) They can ask some……….…. questions at your interview but you can take time to think before you answer.
a) dull c) tough
b) force d) powerful

21) "You are a teacher, aren't you?" was his ………….…… gambit.
a) opening   c) primal
b) fair   d) top

22) She is full of …………..…… promises. You shouldn't believe a word she says.
a) spare   c) null
b) clear   d) empty

23) I think I am appropriate for this job. I have ………………………experience in teaching to young learners.
a) open   c) large
b) considerable   d) thick

24) Kate has always had a very strong ……………….of purpose in her career.
a) sense   b) feeling
b) emotion   d) notion

25) Jane gave a .... of relief as she saw John step off the plane.
a) breath   c) sigh
b) air   d) tone

26) I had a sudden ……………..of energy so decided to clean the whole flat.
a) loss   c) flow
b) explosion   d) burst

27) You should have a great sense of ………… at having reached the last unit of the book.
a) achievement   c) goal
b) task   d) motive

28) She has a ……….for knowledge that; she uses the internet only for learning new things.
a) famine   c) thirst
b) dryness   d) flat

29) There was a/an ………………. of activity as the children fetched their paints.
a) excitement   c) flurry
b) thrill   d) anxiety

30) The company's figures are beginning to offer a ……….……… of hope.
a) glimmer   c) precious
b) variety   d) particle

31) The only ……………… of income of him was his student loan.
a) fund   c) root
b) source   d) origin

32) I had a ………… of luck and found Tom at home when I called. He's not usually there.
a) beat   c) pound
b) hick   d) stroke

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APPENDIX-C. Mobile Learning Motivation Scale

MOBİL ÖĞRENME MOTİVASYON ÖLÇEĞİ

Değerli katılımcı,

      Bu ölçek mobil öğrenmenin motivasyona etkisini değerlendirmek amacıyla geliştirilmiştir. Vereceğiniz cevaplar sadece araştırma amaçlı kullanılacak ve kimse ile paylaşılmayacaktır. Katılımınız için teşekkürler.

Arş. Gör. Kübra OKUMUŞ

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-Yaş:

-Cinsiyet: ( ) K   ( ) E

-Mobil uygulama kullanır mısınız?   ( )Evet ( )Hayır

-Mobil uygulamaları eğitsel amaçlı kullanır mısınız? ( )Evet: ( )Hayır

-Mobil uygulamaları eğitsel amaçlı kullanma sıklığınız nedir?

( )Günde 1-2 saat( )Günde 3-4 saat

( )Günde 5 saat ve fazlası( ) Haftada 1-2 saat

( ) Haftada 3-4 saat

( ) Diğer

-Mobil uygulamaları eğitsel amaçlı hangi alanlarda kullanırsınız?

…………………………………………………………………………………………………

……………………………………………………..

…………………………………………………………………………………………………

……………………………………………………..

…………………………………………………………………………………………………

……………………………………………………..

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1) Mobil uygulamayı kullanmaktan zevk aldım.	1	2	3	4	5
2) Mobil uygulama üzerinde çalıştıkça içeriği öğreneceğime dair inancım arttı.	1	2	3	4	5
3) Mobil uygulamada merak uyandıran şeyler vardı.	1	2	3	4	5
4) Mobil uygulamada yer alan etkinlikleri tamamladığımda kendimi başarılı hissettim.	1	2	3	4	5
5) Etkinliklere verilen geri dönütler çalışmalarımın karşılığını aldığım hissini arttırdı.	1	2	3	4	5
6) Mobil uygulamadaki etkinlik çeşitliliği öğrenmeye olan ilgimin devamlılığını sağladı.	1	2	3	4	5
7) Mobil uygulamanın zaman ve mekân sınırlaması olmaması çalışma isteğimi artırdı.	1	2	3	4	5
8) Mobil uygulamadaki etkinlikleri başarılı bir şekilde tamamlamak öğrenme hevesimi arttırdı.	1	2	3	4	5
9) Mobil uygulama ile istediğim hızda çalışabildiğimden mobil uygulama ile öğrenmeye devam etmek istedim.	1	2	3	4	5
10) İçeriğin organizasyonu uygulamada aktarılanları öğreneceğime dair olan inancımı arttırdı.	1	2	3	4	5
11) Mobil uygulamanın dikkat çekici bir materyal olduğunu düşündüm.	1	2	3	4	5
12) Mobil uygulamada aktarılanlar öğrenme ihtiyacımı karşıladı.	1	2	3	4	5
13) Mobil uygulama ile yeni bilgiler öğrendim.	1	2	3	4	5
14) Mobil uygulama içerisindeki etkinlikleri yapmak eğlenceliydi.	1	2	3	4	5
15) Mobil uygulamanın içeriğinin niteliği dikkatimin devamlılığını sağladı.	1	2	3	4	5
16) Mobil uygulama ile iyi öğrendim.	1	2	3	4	5
17) Mobil uygulamanın içinde yer alan alıştırmaları başarılı bir şekilde tamamlamak benim için önemliydi.	1	2	3	4	5

APPENDIX-D. Learner Autonomy Scale

LEARNER AUTONOMY SCALE

Dear participant,

This scale was designed to get an idea about learners' autonomy level. Your answers will be kept confidential and used for only research. Please try to answer all of the items by putting a cross on the option you believe. Thanks in advance for your cooperation.

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Name- Surname:

Age: Gender:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1) I can set myself goals.					
2) I know what I need to complete a task or to achieve a goal (for example the competencies, steps of a task and language tools).					
3) I can employ a variety of methods or strategies when learning.					
4) I can carry out my learning plan.					
5) I can reflect on materials and resources which I have used.					
6) I can reflect on methods and strategies which I have employed.					
7) I can reflect on my learning.					
8) I can evaluate materials and resources for language learning.					
9) I want to organize my own learning autonomously.					
10) I can motivate myself in a way that works for me.					
11) I can control my feelings when I am learning.					

VERB+NOUN COLLOCATIONS

PART A- DICTIONARY

<u>to pass judgment on</u>: to criticize

<u>to give a reason</u>: to explain the causes

<u>to give an account of</u>: to tell a narrative about someone or something to someone, to describe something

<u>get the message</u>: to understand what someone wants you to do by their actions

<u>to disseminate information</u>: to spread information to a lot of people

<u>to break the news to somebo</u>dy: to tell someone about something unpleasant that has happened

<u>to restore peace</u>: stop the fighting

<u>to bring stability</u>: make the region feel safe

<u>to withdraw troops</u>: take their soldiers out

<u>to produce the results</u>: lead to the results

<u>to wreak havoc</u>: cause a lot of damage

<u>to spell disaster</u>: cause serious problems

<u>to face (up to) the facts</u>: to accept the reality

<u>to foot the bill</u>: to pay

<u>to take issue with</u>: to disagree with

PART B- TRUE/FALSE

1) pass judgment on= criticize   …………….

2) give a reason=state the aim of a task   …………….

3) give an account of= pay the bill   ..………….

4) get the message=understand what someone wants you to do by their actions ..……..…...

5) disseminate information= spread information to a lot of people   …………….

6) break the news to somebody= tell someone about something unpleasant that has happened
   ………………

7) withdraw troops= agreement to stop fighting starts from this time   …………….

8) bring stability= make the region feel safe   …………….

9) restore peace= a peace that could be destroyed   …………….

10) face the facts= to accept the reality   …………….

11)foot the bill= to pay   ……………..

12)take issue with= disagree with   ……………..

13)spell disaster= cause serious problems   ……………..

14)wreak havoc= cause to be no longer used   ……………...

15)produce the results= lead to the results   ……………..

PART C- WRITINGp--- judgment on

g—message

d---------- information

b---- the news

g--- a reason

g--- an account of

r------ peace

b---- stability

w------- troops

s---- disaster

p------ results

w---- havoc

f--- the bill

f--- the facts

t--- issue with

PART D- TEST

1) The main aim of the mass media is to ....information.

    a) breaking b) disseminating   c) stating

2) She asked why he didn't come to the party but he didn't .... her a reason.

    a) give b) sell c) declare

3) Did you ……............ news to him that his sister had a traffic accident?

    a)break b) notify c) protest

4) The speech …………………the message about the policy changes across.

   a) explained b) told c)got

5) The country agreed to ....their troops from the area.

   a) send b) bring c)withdraw

6) A powerful tornado .... havoc on the small village.

   a) breezed b) wreaked c) planted

7) She does not love you. It is time you .... the facts.

   a) mouth b) leg c) face

8) I take .... with some of the points made in the speech.

   a) issue b) deal c) subject

9) As I had no money, my friend had to .... the bill in the restaurant.

   a) foot b) shoulder c) head

10) Despite our all efforts, our studies didn' t ....the results we expect.

   a) prompt b) provoke c) produce

11) The strike could .... disaster for the country.

   a) spell b) render c) plant

12) Don't .... judgment on the exhibit until you've seen it for yourself.

   a) transform b) take c) pass

13) After the rebellion, many efforts were done in order to .... peace in the area.

   a) remain b) restore c) reflect

14) In his lecture, Ralph …………….. an account of his trip to the Maldives.

   a) speeded b) imparted c) gave

15) Many treaties were signed in order to ....stability to the area after war.

a) bring b) disband c) lift

CURRICULUM VITAE

The author was born in Erzincan in 1989. She completed her primary and secondary education in her hometown. She graduated from Erzincan Anatolian Teacher High School in 2007. In the same year, she attended the English Language Teaching Department at Gazi University and graduated from there in 2011. She did her MA in again ELT but this time in Atatürk University between 2012 and 2014. She started her PhD at the same year, field and university. She holds also a BA degree in International Relations in Anadolu University. During these years, she firstly worked as an English language teacher in Erzurum from 2011 to 2013. Then, she worked as research assistant at Atatürk University between 2013 and 2016. Now, she is a research assistant in Sivas Cumhuriyet University.