EXPLORING THE USE OF MOBILE PHONES FOR SUPPORTING ENGLISH LANGUAGE LEARNERS' VOCABULARY ACQUISITION

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

EXPLORING THE USE OF MOBILE PHONES FOR SUPPORTING ENGLISH LANGUAGE LEARNERS' VOCABULARY ACQUISITION

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With their widespread use and their features such as mobility, localization, and personalization, mobile phones offer a great potential for out-of-class learning. Yet, there is scarce research on the use of mobile phones in language learning contexts nor any on using multimedia messages via mobile phones to improve learners' vocabulary acquisition. The major aim of this study was to investigate the potentials and effectiveness of using mobile phones in foreign language education. In particular, the effects of using multimedia messages via mobile phones for improving language learners' acquisition of words were explored. A mixed method approach involving both quantitative and qualitative components was employed in this study. The quantitative part of the study followed a pre-test/post-test quasi-experimental design. The qualitative part of the study included post-study semi-structured interviews with the students, and a questionnaire involving open ended items. The participants of this study were a group of students attending the English Preparatory School of an English-medium university in Turkey. Three different groups were formed in order to investigate the comparative effectiveness of supplementary materials delivered through 3 different means: mobile phones, web pages, and printeds. Analyses of the quantitative data showed that using mobile phones had positive effects on students' vocabulary learning. The qualitative data

collected through the questionnaire and the interviews supported this finding. All participants provided positive feedback about the mobile learning application used in this study.

Keywords: language learning, vocabulary, pronunciation, mobile phones, mobile learning, instructional technology, multimedia

ÖZ

İNGİLİZCE ÖĞRENEN ÖĞRENCİLERİN KELİME KAZANIMLARININ CEP TELEFONU KULLANARAK DESTEKLENMESİNİN ARAŞTIRILMASI

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Cep telefonlarının sahip olduğu ulaşılabilirlik, kişiselleştirilebilirlik ve taşınabilirlik gibi kendine özgü nitelikler, öğrenciler için sınıf dışı öğrenme, alıştırma ve uygulama çalışmalarının gerçekleştirilmesinde büyük bir potansiyel sunmaktadır ve birçok yarar sağlayabilir. Bu potansiyeli kullanarak dil öğreniminde cep telefonlarının kullanımını araştıran çok az sayıda çalışma vardır. Öğrencilerin kelime hazinelerinin geliştirilmesinde cep telefonlarının çoklu ortam iletileri özelliğinin kullanılması üzerine yapılan araştırmalar ise yok denecek kadar azdır. Bu çalışmanın temel amacı cep telefonu teknolojisini kullanarak eğitim ve öğretim süreçlerinin etkin ve verimli hale getirilmesine katkıda bulunmaktır. Bu çalışma ile İngilizce eğitiminde, cep telefonlarının kullanımı ile ilgili potansiyeli ortaya çıkarmak ve özellikle cep telefonlarının kelime öğrenimine olan etkilerinin araştırması hedeflenmektedir. Bu araştırmada nitel veriler, nicel verilerle elde edilen bulguları desteklemede kullanılmıştır. Toplanan nitel ve nicel veriler hibrit yöntemler kullanılarak analiz edilmiştir. Nicel veriler t-test ve ANCOVA analizine tabi tutulmuş; nitel verilen analizinde ise örüntü analizi işe koşulmuştur. Araştırmanın nicel kısmında ön-test/son-test yarı-deneysel tasarım deseni kullanılmıştır. Nitel kısmında ise araştırma sonunda öğrencilerle yarı-yapılandırılmış

görüşmeler yapılmış ve açık uçlu soruların yer aldığı değerlendirme anketi uygulanmıştır. Çalışmanın katılımcıları Ankara'da bulunan bir üniversitemizin İngilizce hazırlık okulundaki öğrencilerdir. Bu çalışmada aynı içeriğin cep telefonu yoluyla, web sayfası üzerinden ve çalışma notları dağıtılması ile işlenmesinin kelimelerin öğrenilmesinde etkililiği karşılaştırılmıştır. Nicel verilerin analiz sonuçları cep telefonu kullanımının kelime öğreniminde olumlu etkileri olduğunu göstermiştir. Görüşmelerde ve açık uçlu anket sorularına verilen cevaplar bu sonucu desteklemektedir. Bütün katılımcılar kullanılan cep telefonu uygulaması hakkında olumlu geri bildirimler vermişlerdir.

Anahtar Kelimeler: dil öğrenimi, kelime hazinesi, telaffuz, cep telefonu, mobil öğrenme, öğretim teknolojileri, çoklu ortam.

To my father, Mehmet Saran
and my son, Onur

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CHAPTER 1

INTRODUCTION

1.1. Background to the Study

Mobile phones connected to wireless networks offer a great potential for learning, and the use of mobile phones to support formal or informal learning is undergoing rapid development. The distinctive features of mobile phones such as portability (fit in a student's pocket) and immediacy (always with students) may allow students to study whenever and wherever they want, and this may result in increased rate of learning. In addition, learners may able to use any wasted time (on the bus, on their way back and to school) on learning languages with the chance of repeating the mobile content as many times as they want conveniently as the words would be at their finger tips on their mobile phones. On the other hand, in cases where computer technology is used in education, requirement of the students to access a computer for learning a material restricts the learning process to place, time and opportunity. As the student is required to be at a specific place at a specific time, learning process is considerably hindered.

The literature on teaching and learning highlights that in-class activities are not sufficient for effective learning and that exercise and practice activities should also be carried out outside the classroom (e.g. Entwistle & Ramsden, 1983; Zull, 1998; Koren, 1999). Although this consideration is expressed by many teachers, students do not put in adequate effort for studying outside the classroom. The most important reason for this could be learners' lack of motivation to start studying. Significance of motivation for effective learning is expressed by many educators (e.g., Keller, 1987; Alessi & Trollip, 2001). The push aspect of mobile phone technology may break these motivational barriers to learning for many students, and it may free the learner from studying in front of a computer screen. By the push aspect, it is meant that the

instructional materials are sent to the learners via mobile phones. In other words, a stimulus comes from an external source. In cases where computer technology is used in education, students are required to access a computer for doing certain educational tasks which restricts the learning process to place, time and opportunity. As the student is required to be at a specific place at a specific time, learning process is considerably hindered. On the other hand, when mobile learning is used, the students are encouraged to study through materials they receive via multimedia or short messages independent of time and space, without opening the course book or lecture notes, without connecting to a web site or sitting in front of a computer or using educational software.

In addition to a lack of motivation, technology access is another barrier to study WEB or WAP page contents. Most of the students –especially in the developing world– do not have personal computers (Prensky, 2005). However, mobile phone ownership among these students is more common (Prensky, 2005). The pre-study questionnaire distributed to all students in the English preparatory school of a university where this study was conducted supported this perspective. The analysis of this questionnaire showed that one hundred percent of the students in the English preparatory school had at least one mobile phone. On the other hand, only 45 percent of the students had personal computers at home.

Since the medium of instruction is English in a considerable number of universities in Turkey, many university students need to be proficient in the English language. However, these students state that they feel inadequate in expressing themselves in English and they report that they cannot use English after years of instruction (Altun, 1995). Instructors also complain that students cannot cope with instruction in English and that they cannot follow lectures in English. A review of the relevant literature and studies exploring these students' language difficulties revealed that one important reason of this in adequacy lies in learners' low vocabulary knowledge (Coady, 1997; Laufer, 1997). According to Laufer (1997), the second/foreign language learners need to know 3.000 high frequency words which would allow them to comprehend a large portion of words in written and spoken texts. This implies that learners have to know a certain size of vocabulary so that they can

comprehend a text comfortably. This understanding led us choose English vocabulary as the content to be delivered to students via mobile phones.

The literature on second language vocabulary acquisition highlights that in-class activities are not sufficient for effective vocabulary learning and that learners should also have input and output opportunities outside the classroom for developing and consolidating vocabulary (Koren, 1999). Mobile phones have great potential to provide supplemental practices for students outside the school. As Thornton and Houser (2005) stated, "mobile phones can help extend learner opportunities in meaningful ways" (p. 1). Yet, there is very little research on the use of mobile phones in language learning contexts. With this consideration, the major aim of this study was to investigate the potentials and effectiveness of using mobile phones in foreign language education. More specifically, the effects of using multimedia messages via mobile phones for improving language learners' vocabulary acquisitions were explored.

1.2. The Purpose of the Study

With their widespread use and their features such as mobility, localization, and personalization, mobile phones offer a great potential for out-of-class learning. Therefore, the major aim of this study was to investigate the potentials and effectiveness of using mobile phones in foreign language education. More specifically, this study investigated how the use of multimedia messages (MMS) and SMS quizzes via mobile phones affect the students' English vocabulary acquisition. In addition, exploring the students' opinions regarding the use of mobile phones for vocabulary learning, and exploring how to develop effective instructional materials for mobile phones were the main concerns of this study.

1.3. The Significance of the Study

Among all technological devices available in our era, mobile phones are the most popular ones, and they have an important place particularly in young people's lives. Mobile phone ownership exceeds personal computer ownership; despite the technology is relatively new (Prensky, 2005). Mobile phones connected to wireless

networks offer a great potential for learning, and the use of mobile phones to support formal or informal learning is undergoing rapid development (Naismith, Lonsdale, Vavoula & Sharples, 2005). In addition, Corbeil and Valdes-Corbeil (2007) stated that "If appropriately facilitated, mobile learning can benefit learners by providing instructional materials and interaction through their mobile devices wherever and whenever they need it" (p. 54). However, Attewell (2004) stated, "the amount of research explicitly exploring the use of mobile phones in education is still small, although there is an increasing amount of work-in-progress" (p.1). There is scarce research on the use of mobile phones in language learning contexts let alone on using mobile phones to improve learners' vocabulary.

The studies utilizing the mobile devices for vocabulary learning in the literature, to date, reported the delivery of the text-only learning materials via SMS feature of mobile phones (e.g. BBC, 2003; Levy & Kennedy, 2005; Thornton & Houser, 2005; Stockwell, 2007; Lu, 2008; Chen & Chung, 2008). The educational research reveals that the integration of verbal and visual information has enhanced performance when used appropriately (Jeung, Chandler, & Sweller, 1997; Kalyuga, Chandler, & Sweller, 1999). Nevertheless, no previous study which reported the delivery of multimedia learning materials via MMS feature of mobile phones have been found in literature. This study will contribute to the literature in this respect.

Vocabulary is crucial to language learning. Second language (L2) learners need to broaden their vocabulary to express themselves appropriately in a variety of situations. The recent literature dealing with vocabulary acquisition indicates that the L2 learners need to know 3.000 high frequency words which would allow them to comprehend a large portion of words in written and spoken texts (Laufer, 1997). In order to acquire a vocabulary item repetition is essential (Nation, 2002). Therefore, the L2 learners need to recycle the words as much as possible in order for them to store words into their long-term memory. With their widespread use and their features such as mobility, localization, and personalization, mobile phones offer a great potential for practicing vocabulary items. The major aim of this study was to investigate the potentials and effectiveness of using multimedia messages via mobile phones for improving language learners' vocabulary. Thus, the findings of this study

may also help English language preparatory schools whether to implement mobile learning or not.

1.4. Objectives of the Study

The objectives of the study are listed below:

- To investigate how the use of multimedia messages (MMS) and SMS quizzes via mobile phones affect the students' English vocabulary acquisition.
- To find out how students use the instructional materials provided by mobile phones.
- To explore the opinions of the students regarding the use of mobile phones for vocabulary learning.

1.5. Limitations of the Study

The limitations of the study are listed below:

- This study is limited to the six classes (each consists of 16-18 students) in an English preparatory school of a private university in Ankara.
- The content of the experiment is limited to 80 English words selected from the regular classroom instruction content.
- The duration of the treatment is limited to four weeks.
- The generalizations of the findings of this study are limited since purposeful sampling was utilized in the present study.
- Validity and reliability of this study are limited to the validity and reliability of the instruments used in the study.
- Validity and reliability of this study are limited to the honesty of the participants' responses to the instruments used in the study.

1.6. Definition of Terms

In this section, brief explanations of the important terms used within the study are provided in order to assist the reader in understanding the study.

Mobile learning: O'Connell and Smith (2007) referred mobile learning to "… learning that is facilitated and enhanced by the use of digital mobile devices that can be carried and used anywhere and anytime" (p. 3).

Vocabulary retention: "Vocabulary retention refers to keeping vocabulary in long term memory and retrieving it for meaningful use in appropriate contexts" (Baturay, 2007, p. 8).

Vocabulary acquisition: Efficient acquisition of new vocabulary requires a conscious effort from the learner because knowing a word is more than just knowing its simple meaning. Bada and Okan (2000) explained that acquiring a word involves an understanding of the spelling, pronunciation, stress, grammatical class, semantic category, and its occurrence in various contexts.

Short-term memory: We receive information from any of our senses (eyes, ears, nose, etc.), and is then stored in short-term memory (also called working memory). It only remains in short-term memory for a moment. If it is not processed or practiced it will be lost and forgotten. Short-term memory is limited in capacity and can hold seven units of information, plus or minus two, at a time (Miller, 1956).

Long-term memory: "Memories that endure outside of immediate consciousness are known as long-term memories" (Memory, 2009). Long-term memory is theoretically unlimited in capacity, and consists of hierarchically organized schemas (Galitz, 2002).

Mobile phone: A mobile phone (also known as a wireless phone, cell phone, or cellular telephone) is portable device for connecting to wireless telecommunications network in order to transmit and receive voice, video, or other data (Mobile Telephone, 2009).

MMS: Abbreviation for 'Multimedia Messaging Service'. Multimedia Messaging Service is a universally accepted standard that lets users of MMS supportive mobile phones send and receive messages with formatted text, graphics, photo-graphic imagery and audio and video clips (Mobile Telephone, 2009).

GSM: GSM, which was first introduced in 1988, is one of the leading digital cellular systems throughout the world. GSM networks operate on the 900 MHz and 1800 MHz in Europe, Asia and Australia, and on the MHz 1900 in North America and in parts of Latin America and Africa (Mobile Telephone, 2009).

3G: 3rd Generation combines high-speed mobile access with computer data network based services. This does not mean faster mobile connection to the World Wide Web, also always-on connection, provides more service such as videoconferencing, fax, etc. (Mobile Telephone, 2009).

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter provides a review of the related literature to this study, and focuses on the following areas in the study: vocabulary learning and acquisition in a second language, cognitive aspects of mobile learning, the effects of media and method on learning, and the use of mobile devices for learning.

2.1. Vocabulary Learning and Acquisition in a Second Language

The learning of vocabulary is regarded as an important component of second language (L2) learning by researchers (Coady, 1997; Laufer, 1997). As McCarthy (1990) pointed out, "No matter how well the student learns grammar, no matter how successfully the sounds of L2 are mastered, without words to express a wider range of meanings, communication in an L2 just cannot happen in any meaningful way" (p.140). In addition, Allen (1983) stated that communication is usually prevented by inadequate or wrong use of vocabulary and therefore, having an adequate vocabulary is very important at all phases of L2 learning.

2.1.1. Research on Knowledge of a Word

Efficient acquisition of new vocabulary requires a conscious effort from the learner because knowing a word is more than just knowing its simple meaning. Bada and Okan (2000) explained that knowing a word involves an understanding of the spelling, pronunciation, stress, grammatical class, semantic category, and its occurrence in various contexts. There are different degrees of knowing a word. For instance, sometimes learners have the knowledge and the experience of recognizing the word when reading it in a text or hearing it during a conversation, but are not able to produce it. Melka (1997) defined this as receptive vocabulary. Productive vocabulary, on the other hand, refers to words when the learner is able to use in

speaking and writing. The assumption is that learners first learn the words (receptive) and later are able to produce them (productive) (Clark, 1993). According to Clark (1993), receptive vocabulary is much larger than productive vocabulary. The two notions, receptive and productive vocabulary, can also be explained as active vocabulary and passive in the literature (Melka, 1997).

2.1.2. Research on What Words to Teach

Knowing the meaning of words is crucial in learning a second language. Learners have to know a certain size of vocabulary in order to be able to effectively use the language and communicate. Thus, in order for learners of L2 to comprehend a text, they should enlarge the size of their vocabulary. The literature dealing with vocabulary acquisition indicates that what words to teach vary according to how the learner wants to use the language. Laufer (1997) stated that the L2 learners need to know 3.000 high frequency words which would allow them to comprehend a large portion of words in written and spoken texts. Moreover, according to Schmitt and McCarthy (1997), if the learner's goal is only to be able to communicate in daily conversation, then the 2.000 high frequency words is a realistic goal to begin with.

2.1.3. Main Approaches to Vocabulary Teaching/Learning

Words can be learned from explicit teaching or they can be learned incidentally. A large number of strategies are used to acquire new words especially for the words stated to have high frequency (Gu, 2003). This section presents some of the vocabulary learning/teaching strategies guided the study during the development of instructional materials.

Learning Words From the Context

Guessing the meaning of the new vocabulary item from the context approach involves L2 learners looking at other words in the text in order to help them comprehend more about the unknown word. In the literature, this way of learning vocabulary is also referred to as implicit or incidental learning (McCarthy, 1990). The advocates of learning words in context approach (i.e. vocabulary acquisition by means of extensive reading) claim that a word learned in a meaningful context is

best acquired and remembered (McCarthy, 1990). Moreover, Nagy and Herman (1987) indicated that teachers should encourage reading since it improves the vocabulary greater than any program of explicit instruction. Context alone approach proposes that there is in fact no need for direct vocabulary instruction as students will learn all the vocabulary they need from context by extensive reading (Krashen, 1989). The emphasis in this approach is on directing learners to recognize clues in context and to use monolingual dictionaries.

Although learning words from context is accepted as an important skill in learning a L2 by many researchers such as Stenberg (1987) and Nation (1990), acquiring vocabulary through it has been criticized for several reasons:

- Learning words from context is a very slow process and usually learners have a limited time to learn a language (Carter & McCarthy, 1998; Scherfer, 1993).
- To be able to guess the meaning of a new word from the context learners must have a certain level of proficiency. Nation (2002) stated learners need to be familiar with at least 95% of the running words to be able to guess the words correctly.
- Learner skill is a critical factor in learning words from context approach. There is a wide variation in the ability of learners to guess from the context (Nation, 2002). Kelly (1990, cited in Schmitt & McCarthy, 1997) pointed out that students seldom guess the correct meanings so 'guessing' is an error-prone process.

Explicit Teaching

This approach emphasizes the explicit/direct teaching of words at early stages but the later stages can be more context-based. Ellis (1994) stated that explicit learning is more conscious and strongly affected by the quality of mental processing. Therefore, many researchers believe that direct instruction promotes vocabulary development (Schmitt, 2000; Sokmen, 1997; Coady, 1997; Nation, 2002).

Hunt and Beglar (1998) proposed that teachers need to consider following when explicitly teaching unfamiliar words:

- Rather than showing only the format of a word, teachers should support learning activity with audio-visual materials to allow learner see and use the new word in context.
- Learning L2 vocabulary should start with semantically unrelated words. Moreover, words with similar forms should be avoided at the beginning of learning.
- Instead of learning the words in one or more longer sessions, studying the vocabulary over several short sessions will cause a better retention.
- Learning small groups of vocabulary (5-7 words) at a time will give more studying opportunity to the students.

The Use of the Dictionary

Dictionaries are used extensively by L2 learners as a vocabulary learning strategy and they play an important role in L2 learning (Summers, 1988). McKeown (1993) indicated that dictionaries might be the only aid available to help learner obtaining the vocabulary meaning of a word when they are alone without any help from a teacher or native speaker. However, there are certain shortcomings and disadvantages of using the dictionary as a vocabulary learning strategy (Scholfield, 1982). Nagy (1988) argued that the dictionary definition does not necessarily lead to successful knowledge of a word. Often it does not provide students with enough information to use the word correctly or in an appropriate manner. For example, even though a dictionary definition provides the pronunciation of the word, learners only see the written form in the dictionary. Thus, they might not be able to recognize the word when they hear it spoken which would ultimately interfere with comprehension.

With regard to the effectiveness of dictionary look-up for vocabulary acquisition, researchers have found mixed results. That is, while some studies found that access to a dictionary increases lexical knowledge after reading (Knight, 1994; Luppescu and Day, 1993), others claimed that the use of dictionaries does not significantly enhance reading comprehension (Bensoussan & Laufer, 1984). In addition, some studies showed that access to dictionary without dictionary training does not

significantly increase vocabulary production. For example, Altun (1995) investigated the effects of monolingual dictionary training on Turkish EFL students' vocabulary learning. The study found that dictionary training has a positive effect on vocabulary production indicating that training is crucial for dictionary use.

Studies have shown that compared to monolingual dictionaries, bilingual dictionaries are used more extensively among L2 learners (Tomaszczyk, 1997). On the other hand, most language experts and teachers are encouraging to use monolingual, rather than bilingual dictionary (Hartmann, 1991, cited in Gu, 2003). Gu (2003) stated that "In fact, most of the published work on this topic is of argumentative type." (p. 7). Therefore, students should be given the option of choosing the type of dictionary (monolingual vs. bilingual) on their own.

2.1.4. Processes That Lead to a Word Being Remembered

Nation (2002) mentioned three important processes that need to be taken into consideration when practicing vocabulary learning activities as they will make it possible for the words to be remembered later. These are noticing, retrieval, and creative use respectively.

Noticing

Noticing means giving attention to an item, that is, learners should be guided to notice the word and should sense it as a useful language item (Nation, 2002). It requires that the word is taken from its message context to be concentrated on as a language item because "Learners need to consciously see language items as parts of the language system rather than as only messages" (Nation, 2002, p.64). Some examples of helping learners notice a word can be listed as follows: teachers' highlighting of a word while writing on the board or explaining a word for the learners by giving a definition, a synonym etc., the learners' negotiating the meaning of a word either with each other or with the teacher. Learners may also notice a word while listening or reading thinking that 'I have seen that word before' or 'that word is used differently here'.

Retrieval

After a word is noticed and comprehended in the textual input, it has to be subsequently retrieved in order for it to be strengthened in the memory. If retrieval is in the form of perceiving the form and meaning when the word is met in listening or reading, it is receptive; but if it involves communicating the meaning of the word in speaking and writing, it is, then productive retrieval (Nation, 2002). To enhance retrieval, some sort of recycling activities should be done in order for the learners to revise the words because not all words a student hears during any lesson become a part of his/her active vocabulary. Therefore, the vocabulary for active use should be systemically presented and practiced. Nation (2002) clearly stated this fact:

> Repetition is essential for vocabulary learning because there is so much to know about each word that one meeting with it is not sufficient to gain this information and because vocabulary items must not only be known, they must also be known so well that they can be fluently accessed. Repetition, thus, adds to the quality of knowledge and also the quantity or strength of this knowledge (pp. 74-75).

Wallace (1982) also stated that "There has to be certain amount of repetition until there is evidence that the student has learned the target word" (p. 29). There has been a great deal of research on how items should be repeated, specifically on the number of repetitions. It is not easy to state a specific number of repetitions for learning to occur since students differ in their abilities and preferences to learn a language (Tinkham, 1993, cited in Nunan, 2001). On the other hand, some studies can give a general idea about the number of repetitions for vocabulary items to be learned. For instance, Kachroo (1962, cited in Nation, 2002) reported that most learners can remember and use the words which are repeated 7 times or more. Crothers and Suppes (1967, cited in Nation, 2002) also indicated that most vocabulary items are learned after 6 or 7 repetitions.

Creative or Generative Use

Creative use of words happen when previously encountered words are subsequently practiced in ways that are different from the previous meetings. There are degrees of generation. It is low if the linguistic context of the word is only slightly different from the first input as in 'chronic pain' becomes 'very chronic pain' but if it is used

in a quite different; for example ‘chronic pain’ becomes ‘chronic illness’ (Nation, 2002). Creative use of a word is stated to be very important by Nation (2002) as the new meeting with the word exerts learners to reconceptualize their knowledge of that word and it can apply to variations from inflection through collocation and grammatical context to reference and meaning.

2.2. Cognitive Aspects of Mobile Learning

Instructional design for learning is a complex process since the underlying basis of it is the unobservable internal constructs in the learners’ minds such as memory, perception, attention, motivation, attitudes, thinking, and reflection. These constructs are mainly explained by cognitive psychology theories. In this part, the cognitive load theory and the dual-coding theory that provide the most relevant principles to the instructional design for mobile learning are presented.

2.2.1. Cognitive Load Theory

The cognitive load theory provides an important theoretical guidance for designing effective instructional materials. This theory is based on a model or theory of memory and storage proposed by Atkinson and Shiffrin (1968). According to this model, sensory registers receive information from any of our senses (eyes, ears, nose, etc.), and is then stored in short-term memory (also called working memory). It only remains in short-term memory for a moment. If it is not processed or practiced it will be lost and forgotten. If you continue to rehearse the information, it will be transferred to long-term memory. This process is called ‘rehearsal’. Once information has entered the long-term memory, it remains for a considerable time. To use the information again, it has to be ‘retrieved’ back into the short-term memory. This process is called ‘retrieval’.

Miller (1956) proposed the idea that we can hold seven units of information, plus or minus two, in short-term memory at a time. This shows that short-term memory is limited in capacity. On the other hand, long-term memory is theoretically unlimited in capacity, and consists of hierarchically organized schemas (Galitz, 2002). “Schemas allow us not only to store learned information in long-term memory but,

because multiple elements of information are treated as a single element in working memory, schemas also reduce the burden on working memory" (Kalyuga, Chandler, & Sweller, 1999, p. 351).

Basically, cognitive load theory is concerned with the limitations of short-term memory, and provides guidelines to efficiently manage the limited processing capabilities of an individual's short-term memory (Sweller, van Merrienboer, & Paas, 1998). The information that exceeds the capacity of short-term memory is lost and forgotten without being transferred to long-term memory. Therefore, instructional designers should try to reduce the short-term memory load while developing materials. For example, Mousavi, Low, and Sweller (1995) stated, "the effective size of working memory may be increased by presenting information in a mixed (auditory and visual mode) rather than in a single mode" (p. 320). In this manner, the capacity of working memory would increase; as a result the amount of information that could be processed would increase (Kalyuga, Chandler, & Sweller, 1999). The limits of the short-term memory capacity can also be improved by a process known as 'chunking' (Ericsson, Chase, & Faloon, 1980). This is the process by which several units of information are broken down into manageable units – twelve numbers, for example, might be broken down into three groups of four numbers.

According to the cognitive load theory, we should keep things simple during the message design process, and provide practice exercises to help transfer information from short-term memory to long-term memory (Sweller, van Merrienboer, & Paas, 1998). In mobile learning, instructional materials should be designed as short learning sessions, and learners should be encouraged to study for short periods of time on several occasions. We should allow enough time for the learners between the segments of messages. Moreover, in order to reduce cognitive load, pictures, audio, and video should correspond to the text without providing additional information that is not considered useful to the learner.

2.2.2. Dual Coding Theory

The dual-coding theory, developed by Paivio (1991), asserts that verbal and visual information are processed through two separate channels. This theory suggests that learning is improved when complementary information is processed by means of two channels than when the information is processed by means of only one channel (Mayer, & Moreno, 2002). It is important to know that the verbal and nonverbal systems can be used separately and that the two separate systems are connected by referential links that enable interaction during encoding and retrieval of information.

Several studies have been conducted to investigate the effectiveness of the combination of different channels within multimedia learning materials, and the integration of text and visual information has improved the performance when use appropriately (Jeung, Chandler, & Sweller, 1997; Kalyuga, Chandler, & Sweller, 1999). In contrast, some studies find no significant difference in performance. For example, Shih and Alessi (1996) compared three different treatments (text; voice; text and voice). They did not find any significant differences among treatment groups and type of learning. However, they reported that eighty-two percent of the students found the combination of text and voice better than the other methods of delivery.

The dual coding theory provides a number of principles for designing multimedia, and these principles can be applied to the development of mobile learning materials. An example of this is the combination of complementary visual information and narration, like a technician describes how a car engine works while you view an animation showing the steps. Our designs can include information rich multimedia components such as drawings, photographs, music, animations, and video. Here, the important point is to combine only the complementary modes of information (Kalyuga, Chandler, & Sweller, 1999). Otherwise, conflicting combinations confuses learners and this causes decrease in learning. For example, listening to a person speak while viewing text with different wording will hinder effective learning.

According to dual coding theory, multimedia may enhance the student's learning process through simulation, animation, video, audio, and pictorial content. If the instruction has words and pictures in it, then the learning process and the individual's working memory will become more efficient according to this theory (Kalyuga, Chandler, & Sweller, 1999). Therefore, words and pictures should be integrated into the in mobile learning materials appropriately, so that students have chance to construct verbal and visual cognitive structures and to build connections between them.

2.3. The Effects of Media and Method on Learning

The roles of media in instructional process have been researched for years. However, there is no consensus among researchers about the roles of media for learning. This issue is called Clark-Kozma debate in the instructional technology literature. There are two major views about this issue. On the one side, Clark (1983) is pioneering the view that it is not the medium that affects learning; it is the method or strategy used in the instructional process. On the other side, Kozma (1994) is pioneering the view that different media have different characteristics and one medium may produce more or different learning than another for different learning contexts.

According to Clark (1983), media are "mere vehicles" that only carries content (p. 445). He suggested truck-groceries-nutrition analogy for the definition of media that bases his arguments. Clark (1983) stated that a truck carrying groceries does not affect our nutrition but the choice of vehicle may affect the cost of distribution. He claimed that like a truck, a medium carrying instruction does not affect our learning but it may affect the time, cost or extent of instruction. Therefore, according to Clark (1983), media and method are two separate concepts. One can deliver any specific method with different media for the same learning outcomes. The result would be the same but the time, cost or the extent of delivery may vary. In addition to this, the attributes (e.g. zooming) do not belong to any specific medium. Many different media may deliver any specific attribute.

Clark (1994) stated that the research studies carried out for decades do not indicate any learning benefits from different media in instruction. According to Clark (1994) the media comparison studies have research design problems. First of all, the learning differences that yielded from these studies might be because of the novelty effect of the new medium. The new and interesting medium may affect the learners temporarily, and this affects the validity of the studies. Clark (1994) mentioned that while comparing a medium with another medium, except from the media, all aspects of comparison groups must be identical. Clark (1994) claimed that the current media comparison studies do not satisfy this requirement. Therefore, the results of these studies are not healthy for theory construction and generalization.

According to Kozma (1991), different media have different presentation and processing capabilities. Therefore, these different capabilities with the particular learning situation (the method, the tasks, environment, and learners) may make a difference in learning. He added that media and method are not two separate concepts; instead they are integrated in design process. In his paper titled "Learning with Media", Kozma (1991) mentioned that media may play an important role during the learning process. He gives the Vygotsky's (1978) "zone of proximal development" theory as an example. The zone of proximal development can be explained as the difference between individual performance and performance with support from others. The others could be the teacher or the media to decrease this difference.

The main argument proposed by Kozma (1994) is that most of the researches reviewed by Clark (1994) were based on the behaviorist stimulus-response paradigm. Kozma (1994) stated that this results in researching surface features of media and will yield the results only reflecting learner's passive responses to messages carried by the media. Kozma (1994) argued that the researchers did not consider the cognitive and social features of media affecting the learning process. According to Kozma (1994), learning is an active, constructive, cognitive, and social process. Therefore, there is a close interaction between learner and the external environment during the learning process. Kozma (1994) indicated that we should not concentrate on the causes and effects; instead, we should concentrate on the

interactions of the components in the learning environments. Qualitative research methods should be used to understand the interactions between learning and media.

The problem lies in the different paradigms that Clark (1983) and Kozma (1994) believe. Clark is positivist and believes in quantitative research methods. He states that research results should be generalizable to other settings. He is also behaviorist and accepts learning as the changes in learner's behavior. On the other hand, Kozma (1994) is interactionist and believes in qualitative research methods. His research paradigm looks for the causal mechanisms between the components. Kozma (1994) accepts learning as the active, constructive, cognitive, and social process. Clark (1994) and Kozma (1994) see the media and method concepts from different perspectives. On the other hand, the number of research studies employing both perspectives together (utilizing elements of both qualitative and quantitative approaches) are rapidly increasing in education (Rocco, Bliss, Gallagher, Pérez-Prado, Alacaci, Dwyer, et al., 2003).

In this study, the students are encouraged to study by sending them exercises and also practice materials via multimedia or short messages. The media used in this study have some specific attributes. For example, the students are able to practice independent from time and space, without opening the course book or lecture notes, without connecting to a web site or sitting in front of a computer or using educational software. In other words, the distinctive features of mobile phones such as portability (fit in a student's pocket) and immediacy (always with students) allow students to study whenever and wherever they want, and this may result in increased rate of retention. On the other hand, the medium itself cannot yield this effect. The instructional media should be supported with the instructional method which is designed in light of the learning and cognitive theories. This study tries to find out whether study materials delivered via mobile phones (as compared to the web- and paper-based media) increase the students' vocabulary retention or not. In order to provide more useful guidance for theory construction and educational practice, this study employs both qualitative and quantitative methods.

2.4. The Use of Mobile Devices for Learning

This section first presents the definitions of mobile devices and mobile learning. Then, the review of educational projects using mobile devices is presented. Finally, mobile learning applications related to the present study in language education field is introduced.

2.4.1. Mobile Devices

The answer of the question 'what is a mobile?' is not straightforward. There are many different kinds of technology that can be classified as 'mobile'. According to Trifanova, Knapp, Ronchetti, and Gamper (2004), a mobile device is "any device that is small, autonomous and unobtrusive enough to accompany us in every moment" (p.3). O'Connell and Smith (2007) provided a more concrete classification method, and they identified mobile devices by their small screen, lack of standard keyboard, and pocket-sized nature. Mobile phones, PDAs (personal digital assistants), personal digital media players (e.g. iPods, MP3 players), and smart phones are regarded as mobile devices. Although laptop computers, tablet personal computers (PCs) and Ultra-Mobile PCs (UMPCs) can also be used to facilitate mobile learning, they are not considered as mobile devices (O'Connell & Smith, 2007).

Mobile devices provide most of the functions of the personal computers through a small screen without a standard keyboard. For example, many mobile devices allow us to organize our appointments and to-do lists; many allow us to create Multimedia Messages (MMS), a picture with a sound clip to send to a friend; some provide desktop-type applications –like word-processing. Full-color games are also possible with these devices. While some feel that these small devices have usability problems and poor interfaces, the emerging technologies offer interesting interaction possibilities involving audio, touch and gestures (Jones & Marsden, 2006). Besides, most of the mobile phones available today is capable of storing and delivering vast amount of information-rich content by using third generation (3G) mobile communication service (O'Connell & Smith, 2007).

Among all technological devices available in our era, mobile phones are the most popular ones, and they have an important place particularly in young people's lives. Mobile phone ownership exceeds personal computer ownership; despite the technology is relatively new. Prensky (2005) stated that all over the world –except for Canada– the mobile phones outnumber the personal computers with 5 to 10 times the total number of mobile phones as compared to the number of personal computers. According to the International Telecommunication Union (2008), there were approximately 3.3 (49 percent of the world population) billion mobile phone subscriptions in the world by 2007 (although some users have multiple subscriptions or inactive subscriptions). These statistics are consistent with the research report published by Telecommunications Authority of the Republic of Turkey (Turkstat, 2006). According to this report, 83% of the 4322 households included in the study across Turkey have at least one mobile phone. On the other hand, only 18.5% of them have home computers. With their widespread use and their features such as mobility, localization, and personalization, mobile phones are the most commonly used technology for mobile learning.

2.4.2. Mobile Learning

Mobile phones connected to wireless networks offer a great potential for learning, and the use of mobile phones to support formal or informal learning is undergoing rapid development. Many learning activities can be considered as mobile. Kukulska-Hulme and Shield (2008) defined mobile learning as "… learning mediated via handheld devices and potentially available anytime, anywhere" (p. 273). Similarly, O'Connell and Smith (2007) referred mobile learning to "… learning that is facilitated and enhanced by the use of digital mobile devices that can be carried and used anywhere and anytime" (p. 3). These definitions indicate that mobile learning is identified both by 'anywhere and anytime' access to formal or informal learning activities.

JISC (2005) outlined six attributes that identify mobile learning. These are: (1) "portability", (2) "any time, any place connectivity", (3) "flexible and timely access to e-learning resources", (4) "immediacy of communication", (5) "empowerment and engagement of learners particularly those in dispersed communities", (6) "active

learning experiences" (JISC, 2005, p. 7). These attributes basically suggest that mobile learning provides immediate access, and acknowledges learning that occurs in any place such as the home, school, outdoors, and the workplace.

Corbeil and Valdes-Corbeil (2007) stated "If appropriately facilitated, mobile learning can benefit learners by providing instructional materials and interaction through their mobile devices wherever and whenever they need it" (p. 54). However, mobile learning involves some challenges. For example, it "could require additional learning curve for non-technical students and faculty", and it "may require media to be reformatted or offered in multiple formats" (Corbeil & Valdes-Corbeil, 2007, p. 54). Although the user interface of mobile devices can be considered as a limitation to display information-rich content in a useful way, this will not be a big challenge in the near future considering the explosive development of mobile technology. Jones and Marsden (2006) stated that many manufacturers of mobile phones already improved and redesigned their voice quality, ease of use, and design quality.

2.4.3. Review of Educational Projects Using Mobile Devices

The development of mobile technologies has resulted in an increasing number of projects that utilize mobile devices as teaching and learning tools (Kim, Mims & Holmes, 2006). On the other hand, "…the amount of research explicitly exploring the use of mobile phones in education is still small" (Attewell & Savill-Smith, 2004, p1). One of the earliest mobile phone utilization for learning was "eBusiness on the Move", developed in Singapore (Ring, 2001). Ring (2001) sent textual course content, quizzes, reminders, and human prompts to students' mobile phones as a supplement to an online business course. Participants found the mobile study convenient and useful. They also found the design of information displayed in the tiny size of their mobile phones' memory and screen usable and pleasant. All of the participants reported that mobile learning adds value to the course. 93% of them stated that mobile learning was useful while commuting. On the other hand, 50% of the participants reported that they were unsure about the idea of offering a distance course delivered using only mobile phones.

One of the interesting projects called 'Text Worm' allowed lecturers to ask questions during a lecture and have the students SMS the answer in real time back to the lecturer's computer- the computer has a mobile handset attached in order to receive the SMSs (Jones & Marsden, 2004). The system supported both multiple-choice questions and open-ended questions. The researchers reported that the system was well received by the students, but students found the open-ended questions displayed on a side-screen too distracting. The cost of SMSs was also reported as a negative aspect of this implementation.

Personal digital assistants (PDAs) are also used for learning activities. Soloway, Norris, Blumenfeld, Fishman, Krajcik, and Marx (2001) developed several educational programs for PDAs in the United States. These programs involve the game -like quiz "Bubble Blasters", the science simulation "Cooties", and the concept map editor "PiCoMap". The elementary school students used these programs, and found them fun and interesting, and reported positive opinions.

In an effort to investigate the impact of mobile computers in primary education in Africa, the Open University in the UK set up 'Project DEEP' (Leach, Ahmed, Makalima & Power, 2005). Teachers reported that by using PDAs students were better able to cope with the electricity supply problem, and were able to work at home or at fieldworks outside the school. They also reported that these devices stimulated learning and creativity in a way that was not happening with desktop systems. Many teachers commented on the unique abilities of the PDAs to be used anywhere and how it opened up new possibilities for learning especially in developing world education environments.

In addition to formal education, mobile devices are also well suited for informal education. An example of this is a PDA application developed for personalized education of breast cancer patients (Wood, Keen, Basu & Robertshaw, 2003). They sent text, images and audio-visual materials to the patients' PDAs via the Internet and the hospital's intranet. The contents delivered were selected based on the individual patient's needs. In this project, patient communication is enhanced via SMS. This system also allowed a patient community to share their experiences. The authors did not provide users' evaluation in their paper.

2.4.4. Mobile Learning in Language Education

A number of studies and projects have been developed using mobile phones and PDAs that focus on various forms of language learning. The use of mobile devices in language learning especially focus on vocabulary learning (e.g. BBC, 2003; Levy & Kennedy, 2005; Thornton & Houser, 2005; Stockwell, 2007; Lu, 2008; Chen & Chung, 2008), but there are few studies that focus on grammar learning, story reading, and pronunciation practices (e.g. Kadyte, 2004; Belanger, 2005). However, the research findings, to date, reveal no formal theory of mobile language learning (Kukulska-Hulme & Shield, 2008).

One of the first projects using mobile phones in language learning explored their use in the vocabulary learning (Thornton & Houser, 2001). Specifically, they developed text messages including short vocabulary lessons for mobile phones, and three times a day, sent them in discrete chunks in order to be easily readable on the small screens of the mobile phones. Their results indicated that 70% of learners preferred to receive SMS instruction over mobiles compared with desktop computers, wished to continue such lessons, and believed mobile learning to be a valuable teaching method. The authors stated that their lessons had been effective due to push aspect of SMS, which promote frequent rehearsal and spaced study. Researchers noted, however, that students were postponing study until they would have the time to concentrate on the task.

In another study, Thornton and Houser (2005) compared the use of pull (web-based) and push (mobile e-mail) approaches in delivering English vocabulary content to mobile phones. Comparison between pre- and post-tests indicated that participants who learned vocabulary through Internet e-mails via mobile phone had significantly more vocabulary gains than those who learned through the Web via PC. The results of the subsequent experiment showed that another mobile phone group gained significantly more vocabulary than the group using paper materials. Thornton and Houser (2005) concluded that the regular messages sent by mobile phone could generate the spacing effect, which facilitated vocabulary retrieval. Thornton and Houser (2005) claimed that mobile phones enhanced regular study, which in turn, led to more vocabulary gains than the presentation of the lessons in class only.

Levy and Kennedy (2005) conducted a study for Italian learners in Australia, sending vocabulary words and idioms, definitions, and example sentences via SMS in a spaced and scheduled pattern of delivery. They also requested feedback in the form of quizzes and follow up questions from the learners. They investigated the best times and scheduling of message delivery. The findings from student surveys indicated that the best times to send messages are between 9 a.m. and 10 a.m. and two messages a day is the best rate at which to send.

There are also a number of commercial mobile language learning applications in all over the world. For example, the BBC World Service offers English lessons via SMS in China (BBC, 2003). Subscribers receive a daily text message on their mobile phones including an English phrase and the Chinese translation of it. General Manager of English Language Teaching, BBC Worldwide, reported: "We're aiming to provide the right content through media which suit people's lifestyle and purse strings, which is why SMS messages - and online - are so exciting" (BBC, 2003, p.1). Another similar commercial application is BBC Wales' 'LrnWelsh' service (Andrews, 2003). In this ten weeks course, text messages including English phrases are sent to the subscribers' mobile phones at 12pm on Mondays, Wednesdays and Fridays. Welsh Language Board Chairman Rhodri Williams said: "LrnWelsh is an important resource because of its modern and imaginative way of presenting the language to people... either looking for an introduction to Welsh or already learning the language" (Andrews, 2003, p.1). Another mobile commercial application is 'Pocket Eijiro', started in December 2002 as an English-Japanese, Japanese-English dictionary (McNicol, 2004). There are more than hundred thousands subscribers for this service, and the site receives more than 100.000 hits per day.

2.5. Summary

Vocabulary is crucial to language learning. Second language (L2) learners need to broaden their vocabulary to express themselves appropriately in a variety of situations. Words can be learned from explicit teaching or they can be learned incidentally. As regards these two different approaches to learning L2 vocabulary, there are different views in the literature regarding the superiority of them. Nation (2002) argued that it is an unfortunate view to see learning from context and direct

intentional learning as opposites because “they are complementary activities, each one enhancing the learning that comes from the other” (p. 232). The consensus seems to be to adopt a mixed approach to vocabulary acquisition. In other words, a range of explicit vocabulary learning strategies should be used to supplement incidental acquisition. The recent literature dealing with vocabulary acquisition indicates that the L2 learners need to know 3.000 high frequency words which would allow them to comprehend a large portion of words in written and spoken texts. Dictionaries are used extensively by L2 learners during the vocabulary learning process, and they play an important role in L2 learning. Repetition is essential for vocabulary acquisition. Therefore, the L2 learners need to recycle the words as much as possible in order for them to store words into their long-term memory.

The cognitive load theory and the dual-coding theory provide the most relevant principles to the instructional design for mobile learning. The general assumption that the more stimulation and the more media are involved, the easier it is to learn cannot guarantee the success of our designs. Any instructional designer should be aware of the general issues or principles related with the cognitive aspects of learning process in order to succeed in message design. This is not to say that the theories and generalizations provide recipes for what to do. Instead, they provide analytical tools for designers to make creative decisions for their instructional designs.

Much of the early research in instructional technology field focused on comparisons between delivery media such as television, Internet, or computer and traditional teaching methods. Most of these media comparison studies found no significant differences in learning. Spenser (1991) ciriticized these early media comparison studies and pointed out that they tended to report comparative statistics concluding the presence or absence of a statistically significant difference between different treatments. As Spencer (1991) stated, since the results of media comparison studies and their instructional impact have resulted in very little practical guidance, rather than this, it seems reasonable to ask how we can improve the quality of classroom instruction. To reach this aim, we should conduct research studies that include both

qualitative and quantitative research methods. Therefore, this study employs both qualitative and quantitative methods in order to provide more useful guidance for theory construction and educational practice. The media used in this study have some specific attributes. For example, the students are able to practice independent from time and space, without opening the course book or lecture notes, without connecting to a web site or sitting in front of a computer or using educational software. In other words, the distinctive features of mobile phones such as portability (fit in a student's pocket) and immediacy (always with students) allow students to study whenever and wherever they want, and this may result in increased rate of retention. On the other hand, the medium itself cannot yield this effect. The instructional media should be supported with the instructional method which is designed in light of the learning and cognitive theories.

People of all educational levels, ages and social classes are already familiar with mobile phones and use it comfortably in their daily life. Mobile devices offer a great potential for learning, and the use of mobile devices to support formal or informal learning is undergoing rapid development. Mobile learning is identified both by 'anywhere and anytime' access to formal or informal learning activities. As Corbeil and Valdes-Corbeil (2007) stated "If appropriately facilitated, mobile learning can benefit learners by providing instructional materials and interaction through their mobile devices wherever and whenever they need it" (p. 54). Although there are an increasing number of studies investigating the utilization of the mobile phones in the delivery of the instruction to the students, there is still much to be learned. That is why it is important to study the effectiveness of mobile learning and the instructional design of its interface. Also the literature reveals that a blended approach to enabling learning with mobile technologies is necessary, instead of using mobile learning alone.

CHAPTER 3

METHOD

This chapter explains the research questions, design of the study, participants involved in the study, data collection procedures, development of instructional materials, data collection instruments, and data analysis procedures.

3.1. Research Questions

1. What is the effect of the use of mobile phones for supporting language learners' vocabulary acquisition?
   a. Does the gain scores (the difference between post and pre tests) in the vocabulary achievement tests differ among the three groups: mobile, web, and printed?
   b. Is there a significant difference between three groups' (mobile, web, and printed) English language vocabulary retention?
   c. Does the gain scores (the difference between post and pre tests) in the pronunciation tests differ among the three groups: mobile, web, and printed?
2. What are the students' perceptions of the use of the mobile phones in their vocabulary learning?
3. What are the students' preferences in using instructional materials provided via mobile phones?
4. Is there a significant difference between three groups' (mobile, web, and printed) motivation regarding the use of instructional materials used in the study?

3.2. Design of the Study

A mixed method approach involving both quantitative and qualitative components was employed in this study as shown in Figure 3.1. The quantitative part of the study followed a pre-test/post-test quasi-experimental design. The qualitative part of the study included post-study semi-structured interviews with the students, and a questionnaire involving open ended questions. The data collected from the interviews and questionnaires were also compared with the log system data which included information about the MMS delivery and web page connection patterns. This comparison allowed us to verify participants' responses and increased the reliability of results.

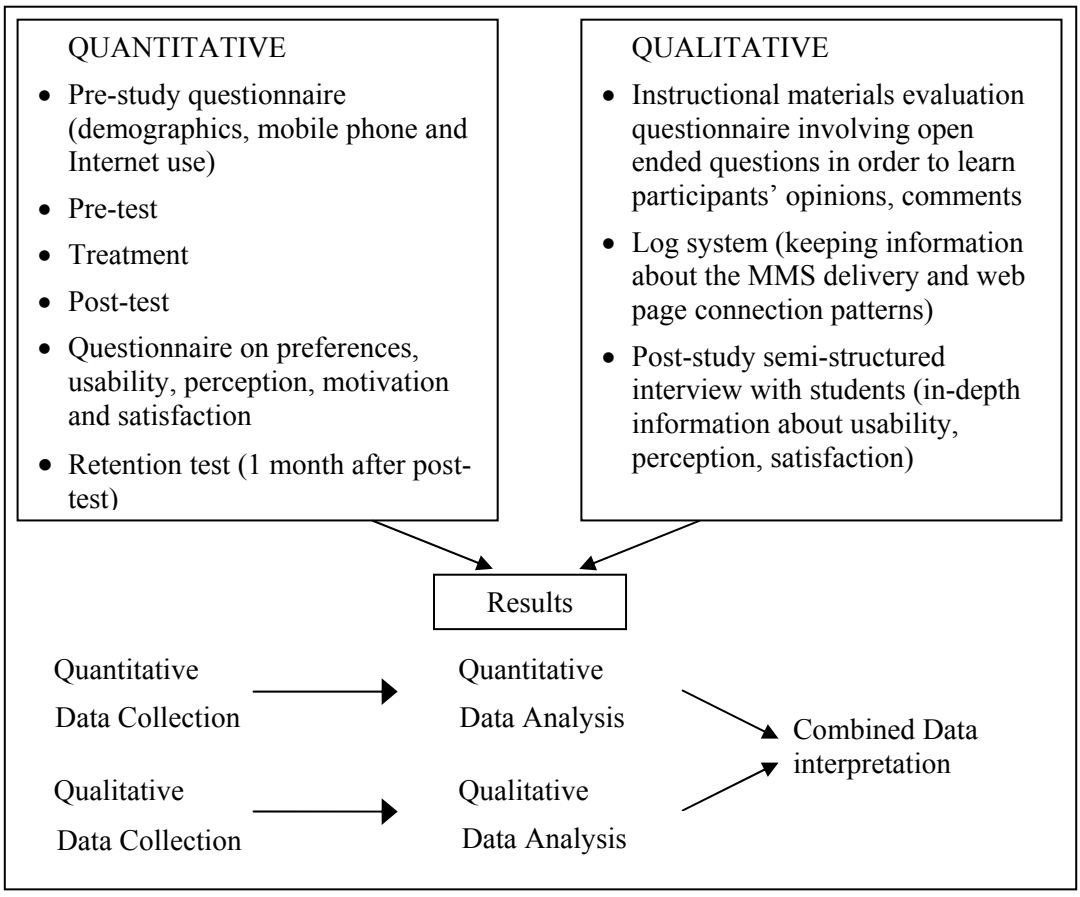


Figure 3.1. Visual representation of the research design used in the study.

The study was conducted in two independent phases. We compared mobile learning supported classroom instruction with regular classroom instruction in the first phase. The first phase was conducted in the Fall 2006 semester during ten weeks. Table 3.1 shows the design of the quantitative part of phase I.

Table 3.1. Design of the quantitative part of the phase I

Groups		**Just before treatment**	**Treatment (10 weeks)**	**Just after treatment**	**1 month after treatment**
Traditional	Elementary Group 1	Vocabulary pre-test	Regular classroom activities	Vocabulary post-test	Retention test
	Pre-int Group 1	Vocabulary pre-test	(No treatment)	Vocabulary post-test	Retention test
Treatment (Mobile)	Elementary Group 2	Vocabulary pre-test	Regular classroom activities supported with mobile learning	Vocabulary post-test	Retention test
	Pre-int. Group 2	Vocabulary pre-test		Vocabulary post-test	Retention test

The second phase was conducted in the Fall 2007 semester. The treatment continued for four weeks. In phase II of the study, three different study modes (mobile, printed, and web) were used as a supplement to regular classroom instruction in order to explore the comparative effectiveness of supplementary materials delivered through 3 different means: mobile phones, web pages, and printed in improving learners' acquisitions of the word items. Table 3.2 explains these three study modes and Table 3.3 shows the design of the quantitative part of phase II.

Table 3.2. Study modes used in the phase II of the study

Study mode	**Explanation**
Mobile	Study materials were sent to participants' mobile phones as multimedia messages (MMS) on different times a day.
Web	Study materials were published on a web page in each day. Only registered participants can access these materials.
Printed	Study materials were distributed to participants as colored handouts each day. The instructor pronounced each word after distributing handouts.

Table 3.3. Design of the quantitative part of the phase II

Groups		Just before treatment	Treatment (4 weeks)	Just after treatment	1 month after treatment
Mobile	Elementary Group 1	Vocabulary pre-test	Regular classroom activities supported with mobile learning	Vocabulary post-test	Retention test
	Pre-int Group 1	Vocabulary pre-test		Vocabulary post-test	Retention test
Web	Elementary Group 2	Vocabulary pre-test	Regular classroom activities supported with web-based learning	Vocabulary post-test	Retention test
	Pre-int. Group 2	Vocabulary pre-test		Vocabulary post-test	Retention test
Printed	Elementary Group 3	Vocabulary pre-test	Regular classroom activities supported with printed study materials	Vocabulary post-test	Retention test
	Pre-int. Group 3	Vocabulary pre-test		Vocabulary post-test	Retention test

3.3. Participants of the Study

The participants of this study were students attending the English Preparatory School of a university before they start their studies in their departments. A purposeful sample of students was selected based on the data collected through a pre-study questionnaire. This survey instrument included the items related to the demographic information about the students, their mobile phone ownership, and their use of mobile phones in their daily life, etc. This instrument was distributed to all students during the English proficiency exam conducted at the beginning of the academic year. The mobile group participants were selected among the students who had MMS supported mobile phones and web group participants were selected among the students who had home computers connected to the Internet.

The participants of phase I were 62 students as shown in Table 3.4. Half of these 62 students formed the traditional group and the other half the treatment group. Sixteen students in the elementary level and 15 students in the pre-intermediate level formed the two treatment groups. Fifteen students in the elementary level and 16 students in the pre-intermediate level formed the two traditional groups.

Table 3.4. Distributions of participants in the phase I of the study

Gender	Mobile		Traditional		Total
	Elem.	*Pre-int.*	*Elem.*	*Pre-int.*	
Female	9	9	7	8	33
Male	7	6	8	8	29
Total	16	15	15	16	**62**

The participants of phase II were 103 students as shown in Table 3.5. Eighteen students in the elementary level and 17 students in the pre-intermediate level formed the two mobile groups. Seventeen students in the elementary level and 17 students in the pre-intermediate level formed the two printed groups. Eighteen students in the elementary level and 16 students in the pre-intermediate level formed the two web groups.

Table 3.5. Distributions of participants in the phase II of the study

Gender	Mobile		Printed		Web		Total
	Ele.	*Pre-int*	*Ele.*	*Pre-int*	*Ele.*	*Pre-int*	
Female	10	8	9	8	10	8	53
Male	8	9	8	9	8	8	50
Total	18	17	17	17	18	16	**103**

Eight students in each elementary group participated to the pronunciation tests as figured out in Table 3.6.

Table 3.6. Distributions of participants of the pronunciation tests

Gender	Mobile	Printed	Web
Female	5	4	5
Male	3	4	3
Total	8	8	8

3.4. Procedures of the Study

A one week pilot study was held in the summer school of the 2006-2007 academic year prior to the application of the first phase of the study. This pilot study was carried out to evaluate the visual design, instructional design, and usability through questionnaire and interviews. Multimedia messages for 12 English words were developed for the pilot study. Some improvements had been made on instructional materials according to feedbacks from the students. After pilot study finished, a total of 120 English words selected from the regular classroom instruction were included in the phase I of the study. The word items in both phases I and II of the study were chosen from the weekly TOEFL word list which was introduced in the regular classroom instruction. Different pre- and post-tests were prepared for each level. Pilot testing of achievement tests were also carried out with different participants before the tests were employed in the study. The participants in the treatment groups were provided with multimedia messages (MMSs) as a supplement to their regular classroom activities. In phase I, 3 English words a day were sent to the participants' mobile phones as MMS. These messages were sent during lecture breaks on school days with an hour time space between them. In addition to MMSs, interactive short message service (SMS) quizzes were sent to test their learning. There were a total of 10 quizzes each consisting of 6 multiple choice questions requiring students to choose the correct answer and send their answers to the system via their mobile phones. The detailed information about the MMSs and interactive SMS quiz system are presented in the next section. The participants in the traditional groups only attended their regular classroom activities. They were not supported with supplementary materials.

In the phase II, there were 80 English words. Four words a day were delivered to the participants by using one of the modes that their group belongs to. Multimedia messages were sent during lecture breaks on school days with an hour time space between messages. The handouts including 4 words of the day were distributed after the first lecture session in the morning, and the same 4 words of the day were published on the Internet at 9:00 am. By its very nature the printed group could not access the words' pronunciations all the time. In order to minimize the effects of this

weakness, the instructor pronounced all the words while distributing the handouts. Before and during the implementation, the participants were informed and encouraged about the importance of self-pronouncing the words by the instructors. Twenty of these words that students had generally difficulty in pronouncing were involved in the pronunciation test. The students' pronunciations were recorded by using digital voice recorder just before and after the treatment. A native rater and a nonnative instructor from the preparatory school evaluated the recordings according to the Educational Testing Service (1985) rubric displayed in the data analysis section. The Table 3.7 summarizes the overall study in a chronological order.

Table 3.7. The Overall Study in a Chronological Order

PHASE I **(Comparison of mobile learning with no treatment)**	
Activity	**Date**
Dissertation proposal was defended	December 30, 2004
TUBITAK project proposal was submitted in cooperation with METU, Cankaya University English Preparatory School and HALICI Software	April 2005
TUBITAK accepted to support our project (Project #: SOBAG-105K070, Project duration 2.5 years)	March 2006
A protocol was signed with AVEA. AVEA accepted to support our project by providing free services in order to send SMS and MMS	April 2006
Windows application was developed to send MMS and SMS over the Internet by using AVEA web services	June 2006
Multimedia messages for 12 English words were developed for the pilot study	July 2006
1 week pilot study was conducted at summer school. Some improvements had been made on multimedia messages according to the feedbacks from the students.	August 2006
Pre-study questionnaire was distributed to all new students during the Proficiency exam (450 students) 104 AVEA, 128 TELSIM, 218 TURKCELL 3 AVEA classes and 3 traditional groups were selected based on the results	September 13, 2006
Development of multimedia messages was started (120 words for pre-intermediate level, 120 words for elementary-starter level). A list of word items were provided by English prep. school. HALICI software started to developed the pronunciations and the visual representations of word items	September 2006

Table 3.7. cont'd

Questionnaire investigating detailed information about mobile phone ownership was distributed to all students	October 2, 2006
Pilot testing of achievement tests.	November 1-2, 2006
Pre-tests were given to both treatment & traditional groups	November 8-9, 2006
Experiment began. 3 MMS a day were sent to the treatment groups during 10 weeks. 120 English words for each level were sent during the experiment. Prep. school had been visited regularly for students' feedbacks and problems Traditional groups: No treatment during 10 weeks	November 13, 2006
Interactive SMS quizzes were started to be sent to the students. 6 multiple choice questions a day were sent during 5 weeks	December 11, 2006
Post-tests were given to both treatment & traditional groups	January 15-16, 2007
Instructional materials evaluation questionnaires were distributed to treatment groups	January 17, 2007
Semi structured interviews with students were conducted	January 18, 2007
Retention-tests were given to both treatment & traditional groups	February 15-16, 2007
PHASE I ended	February 16, 2007
Turkish Patent Institute (TPE) accepted our national patent application titled "An Educational Method" including innovative methods for mobile learning (Application #: 2007/03183) Waiting for Austrian Patent Institute's innovation research report	May 10, 2007
The results of the study had been presented to the Thesis Supervising Committee (TSC). TSC advised to conduct a new experiment that compares the effectiveness of treatments having identical supplementary materials via different media.	June 20, 2007
Decided to compare the effectiveness of supplementary vocabulary materials via three different study modes: mobile, web, and paper	June 27, 2007
A paper titled "Technology Enhanced Learning in Foreign Language Education: The Use of Mobile Phones" was presented at AECT 2007 Conference in Anaheim, USA	October 23-27, 2007
PHASE II (Comparison of the effectiveness of mobile, web-based, and printed learning)	
A protocol was signed with 3G BILISIM (Turkcell service provider) in order to use free Turkcell services for sending SMS and MMS.	October 2007

Table 3.7. cont'd

A new Windows application was developed to send MMS over the Internet by using AVEA and TURKCELL web services.	November 2007
A WEB application (for publishing web-based learning materials) and handouts were developed	November 2007
Questionnaire on mobile phone and Internet usage was distributed to all pre-intermediate and elementary groups (3 pre-intermediate, 5 elementary classes. 177 students filled the questionnaire. Analysis indicated there were 84 AVEA, 67 TURKCELL, 25 VODAFONE users. 2 mobile, 2 web, and 2 printed (1 elementary and 1 pre-intermediate classes for each study mode) groups were selected based on the results	November 29, 2007
Pre-tests were distributed. Pre-pronunciation tests: Recorded 24 students' (8 students for each mobile, web, and printed groups) pronunciation of 20 English words.	December 6, 2007
Experiment began (Continued 4 weeks) Mobile groups: 4 MMS a day were sent 80 English words for each level were sent. Web groups: 4 words a day were published on the Internet web page Printed groups: Worksheets (each consisted of 4 words) were distributed on each school day during the experiment Prep. school were visited regularly for students' feedbacks and problems	December 10, 2007
Printed quizzes were distributed to all groups There were 6 multiple choice questions in each quiz Continued 3 weeks	December 17, 2007
Post-tests were distributed. Post-pronunciation tests: Recorded 24 students' (8 students for each mobile, web, and printed groups) pronunciation of 20 English words.	January 15, 2008
Instructional materials evaluation questionnaires were distributed to all groups	January 16, 2008
Semi structured interviews with students were conducted	January 17, 2008
Retention-tests were given to both treatment & traditional groups	February 14, 2008
PHASE II ended.	February 14, 2008
A paper titled "Use of Mobile Phones in Language Learning: Developing Effective Instructional Materials" was presented in WMUTE 2008 International Conference, organized by IEEE Learning Technology division in Beijing, China	March 23-27, 2008

Table 3.7. cont'd

Singed a protocol with 'METU Teknokent' in order to support our international patent application Applied for the international patent of our methods used in the study regarding the use of mobile phones for learning (Application # P-08-037).	May 7, 2008
A paper titled "Using Mobile Phones in Pronunciation Teaching in English-medium Universities in Turkey" was presented in International Conference 2008: Language Issues in English-medium Universities: A Global Concern in Hong Kong	June 18-20, 2008
A paper titled "Mobile Assisted Language Learning: English Pronunciation at Learners' Fingertips" was published in EJER - Eurasian Journal of Educational Research (a SSCI Journal)	January, 2009

3.5. Nature of the Instructional Materials

The English words included in this study were selected from the contents of the regular classroom instruction since the aim of this study was to provide supplementary practice to regular classroom instruction. In this study, four types of instructional materials, namely, multimedia messages, interactive SMS quizzes, web pages, and colored handouts were developed. SMS quizzes and MMSs were sent by using the software developed for this study. All of the study materials used in this study was developed by using the same content.

3.5.1. Software

Two versions of the software (an Internet and a Windows application) that send and process MMSs and SMSs were developed for this study. The applications were developed by using Microsoft .NET software development tools. In order to keep track of participants' log data, a SQL database was developed and embedded into the applications. The server was directly connected to the GSM network via WEB services. This allowed us to keep track of MMS and SMS delivery, and to realize interactive SMS quizzes. Figure 3.2 shows the block diagram of the system developed for the study. The screenshots of the 'send MMS interfaces' of the

software are shown in Figure 3.3 and 3.4. The screenshots of the 'creating a MMS interfaces' of the software are shown in Figure 3.5 and 3.6.

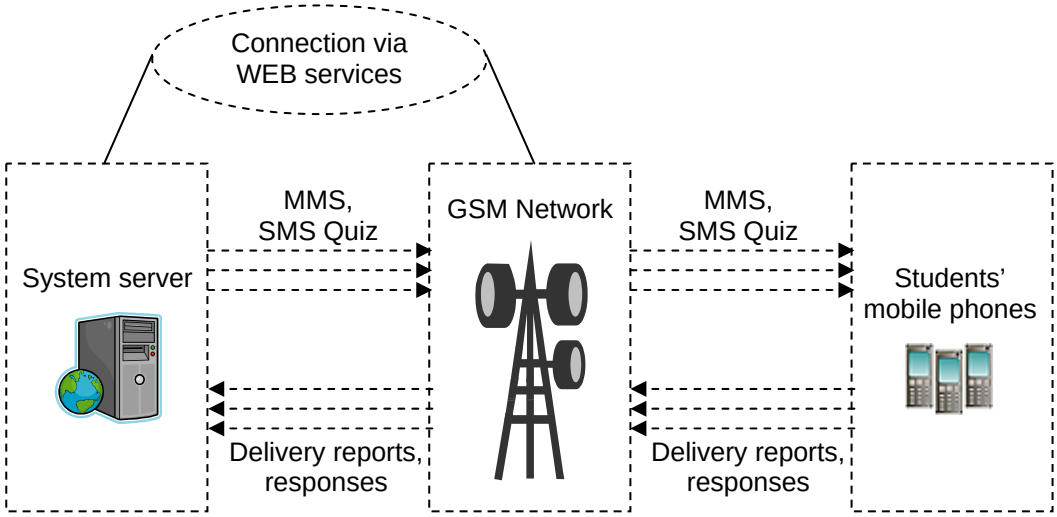


Figure 3.2. Block diagram of the system.

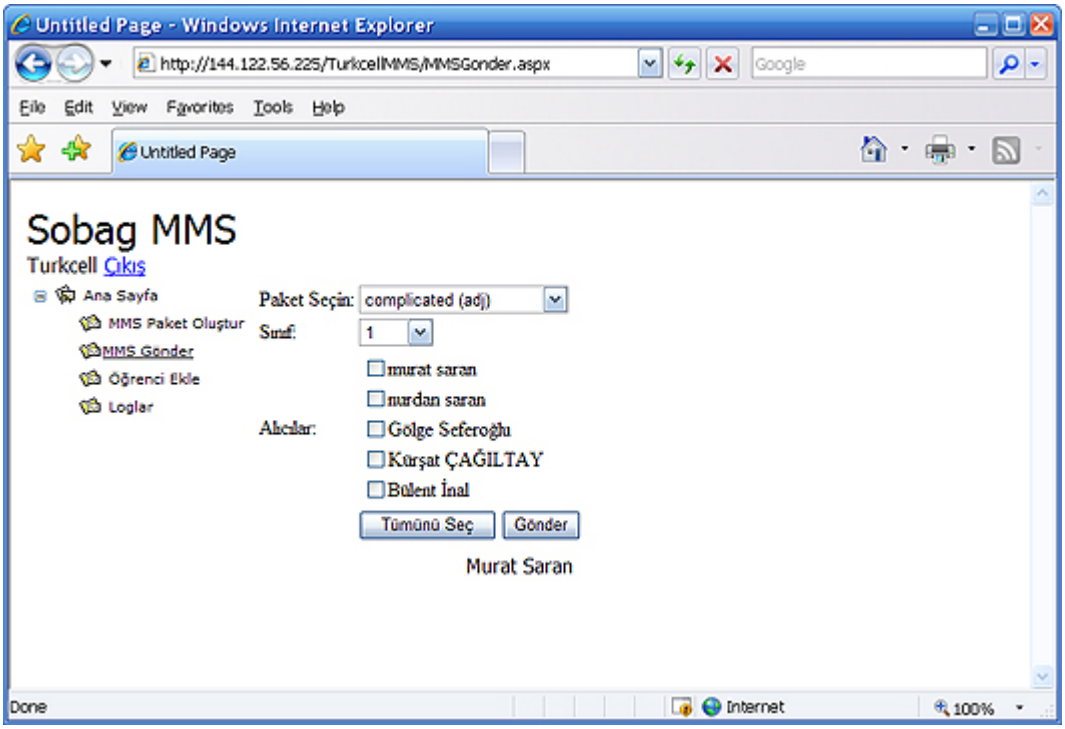


Figure 3.3. Send MMS interface (Internet application)

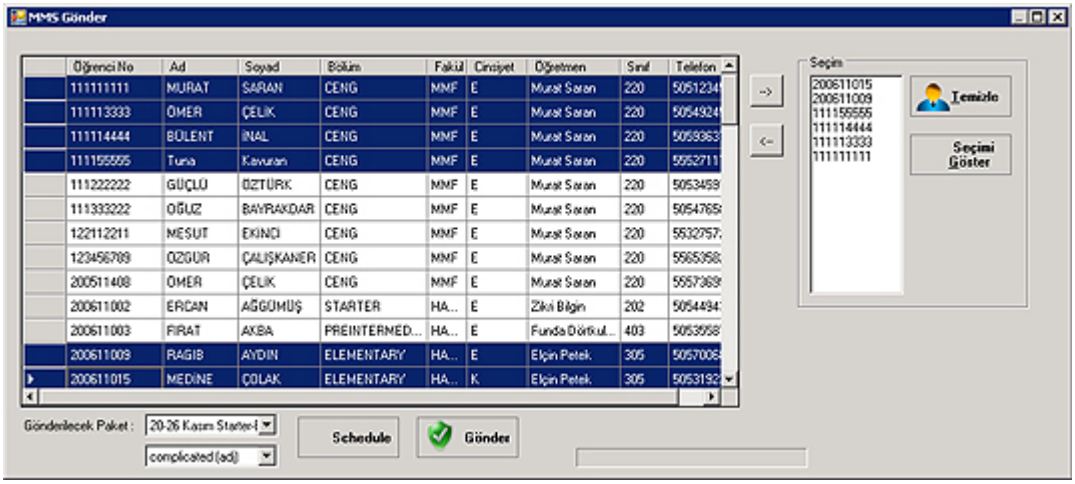


Figure 3.4. Send MMS interface (Windows application)

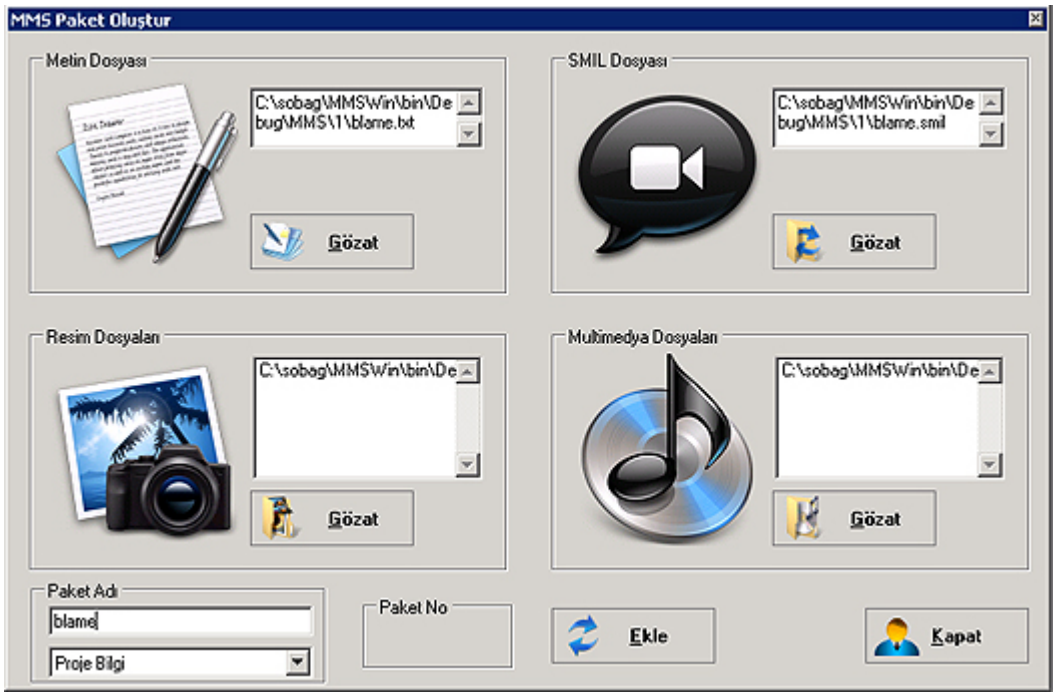


Figure 3.5. Interface of creating a MMS (Windows application)

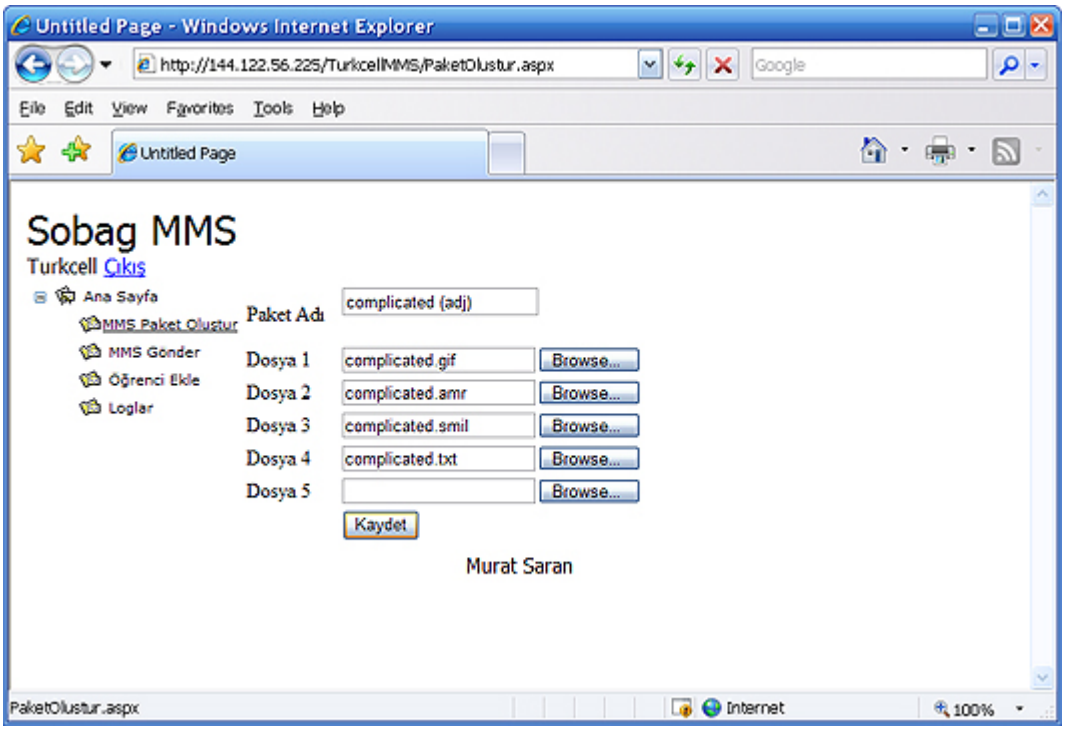


Figure 3.6. Interface of creating a MMS (Internet application)

3.5.2. Multimedia Messages

The multimedia messages (MMS) in this study allowed students to see the definitions of words, example sentences, related pictures, and pronunciations as shown in Figure 3.7. The maximum size of MMS sent to participants was 30 KB including the sound file. This indicates a small size that can be transferred to students' mobile phones in a short time (10-15 sec.), and students can store approximately 8.700 MMS in a 256 MB memory (1 MB=1024 KB). The 3 pictures shown in Figure 3.7 in order from left to right were saved as an animated picture file which pauses 8 seconds between the 3 pictures. The duration of pauses could be adjusted depending on the specific content of each message.

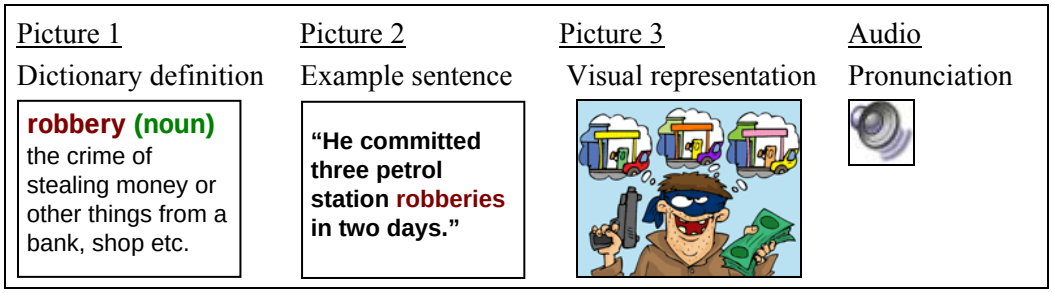


Figure 3.7. An example MMS used in the study.

3.5.3. Specific Issues to Consider While Creating MMS Content for Mobile Phones

In this study, we developed instructional materials for mobile phones operated in second generation GSM networks. There are some technical issues related to the development of MMSs for this type of GSM networks. The followings are our recommendations to consider while creating MMS content for mobile phones operated in second generation GSM networks:

- The ideal size of a multimedia message should be kept at 100K maximum including smil, audio, animated gif, etc. In cases where the message size exceeds 100K and the message is received by a low-capacity mobile phone, there may be a decrease in quality and you may run the risk of the phone not being able to download the message.

- The following data types as listed in Table 3.8 should be used in making up the content of the MMS:

Table 3.8. Recommended data types for content

Content	Recommended data type(s)
video	3gpp
image	(animated) gif / jpeg
audio	amr / midi
text	plain

- Images should have the following resolution:
    - Landscape- 320x240
    - Square- 240x240

- We suggest that the image resolution and image size should be kept at 160x120 and 10KB in cases where there are more than one object images in the content. Table 3.9 displays the maximum number of slides (frames) for each animated gif content. The suggested message size is 100K. With higher resolutions, the number of frames will need to be adjusted.

Table 3.9. Animated gif content

Source resolution	**MMS size**	**Maximum number of frames**
Up to 128x128	100 K	15 frames
128x128 to 176x208	100 K	10 frames

- The following suggestions are offered for the video format:
    - Duration should be maximum 30 seconds
    - Average bitrate should be 128kbps
    - Resolution: 176x144
    - Should support 15 frames per second
    - Preferred input format:
        - 3gp file format
        - Video codec: mpeg4
        - Audio codec: aac

- Table 3.10 shows the recommended audio types with parameters. The suggested message size is 100K for audio content.

Table 3.10. Audio content parameters

Audio format	MMS size	Audio parameters
AMR	100 K	12.2 Kbps, 8 KHz, 16 bps, mono
MP3	100 K – 300 K	128 Kbps, 48 KHz, 16 bps, stereo
AAC	100 K – 300 K	128 Kbps, 48 KHz, 16 bps, stereo

- A slide which only includes text should not exceed 6 lines. More lines will influence the other slides. Text on each slide should be limited to 18-30 words so that the user can scroll easily.

- It is suggested that an MMS include a SMIL presentation in addition to the other content. Synchronized Multimedia Integration Language (SMIL) is a markup language for building time-based, streaming multimedia presentations that combine audio, video, images, and text. The followings are suggested for SMIL presentations:
    - SMIL standards should be followed (OMA1.1, OMA 1.2)
    - SMIL should have a reference to the content title/name
    - Region descriptions within the frame should not overlap
    - Every object in SMIL should be attached/related to an existing region
    - Every MMS/SMIL definition on each slide should be in accordance with OMA
    - Every slide should include a layout and 2 region definitions. Regions may include image and text depending on the need
    - A SMIL should be composed of 7 slides maximum.

3.5.4. Interactive SMS Quiz System

The SMS quiz questions as shown in the Appendix E were the multiple-choice questions requiring students to choose the correct answer and send their answers to the system via their mobile phones. Figure 3.8 illustrates an example SMS quiz question used in the study. Participants needed to answer a series of questions selected at random from a pool of questions. Immediate feedback on each answer

was provided, thereby encouraging them to keep on answering in the shortest possible time.

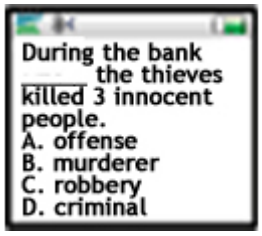


Figure 3.8. An example SMS quiz question

The followings are the main features of our interactive SMS testing system:

- Users might not be available to respond to the SMS quiz questions all the time. Therefore, a start SMS was sent to ask whether a user is ready to start receiving test items. The user can either send a YES or NO response to this initial message. If the user is not ready, then s/he will not respond to this initial message. When the YES response is received from a user, the system starts to send the test items in the determined order. If no response is received within the time limit specified (5 hours in this study), then the system does not send any test items to that user.
- Tests can be composed of any number of test items.
- Tests can be started at any time of the day as identified by the administrator.
- There may be more than one test sent in a day.
- Test items are multiple choice type with 4 response options (A, B, C, D)
- Test items can be answered through 2 possible means:
    - Responding to the received SMS
    - Sending an SMS to the service number (e.g. 5530) provided.
- In order to respond to a test item, a message including the response (A, B, C, D) should be sent to the system through one of the 2 means mentioned above.
- The user must respond the questions within the time limit specified (1 minute in this study). If no response is received within the time limit specified, then the system sends the next test item to that user.

- All information regarding the SMS quiz system are kept in a SQL database.
- All users can receive different test questions randomly selected from the test item bank. The item bank have all items classified according to their difficulty level as ‘easy’, ‘moderate’, or ‘difficult’. The system can automatically select and send the test items based on the criteria set by the administrator.

3.5.5. Web Pages

The web pages were developed by using the same content used in the MMS. Figure 3.9 shows a screenshot from the web application. As in MMSs, each word is explained by using an animated picture file which includes dictionary definition, example sentence, and related visual representations. The web application was developed by using Microsoft .NET software development tools. In order to keep track of participants’ log data, a SQL database was developed and embedded into the web application. This database also stores the registered users’ passwords, and provides a secure authentication system. Only registered users can access the instructional materials published in the web-based vocabulary learning system.

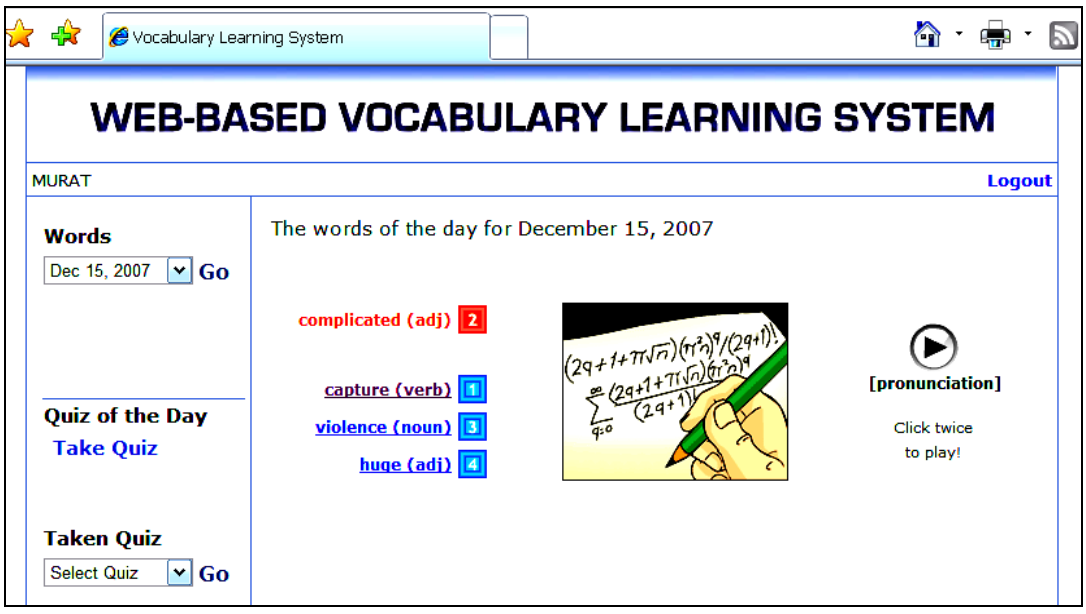


Figure 3.9. A screenshot from the web application used in the study

3.5.6. Handouts

Study materials were distributed to printed groups as colored handouts on each day. The handouts as shown in Figure 3.10 were also developed by using the same content used in the MMS.

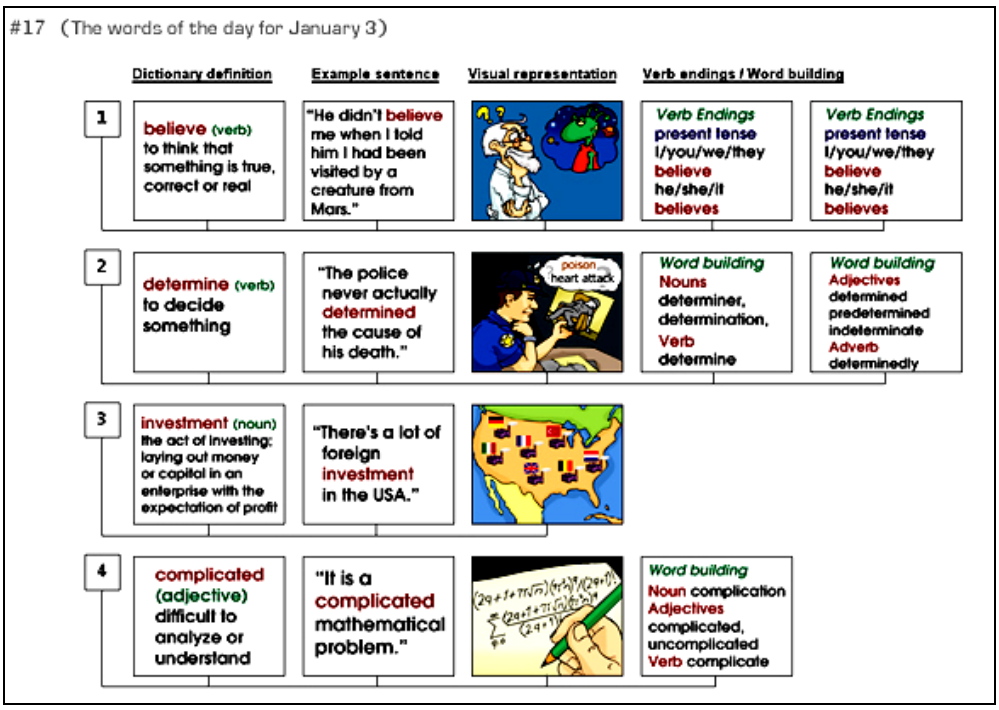


Figure 3.10. An example handout used in the study.

3.6. Instruments

To obtain relevant data to be able to answer the research questions, the following instruments were used in this study.

3.6.1. Vocabulary Achievement Test

For each level (elementary and pre-intermediate), there were 120 English word items in the phase I of the study, and 80 English word items in the phase II of the study. Different tests were developed by the instructors from the English preparatory school for each level. An expert also reviewed the clarity and reliability of these tests. All word items in treatment were included into the achievement tests. Both

tests for phase I and II consisted of fill in the blank questions with appropriate words listed in the boxes. Students could use each word only once. Vocabulary tests used in the study were divided into sections consisting of 8-10 questions. Since a vocabulary test consisting of 120 questions for the phase I would take too much time to complete, the test was divided into two parts, and administered in two consecutive days. A vocabulary test consisting of 80 questions was administered at once. The vocabulary tests used in the phase I and II of the study are presented in Appendix B.

3.6.2. Instructional Materials Evaluation Questionnaire

A questionnaire called 'Instructional Materials Evaluation Questionnaire' was developed in order to gather information about students' preferences, usability, perception, motivation, and satisfaction (see Appendix C). The questionnaire composed of two parts. The first part included the 'Instructional Materials Motivation Survey (IMMS)' that was originally developed by Keller (1993), and then translated into Turkish by Balaban (1993). The second part contained questions investigating students' use of mobile learning and their perceptions. The IMMS survey consisted of 36 items rated on a Likert type scale. A score of 1 was given to "not true", and 5 were given to "very true" for positively worded statements. For negatively worded statements the opposite scores were used. While the possible minimum score got from this survey was 36, the possible maximum score was 180. In this survey, high score shows positive motivation. The survey is based on the Attention, Relevance, Confidence, Satisfaction (ARCS) model of motivational design (Keller, 1987). Keller (1993) categorizes the items under the four essential strategy components as shown in Table 3.11. The numbers in this table are the item numbers in the questionnaire used in the study. These compenents are defined as follows:

- [A]ttention strategies for arousing and sustaining curiosity and interest;
- [R]elevance strategies that link to learners' needs, interests, and motives;
- [C]onfidence strategies that help students develop a positive expectation for successful achievement; and

- [S]atisfaction strategies that provide extrinsic and intrinsic reinforcement for effort (Keller, 1987).

Keller (1993) found the reliability coefficient for IMMS to be 0.96. In this study, it was found to be 0.95 which displayed 95% of the variance of the total motivational scores was reliable and measurement error of the scale was 5%. This indicates high reliability of the IMMS.

Table 3.11. IMMS scoring guide

Attention	Relevance	Confidence	Satisfaction
2	6	1	5
8	9	3 (reverse)	14
11	10	4	21
12 (reverse)	16	7 (reverse)	27
15 (reverse)	18	13	32
17	23	19 (reverse)	36
20	26 (reverse)	25	
22 (reverse)	30	34 (reverse)	
24	33	35	
28			
29 (reverse)			
31 (reverse)			

3.6.3. Interview Form

An interview form (see Appendix D) was developed to collect qualitative data on treatment groups' perceptions about the instructional materials used during the experiment. The purpose of the interview was to determine students' overall reaction to the mobile learning and to determine their satisfaction with the use of multimedia messages for vocabulary learning. Interview questions were reviewed by an expert for clarity of the content.

3.7. Experimental Validity

According to Best and Kahn (1997), 'validity' refers to whether or not you are measuring what you intend to measure. Campbell and Stanley (1966, cited in Best & Kahn, 1997) identify two types of experimental validity, internal validity and external validity. Internal validity refers to whether or not the effects you obtain in your study are due to your independent variable, and not due to some unintended variable (Fraenkel & Wallen, 2000). In other words, if there are alternative explanations to your data then the study does not have internal validity. What is meant by external validity is that, "…the extent to which the variable relationships can be generalized to other settings, other treatment variables, other measurement variables, and other populations" (Best & Kahn, 1997, p. 140).

Internal validity and external validity can be threatened by several factors. However, all possible threats to validity cannot be controlled in any one study since "…there are so many extraneous variables to attempt to control" (Best & Kahn, 1997, p. 141). Campbell and Stanley (1966, cited in Best & Kahn, 1997) identify some of the threats to the validity of designs. The possible threats to internal validity are history, maturation, testing, unstable instrumentation, statistical regression, selection bias, interaction of selection and maturation, experimental mortality, and experimenter bias.

The outcome of the present study can be influenced by events that happen other than part of the experiment (history). In the present study, the possible external events had similar effects on both treatment and traditional groups, in this way this threat was controlled. History threat was also controlled by administering the pre and post-tests to both groups at the same time. Maturation of the participants may be another threat to the internal validity of the study. Maturation refers to physical and mental changes, which occur in the participants during the experiment. Best and Kahn (1997) stated this threat is best controlled by randomly assigning the treatment groups. In this study, random assignment to traditional and treatment groups was not applied. However, the maturation was not a threat in the present study since all the participants were nearly at same age and socioeconomic backgrounds. Testing may be yet another factor affecting the internal validity. Testing threat was unlikely in the

present study since pre-testing affected both groups equally. Unstable instrumentation threat was also unlikely in the study since instrument decay affected both groups equally. The instructors in all groups were not the same in both treatment and traditional groups. In order to minimize the possible negative effects of this threat on experimental validity, four classes for phase I of the study and six classes (three classes in elementary level and three classes in pre-intermediate level) were selected. Lastly, no statistical regression threat was expected in this study because participants were not from the gifted classrooms that can yield extreme scores.

Fraenkel and Wallen (2000) identified two main threats (population validity and ecological validity) related to generalizability of the experimental studies. The generalizations of the findings of this study were limited since convenience sampling was utilized in the present study. However, the findings of this study can be generalized to populations having the same characteristics described in the method part of the study. Moreover, the results of the present study can be generalized to classroom settings similar to this study since the treatments and the instruments were utilized in regular classroom settings.

3.8. Data Analysis

The total scores of each subject for pre, post, and retention tests for vocabulary learning were calculated first. While calculating achievement scores, a score of 1 was given for every correct answer, and a score of 0 was given for an incorrect answer. Since a scale of 100 is a standard for most of the achievement tests, the total scores were than converted into a scale of 100.

The data collected through the achievement tests and motivation questionnaires were analyzed through descriptive and inferential statistics by using the SPSS statistical package. The level of significance for the statistical analyses of the data in this study was set at .05. Independent samples t-test was conducted to compare mobile and traditional groups' achievement scores in the phase I of the study. One-way analysis of covariance (ANCOVA) test was conducted to compare treatment groups' (mobile, web, printed) achievement scores and one-way analysis of variance

(ANOVA) test was conducted to compare treatment groups' motivation scores in the phase II of the study.

The students' pronunciations (in phase II of the study) were recorded by using a digital voice recorder just before and after the treatment. A native rater and a nonnative instructor from the preparatory school evaluated the recordings according to the Educational Testing Service (1985) rubric displayed below:

0: Frequent phonemic errors and foreign stress and intonation patterns that cause the speaker to be unintelligible.
1: Frequent phonemic errors and foreign stress and intonation patterns that cause the speaker to be occasionally unintelligible.
2: Some phonemic errors and foreign stress and intonation patterns, but speaker is intelligible.
3: Occasional nonnative pronunciation errors, but speaker is intelligible.

The data collected through the computer-logs were recorded in electronic spreadsheets by using MS Excel Spreadsheet program. During the implementation, each student's computer-log was recorded in a SQL database. The log data were analyzed by using SQL query statements. During the analysis, the main aim was to see patterns of students' use of instructional materials. The interview data were subjected to content analysis to describe student opinions. For this purpose, students' responses were organized according to the main themes identified for the interview questions. Then, they were interpreted.

CHAPTER 4

RESULTS

As mentioned in the method chapter, two independent phases were conducted with different participants and different research designs in order to yield more reliable results. In this chapter, the findings of both phases are presented.

4.1. Phase I Findings

In this part, the findings of the first phase which was conducted in the Fall 2007 semester are presented. In this section, first, the results of the questionnaire on mobile phone and Internet use that was distributed to participants just before the implementation are provided. Then, the statistical analyses of the vocabulary assessment tests are presented. Finally, the results of the instructional materials evaluation questionnaire exploring students' mobile learning experiences are introduced.

4.1.1. Results of the Questionnaire on Mobile Phone and Internet Use

A questionnaire investigating demographic information, and mobile phone use and ownership was filled up by all the students in the English preparatory school just before the implementation. Sixty two students were selected to be part of this study based on the results of this questionnaire. The following sections present the results of these questionnaires filled up by 62 students who comprise two mobile and two traditional groups in two different levels of English in the prep school.

Gender and Age

There were two mobile groups (1 elementary and 1 pre-intermediate level) which were supported with mobile learning and two traditional groups which did not receive any mobile learning support in this phase. The distribution of female (53%)

and male (47%) participants participated in the first phase of the study were nearly equal among all groups, and a great majority of the participants (80%) participated in the study were between the ages 19 (40%) and 20 (40%) as shown in Table 4.1.

Table 4.1. Distribution of phase I participants concerning their gender and ages

	Mobile				Traditional				Overall	
	Elem.		*Pre-int.*		*Elem.*		*Pre-int.*			
Gender	n	%	n	%	n	%	n	%	n	%
Female	9	56	9	60	7	47	8	50	33	53
Male	7	44	6	40	8	53	8	50	29	47
Total	16	100	15	100	15	100	16	100	62	100
Age	n	%	n	%	n	%	n	%	n	%
18	1	6	2	13	1	7	1	6	5	8
19	8	50	5	33	5	33	7	44	25	40
20	4	25	7	47	8	53	6	38	25	40
21	3	19	1	7	1	7	2	12	7	12

Mobile Phone Ownership

As described in the method section, purposeful sampling method was employed in the study. This method allowed us to compose two treatment groups with students who had mobile phones with MMS feature and a specific GSM operator (AVEA) that we signed a contract before the implementation. Therefore, all of the participants in two treatment groups were users of the same GSM operator, and nearly all of them had mobile phones with MMS feature. The frequencies and percents of participants concerning their mobile phone ownership and GSM operators are presented in Table 4.2. All students participated in the study had at least one mobile phone and 35% of them had two mobile phones.

Table 4.2. Frequencies and percents of phase I participants concerning their mobile phone ownership, their mobile phones' MMS feature, and their GSM operators

	Mobile				Traditional				Overall	
	Elem.		*Pre-int.*		*Elem.*		*Pre-int.*			
# of mobile phone	n	%	n	%	n	%	n	%	n	%
1	12	75	9	60	10	67	9	56	40	65
2	4	25	6	40	5	33	7	44	22	35
None	0	0	0	0	0	0	0	0	0	0
MMS feature	n	%	n	%	n	%	n	%	n	%
Yes	14	88	13	87	11	73	11	69	49	79
No	2	12	2	13	4	27	5	31	13	21
GSM operator	n	%	n	%	n	%	n	%	n	%
Avea	15	100	16	100	4	27	5	31	40	65
Turkcell	0	0	0	0	7	46	8	50	15	24

4.1.2. Results of the Questionnaire on the MMS Usage

In order to identify the participants' mobile phone based use of supplementary materials delivered through mobile phones and to reveal their experiences with the instructional materials on mobile phones and get their suggestions about the implementation, a checklist (in instructional materials evaluation questionnaire, see Appendix C) was delivered to all participants just after the treatment. Table 4.3 shows the results of the checklists. All of the participants (n=31) in the mobile group reported that they read all the multimedia messages that were sent throughout the study.

Since repetition is especially important in vocabulary learning, the question "On an average, how many times did you read each MMS throughout the study?" was posed to find out participants' average number of repetitions. Thirty five percent of the students stated that they read the MMSs only once. Sixty five percent of them stated that they read the messages more than once. Thirty percent of the participants reported that they read the multimedia messages more than twice. The average number of times that students read MMS is 2.03. In addition, a great majority of the

students (89%) reported that they saved the multimedia messages on their phones for future use. These findings suggest that the multimedia messages encouraged the students to repeat the study materials.

Table 4.3. Frequencies and percents of phase I participants concerning their responses to the MMS usage questionnaire questions

	Elem.		Pre-int.		Overall	
	n	%	n	%	n	%
Have you read all multimedia messages that were sent throughout the study?						
Yes	16	100	15	100	31	100
No	0	0	0	0	0	0
On an average, how many times did you read each MMS throughout the study?						
1	3	19	8	53	11	35
2	9	56	2	13	11	35
3	2	13	4	27	6	20
4	2	13	1	7	3	10
Where did you read the multimedia messages?						
My mobile phone	14	88	13	87	27	87
My friend's mobile phone	1	6	0	0	1	3
Operator's Web page	1	6	2	13	3	10
Did you save the multimedia messages in your mobile phone?						
Yes	13	93	11	85	24	89
No	1	7	2	15	3	11
What do you think about the number of 3 MMS sent in a day?						
Very few	1	6	3	20	4	13
Few	4	25	4	27	8	26
Enough	10	63	8	53	18	58
Much	1	6	0	0	1	3
Too much	0	0	0	0	0	0
What do you think about two hours time space between multimedia messages?						
Very few	0	0	0	0	0	0
Few	0	0	1	7	1	3
Enough	11	69	8	53	19	61
Much	5	31	6	40	11	36
Too much	0	0	0	0	0	0

It was one of the aims of this study to find the most suitable scheduling for MMS delivery. Students were sent three multimedia messages in a day on lecture breaks with two hours time space between messages in the phase I. A majority of the participants (58%) found three multimedia messages in a day just right, 39% of them found it to be few, and only 3% of them found it too many. Participants reported that two hours time space is a suitable interval between messages. Sixty one percent of the participants reported that two hours time space is enough, 36% of them found it to be too long and only 3% of them found it short. To sum up, the results of the questionnaire indicate that participants made use of the study materials that were sent as multimedia messages via mobile phones and majority of them found the scheduling used in the study to be appropriate for them.

4.1.3. Vocabulary Gain and Retention

In the first phase of the study, in order to find out the effect of the use of mobile phones for supporting language learners' vocabulary acquisition, a vocabulary assessment test consisting of 120 English word items was developed. Since a vocabulary test consisting of 120 questions would take too much time to complete, the test was divided into two parts, and administered in two consecutive days. These tests were used as pre, post and retention tests. There were three levels as beginner, elementary, and pre-intermediate at the English preparatory school. The elementary and pre-intermediate levels were included in this study. Therefore, the findings are presented for each level separately.

Vocabulary Gain and Retention for Elementary Level Students

The means and standard deviations for each elementary level group on the pre-test, post-test, retention-test, and gain scores for the vocabulary assessment test are presented in Table 4.4. The gain scores (the difference between post- and pre-tests) are 28.59 and 19.68 for elementary level mobile and traditional groups respectively. The results indicate that mobile group performed better than traditional group as illustrated in Figure 4.1.

Table 4.4. Elementary groups' means and standard deviations of the pre-test, post-test, retention-test and gain scores for the vocabulary assessment test

Elementary Group	Pre-test		Post-test		Ret-test		Gain 1*		Gain 2**	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Mobile (n=16)	47.14	11.80	75.73	15.85	76.25	17.28	28.59	5.93	.52	2.85
Traditional (n=15)	44.21	11.10	63.89	12.52	60.99	12.46	19.68	7.36	-2.90	2.48

* Difference between Post-test and Pre-test
** Difference between Retention-test and Post-test

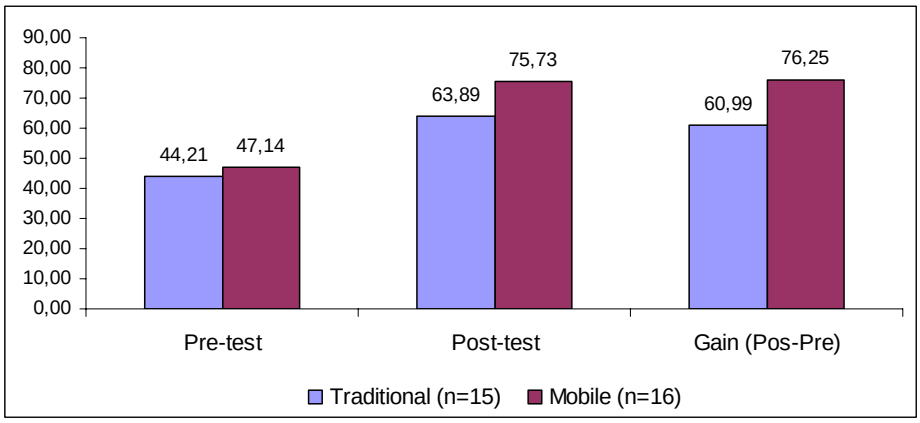


Figure 4.1. Comparison of elementary groups' mean scores on vocabulary assessment test

Independent samples t-test was conducted to evaluate whether the difference between gain scores is statistically significant or not. The independent variable, the treatment, was the mobile learning application. The dependent variable was the average change in the scores from the vocabulary assessment tests implemented before and after the treatment. The t-test was significant, t (29)=3.726, p =.001 as shown in Table 4.5. Students in the elementary level mobile group gained statistically more word items than (M=28.59, SD=5.93) than students in the elementary level traditional group (M=19.68, SD=7.36). The eta square index indicated that approximately 32% of the variance of the vocabulary gain was accounted for by whether a student was assigned to a mobile group or traditional group.

Table 4.5. The results of the independent samples test for elementary groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Average of differences between pre and post scores of vocabulary assessment test	Equal variances assumed	1.160	.290	3.726	29	.001

In order to compare the students' retentions of word items, a retention test was conducted 1 month after the post-test. The retention gain scores (the difference between retention- and post-tests) are .52 and -2.90 for elementary level mobile and traditional groups respectively (Table 4.4). Students in elementary level mobile group increased their scores from post-test to retention-test by .52 (on an average). On the other hand, students in elementary level traditional group decreased their scores by -2.90. The results indicate that students in elementary level mobile group retained more words than students in traditional group.

Independent samples t-test was conducted to evaluate whether the difference between retention gain scores is statistically significant or not. The independent variable, the treatment, was the mobile learning application. The dependent variable was the average change in the scores from the vocabulary assessment tests implemented after the treatment and the vocabulary assessment tests implemented 1 month after the treatment. The t-test was significant, t (29)=3.555, p =.001 as shown in Table 4.6. Students in the elementary level mobile group retained statistically more word items than (M=.52, SD=2.85) than students in the elementary level traditional group (M=-2.90, SD=2.48).

Table 4.6. The results of the independent samples test for elementary groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Average of differences between retention and post test scores of vocabulary assessment test	Equal variances assumed	.020	.889	3.555	29	.001

Vocabulary Gain and Retention for Pre-intermediate Level Students

The means and standard deviations for each pre-intermediate level group on the pre-test, post-test, retention-test, and gain scores for the vocabulary assessment test are presented in Table 4.7. The gain scores (the difference between post- and pre-tests) are 26.33 and 18.32 for pre-intermediate level mobile and traditional groups respectively. The results indicate that mobile group performed better than traditional group as illustrated in Figure 4.2.

Table 4.7. Pre-intermediate groups' means and standard deviations of the pre-test, post-test, retention-test and gain scores for the vocabulary assessment test

Pre-intermediate Group	Pre-test		Post-test		Ret-test		Gain 1*		Gain 2**	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Mobile (n=15)	49.83	10.25	76.17	12.61	77.29	13.53	26.33	6.62	1.12	1.96
Traditional (n=16)	46.69	7.01	65.01	9.08	62.69	11.99	18.32	5.98	-2.32	4.74

* Difference between Post-test and Pre-test
** Difference between Retention-test and Post-test

Independent samples t-test was conducted to evaluate whether the difference between gain scores is statistically significant or not. The independent variable, the treatment, was the mobile learning application. The dependent variable was the average change in the scores from the vocabulary assessment tests implemented before and after the treatment. The t-test was significant, t (29)=3.541, p =.001 as

shown in Table 4.8. Students in the pre-intermediate level mobile group gained statistically more word items than (M=26.33, SD=6.62) than students in the elementary level traditional group (M=18.32, SD=5.98). The eta square index indicated that approximately 30% of the variance of the vocabulary gain was accounted for by whether a student was assigned to a mobile group or traditional group.

Table 4.8. The results of the independent samples test for pre-intermediate groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Average of differences between pre and post scores of vocabulary assessment test	Equal variances assumed	.014	.905	3.541	29	.001

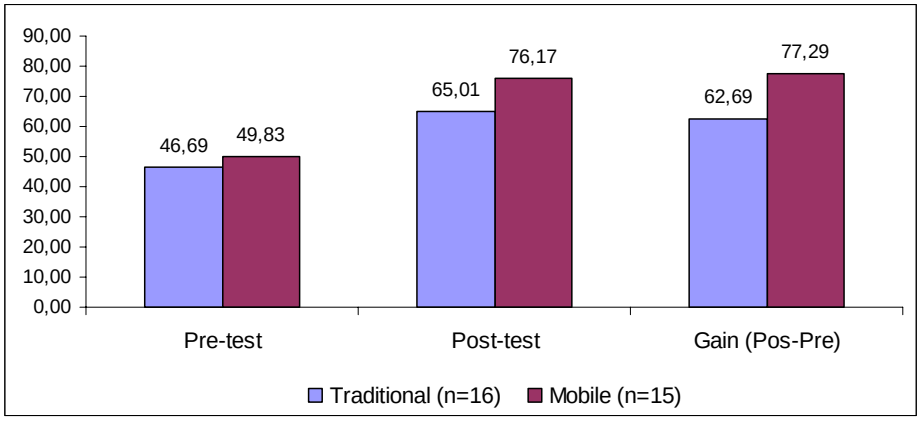


Figure 4.2. Comparison of pre-intermediate groups' mean scores on vocabulary assessment test

In order to compare the students' retentions of word items, a retention test was conducted 1 month after the post-test. The retention gain scores (the difference between retention- and post-tests) are 1.12 and -2.32 for pre-intermediate level mobile and treatment groups respectively (Table 4.7). Students in pre-intermediate level mobile group increased their scores from post-test to retention-test by 1.12 (on

an average). On the other hand, students in pre-intermediate level traditional group decreased their scores by -2.32. The results indicate that students in pre-intermediate level mobile group retained more words than students in traditional group.

Independent samples t-test was conducted to evaluate whether the difference between retention gain scores is statistically significant or not. The independent variable, the treatment, was the mobile learning application. The dependent variable was the average change in the scores from the vocabulary assessment tests implemented after the treatment and the vocabulary assessment tests implemented 1 month after the treatment. The t-test was significant, t (29)=2.610, p =.014 as shown in Table 4.9. Students in the pre-intermediate level mobile group retained statistically more word items than (M=1.12, SD=1.96) than students in the pre-intermediate level traditional group (M=-2.32, SD=4.74).

Table 4.9. The results of the independent samples test for pre-intermediate groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Average of differences between retention and post test scores of vocabulary assessment test	Equal variances assumed	9.985	.004	2.610	29	.014

As a summary, retention (the difference between retention- and post-tests) and gain scores (the difference between post- and pre-tests) of students who were exposed to this mobile learning application were higher than that of traditional groups. This result may suggest that the mobile phone application helped the treatment group students learn the English words better than traditional groups.

4.1.4. The Results of the Open Ended Questions in the Instructional Materials Evaluation Questionnaire

One of the aims of the study was to explore the students' perceptions regarding the use of mobile phones for supporting their vocabulary learning. Therefore, the second

research question was asked as: What are the students' perceptions of the use of the mobile phones in their vocabulary learning? In order to gather data on this question, a questionnaire called 'Instructional Materials Evaluation Questionnaire' was delivered just after the treatment. There were three open ended questions in this questionnaire.

The first open ended question was 'What do you like most about this mobile application?' Table 4.10 presents the pre-intermediate group students' responses, and Table 4.11 presents the elementary group students' responses. Two students in pre-intermediate group and a student in elementary group did not respond to the question. Out of 28 students who responded the question, ten students indicated that pictures and example sentences were nice. Five respondents indicated that they liked the approach because it was useful for learning and retaining new words. In addition, some respondents found the application unique and some found it to be very entertaining. Two students indicated that they liked the application because the contents were related with their courses.

Table 4.10. What do you like most about this mobile application? [Phase I, pre-intermediate group]

1 Pictures, pronunciations, and example sentences were very nice.
[Resimler seslendirmeler örnek cümleler çok güzeldi.]

2 Pictures and pronunciations.
[Seslendirmeler ve resimler.]

3 Helped me to learn new words.
[Kelime öğrenmede faydası oldu.]

4 Involving pictures and providing word building.
[Resimli olması ve kelimenin yapısının verilmesi.]

5, 12
[did not respond]

6 Being in high quality.
[Kaliteli olması.]

7 I liked to learn the words that I didn't know before.
[Bilmediğim kelimeleri öğrenmem hoşuma gitti.]

8 MMSs were good.
[MMS ler güzeldi.]

9 Being different.
[Değişik olması.]

10 Pictures, pronunciations, and example sentences were nice.
[Resimler seslendirmeler örnek cümleler güzeldi.]

11 Pictures, pronunciations.
[Resimler ve seslendirmeler.]

13 The idea of coming words to my mobile phone was very entertaining.
[Kelimelerin cep telefonuma gelmesi fikri çok eğlenceliydi.]

14 Example sentences.
[Örnek cümleler.]

15 Being related with the course.
[Dersle ilgili olması.]

Table 4.11. What do you like most about this mobile application? [Phase I, elementary group]

1	I learned new words. [Yeni kelimeler öğrendim.]
2	[did not respond]
3	It was a pleasurable application. [Zevkli uygulamaydı.]
4	I remembered the words that I've forgotten. [Unuttuğum kelimeleri hatırladım.]
5	It was fascinating. [Çok etkileyiciydi.]
6	It facilitated vocabulary learning. [Kelime öğrenmeyi kolaylaştırdı.]
7	Great opportunity and free. [Büyük fırsattı ve ücretsizdi.]
8	I learned new words. [Yeni kelimeler öğrendim.]
9	Involving pictures and providing word building. [Resimli olması ve kelimenin yapısının verilmesi.]
10	Pictures, pronunciations, and example sentences were nice. [Resimler seslendirmeler örnek cümleler güzeldi.]
11	Words were from our courses. [Derslerdeki kelimeleri içermesi.]
12	The method of explaining words and pronunciations were nice. [Sözcüklerin anlatım yöntemi ve telaffuzlar güzeldi.]
13	Pictures, pronunciations, and example sentences were very nice. [Resimler, seslendirmeler ve örnek cümleler çok güzeldi.]
14	Motivate me to study vocabulary. [Kelime çalışma konusunda harekete geçmemi sağladı.]
15	With example sentences words' definitions were very instructive. [Kelime anlamları gelen örnek cümleler sayesinde çok öğreticiydi.]
16	Being designed well. [İyi tasarlanmış olması.]

The second open ended question (What do you dislike most about this mobile application?) was the reverse of the first question. Table 4.12 presents the pre-intermediate group students' responses, and Table 4.13 presents the elementary group students' responses. Four students out of 31 students did not respond to this question. Seventeen students used the word "nothing" in their answers. This indicates that majority of the students acknowledged the convenience of the method used in the study. However, some students reported negative opinions. Throughout the study, same words were sent more than once for the purpose of repetitive exposure. Four students stated that they did not like to receive the same words more than once. There were also some problems with the SMS quiz system because of the limited SMS storage capacity of some mobile phones. This caused the quiz questions to be queued in the base station. When students' mobile phones become available to receive SMSs, the questions were sent immediately without waiting students to respond to the previous question. Five students reported this problem and stated that they did not like it. Overall responses that reported negative aspects to this question constitute 37% of the students.

Table 4.12. What do you dislike most about this mobile application? [Phase I, pre-intermediate group]

1, 3, 4, 6, 8, 9, 11, 13, 15	Nothing. [Yok]
2	Questions in some SMS quizzes were coming consecutively. [Bazı quizlerde sorular ard arda geliyordu.]
5, 12	[did not respond]
7	Receiving the same words more than once. [Aynı kelimelerin birden fazla gelmesi.]
10	Receiving the same MMS several times. [Aynı MMS lerin birkaç kez gelmesi.]
14	The problems in SMS quizzes. [SMS quizlerde karşılaşılan sorunlar.]

Table 4.13. What do you dislike most about this mobile application? [Phase I, elementary group]

1	Questions in some SMS quizzes were coming irregularly. [Bazı SMS quizlerde sorular düzensiz geliyordu.]
2	Timing problems for SMS quiz questions. [SMS quiz sorularında olan zamanlama problemleri.]
3	I didn't like to receive messages frequently. [Sık sık mesaj gelmesi hoşuma gitmedi.]
4, 6	[did not respond]
5, 8, 9, 10, 12, 14, 15, 16	Nothing. [Yok]
7	Receiving the same word several times. [Aynı kelimenin bir kaç kere gelmesi.]
11	Short time for responding quiz questions. [Quiz sorularına cevap verme zamanının kısa olması.]
13	Receiving the same word more than once. [Aynı kelimenin birden fazla gelmesi.]

The third open ended question was as follows: Do you think that this method is good for vocabulary learning? Why? Table 4.14 and 4.15 show the pre-intermediate and elementary groups' responses to the question. Only a student in the pre-intermediate group did not respond to this question. The responses show that nearly all of the students (a student in elementary group stated "partly") found it very useful. Although most of the students did not state the reasons, some students (n=11) provided their reasons. For example, a student in the pre-intermediate group stated "…a good opportunity to review anytime you want". In addition, 3 students stated that the pictures used in the MMSs were helpful to retain words in memory.

Table 4.14. Do you think that this method is useful for vocabulary learning? Why? [Phase I, pre-intermediate group]

1	It's perfect for practice. It's useful if you repeat. [Pratik yapmak için ideal. Tekrar edilince işe yarıyor.]
2, 4, 15	Absolutely. [Kesinlikle.]
3	More than enough. [Fazlasıyla]
5, 14	Yes. [Evet.]
6	Yes, a good opportunity to review anytime you want. [Evet istediğin zaman tekrar bakmak için iyi bir olanak.]
7	Great. [Mükemmel.]
8	Yes a good method. [Evet iyi bir yöntem.]
9	Evet. MMSs are catchy. [MMS ler akılda kalıcı.]
10	Partly. [Kısmen.]
11	Yes. It's a good method especially for repetition. [Evet. Özellikle tekrar açısından iyi bir yöntem.]
12	[did not respond]
13	Yes. A useful method. [Evet. Faydalı bir yöntem]

Table 4.15. Do you think that this method is useful for vocabulary learning? Why? [Phase I, elementary group]

1	Yes absolutely. Visual explanations are nice. [Evet kesinlikle. Görsel anlatımlar güzel.]
2	Yes. Explanations with pictures are very nice and help to retain in memory. [Evet. Resimli anlatımlar çok güzel ve akılda kalmasını sağlıyor.]
3, 13	Yes a good method. [Evet iyi bir yöntem.]
4, 6, 9, 12, 14	Yes. [Evet.]
5	Yes. Explanations were good. [Evet. Açıklamalar iyiydi.]
7, 10	Absolutely. [Kesinlikle.]
8	Yes. Even reading messages only once helps to retain in memory. [Evet. Mesajları bir kere okumak bile akılda kalmaya yardımcı oluyor.]
11	Yes. Pictures helped to retain words permanently. [Evet. Resimler kalıcı olmasını sağlıyor.]
15	Yes. Because message contents were related to the words in our courses. [Evet. Çünkü mesaj içerikleri derslerdeki kelimelerle ilgiliydi.]
16	Yes. My mobile phone served me a sort of study tool. [Evet. Cep telefonum bir nevi ders çalışma aracı görevi gördü.]

4.2. Phase II Findings

In the phase II of the study, three different study modes (mobile, printed, and web) were used as a supplement to regular classroom instruction in order to explore the comparative effectiveness of supplementary materials delivered through 3 different means: mobile phones, web pages, and printed in improving learners' acquisitions of the word items. In this section, the findings related to the second phase which was conducted in the Fall 2008 semester are presented. First, the results of the questionnaire on mobile phone and Internet use that was distributed to participants just before the implementation are provided. Then, the statistical analyses of the vocabulary assessment tests are presented. Next, the results of the instructional materials evaluation questionnaire are introduced. Finally, the results of the interviews are provided in this chapter.

4.2.1. Results of the Questionnaire on Mobile Phone and Internet Use

In this section, the analyses of the answers of 103 students to the questionnaire on mobile phone and Internet use are provided. The questionnaire was distributed to students just before the implementation.

Gender and Age

The participants of the phase II were 103 students as shown in the Table 4.16. Eighteen students in the elementary level and 17 students in the pre-intermediate level formed the two mobile groups. Seventeen students in the elementary level and 17 students in the pre-intermediate level formed the two printed groups. Eighteen students in the elementary level and 16 students in the pre-intermediate level formed the two web groups. The distribution of female (51%) and male (49%) students participated in the study were nearly equal among all groups, and a great majority of the students (78%) participated in the study were between the ages 19 (33%) and 20 (45%) as shown in Table 4.16.

Table 4.16. Frequencies and percents of participants concerning their gender and age

	Mobile				Printed				Web				
	Elem.		*Pre-int.*		*Elem.*		*Pre-int.*		*Elem.*		*Pre-int.*		Overall
Gender	n	%	n	%	n	%	n	%	n	%	n	%	n %
Female	9	50	8	47	9	53	8	47	10	56	8	50	52 51
Male	9	50	9	53	8	47	9	53	8	44	8	50	51 49
Total	18	100	17	100	17	100	17	100	18	100	16	100	103 100
Age	n	%	n	%	n	%	n	%	n	%	n	%	n %
18	4	22	2	12	2	12	1	6	4	22	1	6	14 13
19	6	33	5	29	1	6	9	53	5	28	8	50	34 33
20	7	39	8	47	13	76	6	35	6	33	6	38	46 45
21	1	6	2	12	1	6	1	6	3	17	1	8	9 9

Mobile Phone Ownership

The questionnaire results indicated that all students participated in the study had at least one mobile phone, and nearly half of them had two mobile phones (Table 4.17). Since purposeful sampling method was used as explained in the method chapter, all of students in mobile groups had MMS supported mobile phones. In the first phase of the study conducted just one year before this phase, out of 62 students, 21% of the students did not have MMS supported mobile phones. However, only 3 students in printed groups and 1 student in web groups did not have MMS supported mobile phones in this phase corresponding to nearly 4% of the 103 students. This indicates that MMS feature is becoming more available in the mobile phones.

Table 4.17. Frequencies and percents of participants concerning their mobile phone ownership, their mobile phones' MMS feature, and their GSM operators

	Mobile				Printed				Web				
	Elem.		*Pre-int.*		*Elem.*		*Pre-int.*		*Elem.*		*Pre-int.*		Overall
# of mobile phone	n	%	n	%	n	%	n	%	n	%	n	%	n %
1	10	56	8	47	9	53	12	70	9	50	8	50	56 54
2	8	44	9	53	8	47	5	30	9	50	8	50	47 46
MMS feature	n	%	n	%	n	%	n	%	n	%	n	%	n %
Yes	18	100	17	100	16	94	15	88	18	100	15	94	99 96
No	0	0	0	0	1	6	2	12	0	0	1	6	4 4
GSM operator	n	%	n	%	n	%	n	%	n	%	n	%	n %
Avea	6	33	7	41	8	47	6	35	6	33	7	44	40 39
Turkcell	10	56	8	47	6	35	8	47	7	39	6	37	45 44
Vodafone	2	11	2	12	3	18	3	18	5	28	3	19	18 17

4.2.3. Results of the Questionnaire on the MMS Usage

In order to identify the participants' mobile phone based supplementary material use and to reveal their experiences with the instructional materials and get their suggestions about the implementation, a checklist (in instructional materials evaluation questionnaire) was delivered to all participants just after the treatment. Table 4.18 shows the analysis of the checklists. Ninety four percent of the participants (n=35) in two mobile groups reported that they read all the multimedia messages that were sent throughout the study.

Since repetition is especially important in vocabulary learning, the question "On an average, how many times did you read each MMS throughout the study?" was posed to find out participants' average number of repetitions. Only 15% of the students stated that they read the MMSs only once. Eighty five percent of them stated that they read the messages more than once. Twenty seven percent of the participants reported that they read the multimedia messages more than twice. The average number of times that students read MMS is 2.32. In addition, a great majority of the students (85%) reported that they saved the multimedia messages on their phones for

future use. These findings suggest that the multimedia messages encouraged the students to repeat the study materials.

It was one of the aims of this study to find the most suitable scheduling for MMS delivery. Students were sent four multimedia messages in a day on lecture breaks with an hour time space between messages in the phase II. A great majority of the participants (73%) found four multimedia messages in a day just right, 18% of them found it to be few, and 9% of them found it too many. Similarly, participants reported that an hour time space is the most suitable interval between messages. Seventy nine percent of the participants reported that an hour time space is enough, 9% of them found it to be short, and 12% of them found it too long. To sum up, the results of the questionnaire indicate that participants made use of the study materials that were sent as multimedia messages via mobile phones and they found the scheduling used in the study to be appropriate for them.

Table 4.18. Frequencies and percents of participants concerning their responses to the questionnaire questions

	Elem.		Pre-int.		Overall	
	n	%	n	%	n	%
Have you read all multimedia messages that were sent throughout the study?						
Yes	16	88	17	100	33	94
No*	1	6	0	0	1	3
No**	1	6	0	0	1	3
* : Different operator	** : MMS feature is not supported					
On an average, how many times did you read each MMS throughout the study?						
1	3	19	2	12	5	15
2	7	44	12	71	19	58
3	5	31	2	12	7	21
4	1	6	1	6	2	6
Did you save the multimedia messages in your mobile phone?						
Yes	14	88	14	82	28	85
No*	2	12	2	12	4	12
No**	0	0	1	6	1	3
* : Due to insufficient memory	** : I found it unnecessary					
Where did you read the multimedia messages?						
My mobile phone	14	88	16	94	30	91
My friend's mobile phone	2	12	0	0	2	6
Operator's Web page	0	0	1	6	1	3
What do you think about the number of 4 MMS sent in a day?						
Very few	0	0	1	6	1	3
Few	0	0	5	29	5	15
Enough	14	88	10	59	24	73
Much	2	12	0	0	2	6
Too much	0	0	1	6	1	3
What do you think about an hour time space between multimedia messages?						
Very few	0	0	2	12	2	6
Few	0	0	1	6	1	3
Enough	15	94	11	65	26	79
Much	0	0	3	18	3	9
Too much	1	6	0	0	1	3

4.2.4. Vocabulary Gain and Retention

There were three levels as beginner, elementary, and pre-intermediate at the English preparatory school. The elementary and pre-intermediate levels were included in this study. Therefore, the findings are presented for each level separately.

Vocabulary Gain and Retention for Elementary Level Students

The means and standard deviations for each elementary level group on the pre-test, post-test, retention-test, and gain scores for the vocabulary assessment test are presented in Table 4.19. The gain scores (the difference between post- and pre-tests) are 20.37, 13.87, and 11.15 for elementary level mobile, printed, and web groups respectively. The results indicate that elementary level mobile group performed better than printed and web groups as illustrated in Figure 4.3.

Table 4.19. Elementary level groups' means and standard deviations of the pre-test, post-test, retention-test and gain scores for the vocabulary assessment test

Elementary Group		Pre-test		Post-test		Ret-test		Gain 1*		Gain 2**	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Mobile	(n=17)	54.91	9.81	75.28	11.27	76.91	12.09	20.37	5.96	1.63	3.73
Printed	(n=17)	53.85	7.45	67.72	9.06	66.03	8.99	13.87	6.43	-1.69	4.10
Web	(n=16)	57.64	9.42	68.79	12.36	68.53	11.46	11.15	8.72	-.26	3.87

* Difference between Post-test and Pre-test
** Difference between Retention-test and Post-test

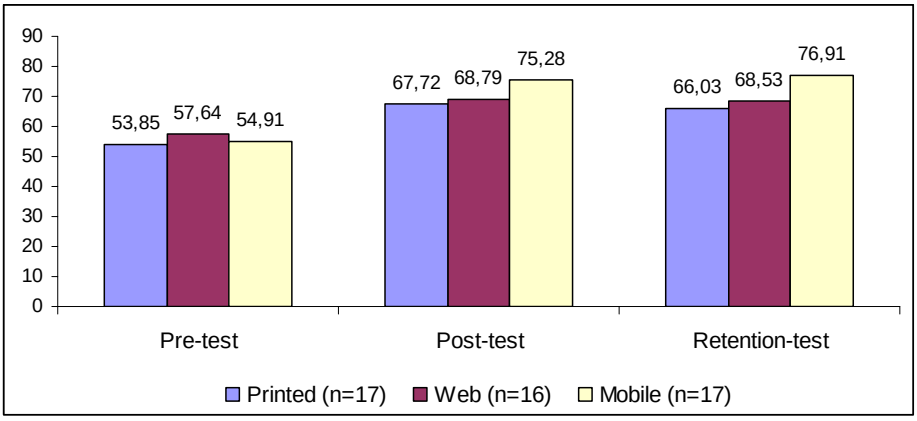


Figure 4.3. Comparison of elementary level groups' mean scores on vocabulary assessment test

In order to understand whether the differences are statistically significant or not, one-way analysis of covariance (ANCOVA) was conducted. The independent variable, study method, included three modes: mobile, printed, and web. The dependent variable was the gain score (the difference between post-test and pre-test) and the covariate was the pre-test scores. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(2,50)=.064$, MSE=3.460, $p=.938$, partial $\eta^2=.003$. The ANCOVA was significant, $F(2, 50) = 7.500$, MSE=388.851, $p=.001$ (Table 4.20). The strength of relationship between treatment and gain scores, as assessed by Eta Squared, was strong, with the treatment factor accounting for 23.4% of the variance of the dependent variable holding constant the pre-test scores.

Table 4.20. The results of ANCOVA analysis concerning elementary level groups' gain scores on vocabulary achievement test

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Pre-test (covariate)	16.540	1	16.540	.319	.575	.006
Group	777.702	2	388.851	7.500	.001	.234
Error	2540.353	49	51.844			

The means of the gain scores adjusted for initial differences were ordered as expected across the three study modes. The mobile group had the largest adjusted mean ($M=20.33$), the printed group had a smaller adjusted mean ($M=13.76$), and the web group had the smallest adjusted mean ($M=20.33$). Follow-up test was conducted to evaluate pair-wise differences among these adjusted means. The Holm's sequential Bonferroni procedure was used to control Type I error across the three pairwise comparisons. There were significant differences in the adjusted means between mobile and the other two groups with a p values smaller than .05 (printed group p=.010, web group p=.000) (Table 4.21). On the other hand, there were not significant differences in adjusted means between printed and web groups with a p value .322 greater than .05. These results suggest that students in elementary level

mobile groups gained more vocabulary items than students in printed and web groups.

Table 4.21. Pairwise mean comparison results for elementary level groups

Dependent Variable: Gain scores (Post-test – Pre-test)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	6.569(*)	2.438	.010	1.670	11.469
Mobile	Web	9.042(*)	2.420	.000	4.179	13.905
Printed	Web	2.472	2.473	.322	-2.497	7.444

* The mean difference is significant at the .05 level.

In order to compare the students' retentions of word items, a retention test was conducted 1 month after the post-test. The retention gain scores (the difference between retention- and post-tests) are 1.63, -1.69, and -.26 for elementary level mobile, printed, and web groups respectively (Table 4.19). Students in elementary level mobile group increased their scores from post-test to retention-test by 1.63 (on an average). On the other hand, students in elementary level printed and web groups decreased their scores by -1.69 and -.26 respectively. The results indicate that students in elementary level mobile group retained more words than students in printed and web groups.

In order to understand whether the differences are statistically significant or not, one-way analysis of covariance (ANCOVA) was conducted. The independent variable, study method, included three modes: mobile, printed, and web. The dependent variable was the retention gain score (the difference between retention-test and post-test) and the covariate was the pre-test scores. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(2,50)=1.093$, MSE=16.162, $p=.344$, partial $\eta^2=.044$. The ANCOVA was significant, $F(2, 50) = 3.427$, MSE=50.863, $p=.040$ (Table 4.20). The strength of relationship between treatment and gain scores, as

assessed by Eta Squared, was moderate, with the treatment factor accounting for 12.3% of the variance of the dependent variable holding constant the pre-test scores.

Table 4.22. The results of ANCOVA analysis concerning elementary level groups' retention gain scores on vocabulary achievement test

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Pre-test (covariate)	33.497	1	33.497	2.257	.139	.044
Group	101.727	2	50.863	3.427	.040	.123
Error	727.749	49	14.482			

The means of the gain scores adjusted for initial differences were ordered as expected across the three study modes. The mobile group had the largest adjusted mean (M=1.57), the printed group had a smaller adjusted mean (M=-.07), and the web group had the smallest adjusted mean (M=-1.84). Follow-up test was conducted to evaluate pair-wise differences among these adjusted means. The Holm's sequential Bonferroni procedure was used to control Type I error across the three pairwise comparisons. There was a significant difference in the adjusted means between mobile and the web groups with a p value smaller than .05 (p=.012, see Table 4.23). On the other hand, there were not significant differences in adjusted means between mobile and printed, and web and printed groups with p values greater than .05. These results suggest that students in elementary level mobile groups retained more vocabulary items than students in web groups.

Table 4.23. Pairwise mean comparison results for elementary level groups' retention

Dependent Variable: Retention gain scores (Retention-test – Post-test)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	1.643	1.295	.211	-.959	4.245
Mobile	Web	3.415(*)	1.304	.012	.794	6.037
Printed	Web	1.772	2.473	.187	-.886	4.431

* The mean difference is significant at the .05 level.

Vocabulary Gain and Retention for Pre-intermediate Level Students

The means and standard deviations for each pre-intermediate level group on the pre-test, post-test, retention-test, and gain scores for the vocabulary assessment test are presented in Table 4.24. The gain scores (the difference between post- and pre-tests) are 21.60, 11.40, and 8.86 for the pre-intermediate level mobile, printed, and web groups respectively. The results indicate that the pre-intermediate level mobile group performed better than printed and web groups as illustrated in Figure 4.4.

Table 4.24. Pre-intermediate groups' means and standard deviations of the pre-test, post-test, retention-test and gain scores for the vocabulary assessment test

Pre-intermediate Group		Pre-test		Post-test		Ret-test		Gain 1*		Gain 2**	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Mobile	(n=17)	59.74	7.88	81.34	9.65	82.62	9.86	21.60	6.32	1.28	2.20
Printed	(n=17)	61.00	9.11	72.40	8.60	71.46	7.87	11.40	5.86	-.94	2.42
Web	(n=16)	62.00	9.43	70.86	10.00	69.27	10.16	8.86	4.36	-1.59	3.30

* Difference between Post-test and Pre-test
** Difference between Retention-test and Post-test

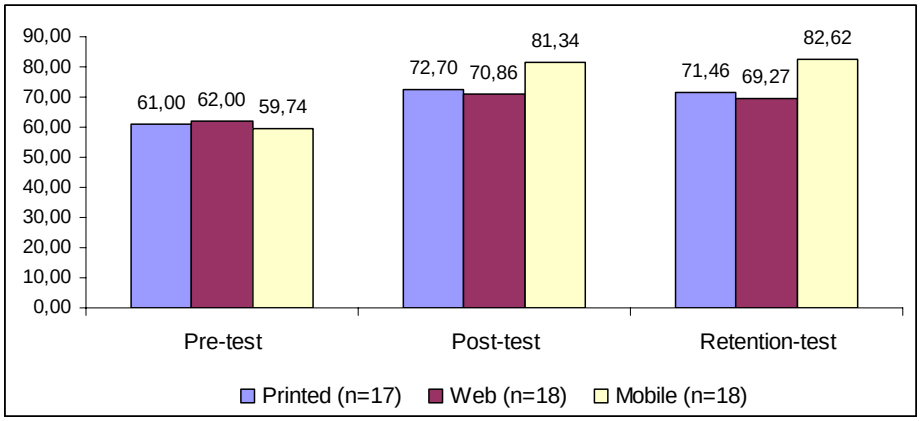


Figure 4.4. Comparison of pre-intermediate groups' mean scores on vocabulary assessment test

In order to understand whether the differences are statistically significant or not, one-way analysis of covariance (ANCOVA) was conducted. The independent

variable, study method, included three modes: mobile, printed, and web. The dependent variable was the gain score (the difference between post-test and pre-test) and the covariate was the pre-test scores. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, F(2,47)=.570, MSE=17.836, p=.570, partial η^2=.025. The ANCOVA was significant, F(2, 47) = 23.465, MSE=720.533, p=.000 (Table 4.25). The strength of relationship between treatment and gain scores, as assessed by Eta Squared, was strong, with the treatment factor accounting for 50.5% of the variance of the dependent variable holding constant the pre-test scores.

Table 4.25. The results of ANCOVA analysis concerning pre-intermediate level groups' gain scores on vocabulary achievement test

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Pre-test (covariate)	62.593	1	62.593	2.038	.160	.042
Group	1441.065	2	720.533	23.465	.000	.505
Error	1412.510	46	30.707			

The means of the gain scores adjusted for initial differences were ordered as expected across the three study modes. The mobile group had the largest adjusted mean (M=21.45), the printed group had a smaller adjusted mean (M=11.41), and the web group had the smallest adjusted mean (M=9.01). Follow-up test was conducted to evaluate pair-wise differences among these adjusted means. The Holm's sequential Bonferroni procedure was used to control Type I error across the three pairwise comparisons. There were significant differences in the adjusted means between mobile and the other two groups with a p values smaller than .05 (printed group p=.000, web group p=.000) (Table 4.26). On the other hand, there were not significant differences in adjusted means between printed and web groups with a p value .220 greater than .05. These results suggest that students in pre-intermediate level mobile groups gained more vocabulary items than students in printed and web groups.

Table 4.26. Pairwise mean comparison results for pre-intermediate level groups

Dependent Variable: Gain scores (Post-test – Pre-test)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	10.040(*)	1.904	.000	6.207	13.873
Mobile	Web	12.444(*)	1.941	.000	8.537	16.352
Printed	Web	2.404	1.932	.220	-1.485	6.294

* The mean difference is significant at the .05 level.

In order to compare the students' retentions of word items, a retention test was conducted 1 month after the post-test. The retention gain scores (the difference between retention- and post-tests) are 1.28, -.94, and -1.59 for the pre-intermediate level mobile, printed, and web groups respectively (Table 4.24). Students in the pre-intermediate level mobile group increased their scores from post-test to retention-test by 1.28 (on an average). On the other hand, students in pre-intermediate level printed and web groups decreased their scores by -.94 and -1.59 respectively. Like elementary level findings, the results indicate that students in the pre-intermediate level mobile group retained more words than students in printed and web groups.

In order to understand whether the differences are statistically significant or not, one-way analysis of covariance (ANCOVA) was conducted. The independent variable, study method, included three modes: mobile, printed, and web. The dependent variable was the retention gain score (the difference between retention-test and post-test) and the covariate was the pre-test scores. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(2,47)=.000$, MSE=.004, $p=1.00$, partial $\eta^2=.000$. The ANCOVA was significant, $F(2, 47) = 4.940$, MSE=35.111, $p=.011$ (Table 4.27). The strength of relationship between treatment and gain scores, as assessed by Eta Squared, was strong, with the treatment factor accounting for 17.7% of the variance of the dependent variable holding constant the pre-test scores.

Table 4.27. The results of ANCOVA analysis concerning pre-intermediate level groups' retention gain scores on vocabulary achievement test

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Pre-test (covariate)	6.978	1	6.978	2.257	.327	.021
Group	70.222	2	35.111	3.427	.011	.177
Error	326.933	46	7.107			

The means of the gain scores adjusted for initial differences were ordered as expected across the three study modes. The mobile group had the largest adjusted mean (M=1.23), the printed group had a smaller adjusted mean (M=-.94), and the web group had the smallest adjusted mean (M=-1.55). Follow-up test was conducted to evaluate pair-wise differences among these adjusted means. The Holm's sequential Bonferroni procedure was used to control Type I error across the three pairwise comparisons. There was a significant difference in the adjusted means between mobile and the other two groups with a p value smaller than .05 (printed group p=.022, web group p=.005) as shown in Table 4.28. On the other hand, there was not a statistically significant mean difference between printed and web groups with a p value .516 greater than .05. Different from the elementary level, the students in mobile groups retained more vocabulary items than students in both printed and web groups.

Table 4.28. Pairwise mean comparison results for pre-intermediate level groups' retention

Dependent Variable: Retention gain scores (Retention-test – Post-test)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	2.165(*)	.916	.022	.321	4.009
Mobile	Web	2.774(*)	.934	.005	.894	4.654
Printed	Web	.609	.930	.516	-1.262	2.480

* The mean difference is significant at the .05 level.

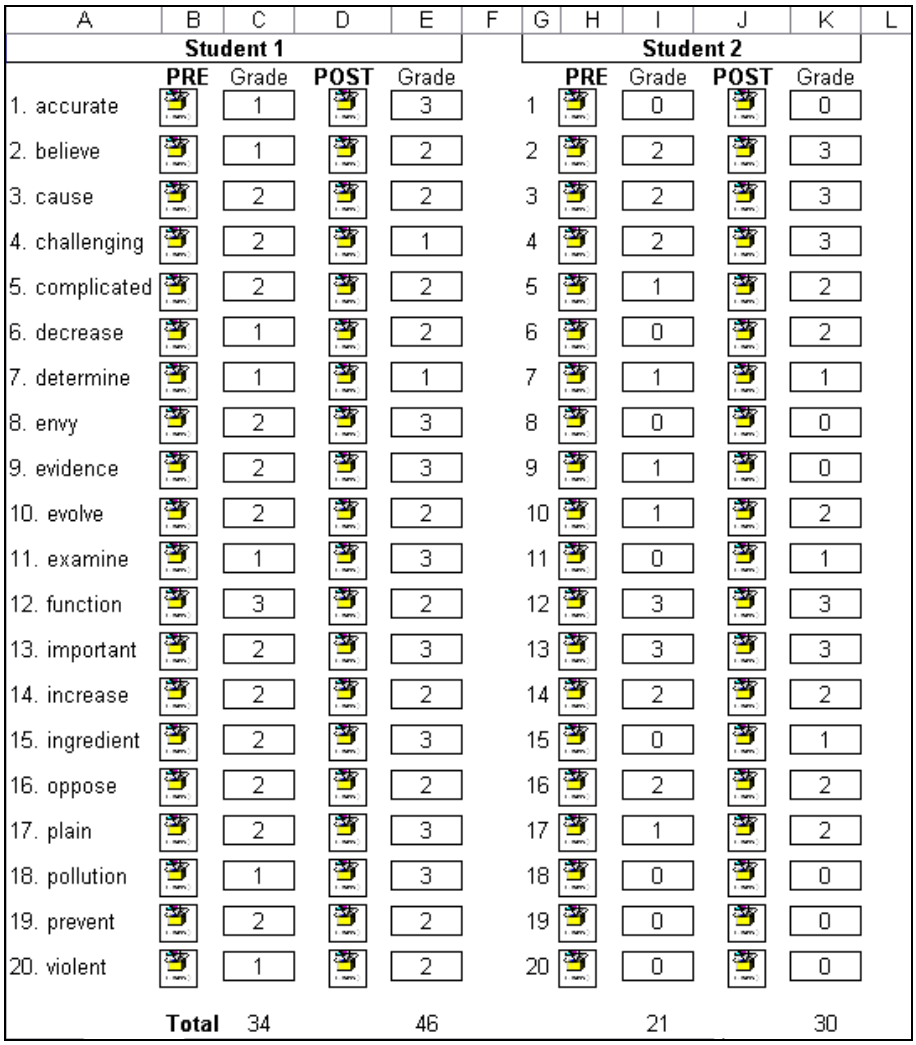
4.2.5. Pronunciation Gain

In phase II of the study, the participants' pronunciation gains were also investigated. As stated in the method section, students' pronunciations were rated according to the Educational Testing Service (1985) criteria. Eight students in each elementary group participated in the pronunciation tests. Figure 4.5 shows a screenshot from the MS Excel spreadsheet used by the raters also presenting the English words included in the study. Table 4.29 shows the average scores and standard deviations of pre- and post-tests, and gain scores for each group of students studying identical materials via three different means: mobile MMS, printed, and web.

Table 4.29. Means and standard deviations of the groups for the pronunciation test

		Pre-test		Post-test		Gain*	
Group		*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Mobile	(n=8)	29.19	8.99	41.13	8.29	11.94	2.90
Printed	(n=8)	30.88	3.23	37.69	3.27	6.81	4.46
Web	(n=8)	31.50	5.79	38.31	3.80	6.81	3.71

* Difference between Post-test and Pre-test



	Student 1					Student 2				
	PRE	Grade	POST	Grade		PRE	Grade	POST	Grade
1. accurate		1		3	1		0		0
2. believe		1		2	2		2		3
3. cause		2		2	3		2		3
4. challenging		2		1	4		2		3
5. complicated		2		2	5		1		2
6. decrease		1		2	6		0		2
7. determine		1		1	7		1		1
8. envy		2		3	8		0		0
9. evidence		2		3	9		1		0
10. evolve		2		2	10		1		2
11. examine		1		3	11		0		1
12. function		3		2	12		3		3
13. important		2		3	13		3		3
14. increase		2		2	14		2		2
15. ingredient		2		3	15		0		1
16. oppose		2		2	16		2		2
17. plain		2		3	17		1		2
18. pollution		1		3	18		0		0
19. prevent		2		2	19		0		0
20. violent		1		2	20		0		0
	Total	34		46			21		30

Figure 4.5. A screenshot from the MS Excel spreadsheet used by the raters

The gain scores (the difference between post- and pre-tests) are 11.94, 6.81, and 6.81 for mobile, printed, and web groups respectively. The results indicate that the mobile group performed better than the printed and web groups as illustrated in Figure 4.6.

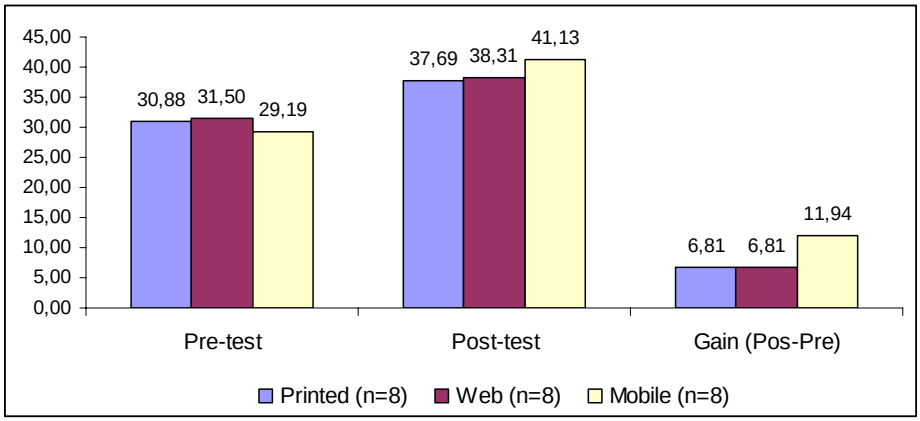


Figure 4.6. Comparison of mean scores on pronunciation test

In order to understand whether the differences are statistically significant or not, one-way analysis of covariance (ANCOVA) was conducted. The independent variable, study method, included three modes: mobile, printed, and web. The dependent variable was the retention gain score (the difference between retention-test and post-test) and the covariate was the pre-test scores. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(2, 21)=3.020$, MSE=27.573, $p=.074$, partial $\eta^2=.251$. The ANCOVA was significant, $F(2, 21) = 4.898$, MSE=53.753, $p=.019$ (Table 4.30). The strength of relationship between treatment and gain scores, as assessed by Eta Squared, was strong, with the treatment factor accounting for 32.9% of the variance of the dependent variable holding constant the pre-test scores.

Table 4.30. The results of ANCOVA analysis concerning elementary level groups' gain scores on pronunciation test

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Pre-test (covariate)	74.656	1	74.656	6.802	.017	.254
Group	107.506	2	53.753	4.898	.019	.329
Error	219.500	20	10.975			

The means of the gain scores adjusted for initial differences were ordered as expected across the three study modes. The mobile group had the largest adjusted mean (M=11.55), the printed group had a smaller adjusted mean (M=7.10), and the web group had the smallest adjusted mean (M=6.92). Follow-up test was conducted to evaluate pair-wise differences among these adjusted means. The Holm's sequential Bonferroni procedure was used to control Type I error across the three pairwise comparisons. There was a significant difference in the adjusted means between mobile and the other two groups with a p value smaller than .05 (printed group p=.015, web group p=.012) as shown in Table 4.31. On the other hand, there was not a statistically significant mean difference between printed and web groups with a p value .913 greater than .05. The results suggests that the delivery of foreign language pronunciation study materials as multimedia messages via mobile phones led to better pronunciation learning.

Table 4.31. Pairwise mean comparison results for the elementary level groups' pronunciation gain

Dependent Variable: Retention gain scores (Retention-test – Post-test)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	4.449(*)	1.677	.015	.952	7.946
Mobile	Web	4.632(*)	1.667	.012	1.154	8.109
Printed	Web	.183	1.658	.913	-3.641	3.276

* The mean difference is significant at the .05 level.

4.2.6. The Results of the Open Ended Questions in the Instructional Materials Evaluation Questionnaire

As stated in the results of the phase I of the study, one of the aims of the study was to explore the students' perceptions regarding the use of the mobile phones to support their vocabulary learning. Therefore, the same questionnaire is applied in the second phase. The first open ended question was 'What do you like most about this mobile application?' Table 4.32 shows the pre-intermediate group students' responses, and Table 4.33 shows the elementary group students' responses. Two

students in the pre-intermediate group and one student in the elementary group did not respond to the question. Out of 32 students who responded to the question, 14 students stated that they liked the pictures and example sentences most. Sixteen respondents indicated that they liked the approach because it was useful for learning and retaining words in memory. In addition, some respondents found the application unique and some found it to be very entertaining. Five students reported that they also liked the pronunciations included in the MMSs. The responses to this question show that all of students provided positive opinions about the application.

Table 4.32. What do you like most about this mobile application? [Phase II, pre-intermediate group]

1 Being very helpful to retain words permanently.
[Kelimelerin akılda kalıcılığı için çok faydalı olması.]

2 Being a nice application.
[Güzel bir uygulama olması.]

3 Using words in sentences.
[Kelimelerin cümleler içinde kullanılması.]

4, 15 Pictures and words used in sentences.
[Resimler ve kelimelerin cümle içinde kullanılmaları.]

5 In addition to learning new words, it also helped me to strengthen the words which I already know.
[Birçok yeni kelime öğrenmenin yanında eskiden bildiğim kelimeleri pekiştirmemi sağladı.]

6 It was a nice application although my phone did not open the MMSs completely.
[Gerçi benim telefonum MMS leri tam olarak açmadı ama yine de güzel bir uygulamaydı.]

7 Being different.
[Farklı olması.]

8 It was very helpful to learn new words.
[Yeni kelimeleri öğrenmem için çok iyi oldu.]

9, 14 [did not respond]

10 Providing me a word list that I can look at anytime I want. I think it is extraordinarily good for retaining words permanently. It should continue.
[Elimin altında her zaman bakabileceğim bir kelime listesi olması. Bence akılda kalıcılık açısından gayet süper. Bence devam etmeli.]

11 Very effective to improve our vocabulary. Words can be more permanent in memory because explanations were supported with visual representations. It also helped us to learn correct pronunciations.
[Kelime hazinemizi geliştirmemizde oldukça etkili. Görsel anlatımlarla desteklendiği için kelimeler daha akılda kalıcı olabiliyor. Aynı zamanda kelimelerin telaffuzunu düzgün öğrenmemizi sağlıyor.]

12 I liked particularly the visual representations. Pronunciations were also very helpful.
[Grafiklerle anlatım özellikle hoşuma giden yönü oldu. Seslendirme de gayet yararlıydı.]

13 Pictures and pronunciations.
[Resimler ve seslendirmeler.]

16 I learned new words.
[Yeni kelimeler öğrendim.]

17 Instructive. Pictures were really intriguing.
[Çok öğretici. Resimler gerçekten merak uyandırıcıydı.]

Table 4.33. What do you like most about this mobile application? [Phase II, elementary group]

1	Improved my vocabulary. Helped me to retain words permanently. [Kelime haznemi geliştirdi. Kelimelerin aklımda kalıcı olmasına yardım etti.]
2	It's very good to provide detailed information about the words. I also liked the pictures a lot. [Kelimelerle ilgili ayrıntılı bilgilerin olması çok iyiydi. Resimler de çok hoşuma gitti.]
3	I could learn the words easily and I didn't forget them. [Kelimeleri kolayca öğrenebildim ve unutmadım.]
4	Pictures and pronunciations. [Seslendirmeler ve resimler.]
5	I liked the example sentences with pictures and their comprehensibility. [Resimli örnek cümleler ve anlaşılır olması hoşuma gitti.]
6	Since my mobile phone is always with me, it provided me to learn words at my spare times. It helps to retain words permanently by drawing my attention with visual representations. [Cep telefonum her zaman yanımda olduğu için boş zamanlarımda bile kelime öğrenmemi sağlaması. Görsel anlatımlarla dikkatimi çekerek kelimelerin aklımda kalmasına yardımcı oldu.]
7	I liked to learn new words from it. [Bize yeni kelimeler öğretmesi hoşuma gitti.]
8	I liked the pronunciations very much. [Seslendirmeler benim çok fazla hoşuma gitti.]
9	I learned words. Thanks to MMS providing audio visual explanations that helped to retain words in memory permanently. [Kelimeler öğrendim. Görsel ve işitsel anlatımların MMS şeklinde yollanması sayesinde gördüğümüz kelimeler hafızada daha kalıcı oldu.]
10	Involving pictures and providing word building. [Resimli olması ve kelimenin yapısının verilmesi.]
11	I can learn while I'm reading messages. Pictures were very nice and memorable. [Mesaj okurken öğrenebiliyorum. Resimler çok hoştu akılda kalıcıydı.]
12	Words' explanations were coming to my mobile phone in the ready-made form. [Kelime anlatımlarının hazır bir şekilde cep telefonuma gelmesi.]
13	Explaining words with example sentences helped us to learn. [Kelimelerin örnek cümlelerle açıklanması öğrenmemize katkıda bulundu.]
14	[did not respond]
15	Improved my vocabulary. [Kelime dağarcığımı geliştirdi.]
16	Helped me to learn new words. [Yeni kelimeler öğrenmemi sağladı.]

Table 4.33. cont'd

17	I learned a lot of words that I didn't understand their meaning previously by the help of this application. Also my vocabulary has improved. The feature of visualizing words' meanings with pictures just after words' definitions was very nice. [Önceden anlamadığım birçok kelimeyi öğrendim bunun sayesinde. Kelime haznemde gelişti. Kelimelerin tanımlarının arkasından resimlerle anlatılması çok hoştu.]
18	Very interesting application for vocabulary learning. [Uygulama kelime öğrenmek için çok ilgi çekiciydi.]

The second open ended question (What do you dislike most about this mobile application?) was the reverse of the first question. Table 4.34 shows the pre-intermediate group students' responses, and Table 4.35 shows the elementary group students' responses. Six students out of 35 students did not respond to this question. Nineteen students used the word "nothing" in their answers. Two students stated "Nothing, it was interesting" and two student stated "Everything is fine, no problem". This indicates that the great majority of the students acknowledged the convenience of the method used in the study. However, some students reported negative opinions. For example, 2 students stated that they did not like to receive very common and known words. In addition, 2 students reported the same negative opinion as: "MMSs take too much space in the phone's memory" and "MMSs filled up my phone's memory". Although as stated in method chapter, the MMSs used in the study take small space in memory (1 MMS's size in memory is approximately 30 KB), this might be a problem for mobile phones that do not have enough memory. Overall responses that reported negative aspects to this question constitute 33% of the students.

Table 4.34. What do you dislike most about this mobile application? [Phase II, pre-intermediate group]

1, 2, 4, 5, 6, 7, 10, 11
Nothing.
[Yok]

3 It's unnecessary to receive very common and known words.
[Çok bilindik kelimelerin gelmesi gereksiz.]

8 MMSs take too much space in the phone's memory.
[MMS ler telefonda çok yer kaplıyor.]

9, 12, 14 [did not respond]

13 Received messages continuously and I think it damages my phone. Times were also not suitable all the time.
[Sürekli mesaj geldi ve telefonuma zarar verdiğini düşünüyorum. Ayrıca saatler her zaman uygun değildi.]

15 It's not nice to receive very common and known words again and again.
[Bilindik kelimelerin tekrar tekrar gönderilmesi hoş değildi.]

16 Nothing, it was interesting.
[Yok, ilgi çekiciydi]

17 MMSs filled up my phone's memory.
[MMS ler telefon hafızamı doldurdu]

Table 4.35. What do you dislike most about this mobile application? [Phase II, elementary group]

1, 4, 6, 7, 9, 10, 11, 13, 14, 16
Nothing.
[Yok]

2, 5, 12 [did not respond]

3 When my phone's battery was low incoming MMSs ran out my battery. This was the point that I was mostly angry about.
[Şarjımın az olduğu zaman gelen MMS ler şarjımı bitiyordu. Bu en sinir olduğum noktaydı.]

8, 17
Everything is fine, no problem.
[Hersey güzel hiçbir problem yok.]

15 Receiving more messages than necessary in a day make me feel uncomfortable.
[Bir günde gereğinden fazla mesaj gelmesi beni rahatsız etti.]

18 I started to get bored after a while from this application.
[Bu uygulamadan bir süre sonra sıkılmaya başladım.]

The third open ended question was as follows: Do you think that this method is good for vocabulary learning? Why? The Table 4.36 and 4.37 show the pre-intermediate and elementary groups' responses to the question. Only two students in the pre-intermediate group did not respond to this question. The responses show that nearly all of the students (only one student in elementary group stated a negative opinion) found the method used in the study very useful. Seven students stated that the pictures used in the MMSs were helpful to retain words in memory. For example, one student in the pre-intermediate group stated "Pictures and example sentences help to retain words in memory". In addition, 8 students noted that the anytime, anywhere access to mobile phones was the main factor for this method's success. A negative response was stated by one student in the elementary group as "…because the messages that were sent systematically make me uncomfortable and after awhile it becomes boring".

Table 4.36. Do you think that this method is useful for vocabulary learning? Why? [Phase II, pre-intermediate group]

1, 5, 9, 11, 15 Yes. [Evet.]
2 Yes because mobile phone is always at hand. [Evet çünkü cep telefonu sürekli elimizin altında.]
3 Yes, visual and audio explanations were a good method. [Evet, görsel ve işitsel anlatım bence iyi bir yöntemdi.]
4 A good method. Pictures and example sentences help to retain words in memory. [İyi bir yöntem. Resimler ve örnek cümleler kelimelerin akılda kalmasına yardımcı oluyor.]
6 Yes, but I'd like to receive words that are more difficult. [Evet, ama daha zor kelimeler gönderilmesini isterdim.]
7 A good method. Since it comes to phone we can look at anytime and anywhere. [İyi bir yöntem. Telefona geldiği için her an her yerde bakabiliriz.]
8 Yes, with the help of this it's easily learned while focusing on the words. [Evet, bu sayede kelimelere odaklanıp kolayca öğrenebiliniyor.]
10 Yes, because we can look at all the time. [Evet, çünkü sürekli bakabiliyoruz.]
12, 14 [did not respond]
13 Of course it's a good method. If you take it seriously, it can teach many things to the people. [Tabikide çok iyi bir yöntem. Ciddiye alındığı takdirde insana çok şey öğretebilir.]
16 Super. The most used device is mobile phone. [Süper. En çok kullanılan cihaz cep telefonu.]
17 Of course. [Elbette.]

Table 4.37. Do you think that this method is useful for vocabulary learning? Why? [Phase II, elementary group]

1 Yes because mobile phone is always at hand.

[İyi bir yöntem çünkü telefon her an elinin altında.]

2 Absolutely, because mobile phone is a device that we spend most of our time, and it's a good idea to use them for educational purposes.

[Kesinlikle, çünkü vaktimizi en çok geçirdiğimiz alet cep telefonu ve eğitim amaçlı kullanılması iyi fikir.]

3, 7 Yes, it's catchy with pictures and example sentences.

[Evet, resimler ve örnek cümlelerle akılda kalıcı oluyor.]

4 A good method because pictures help to understand.

[Güzel bir yöntem çünkü resimler anlamayı kolaylaştırıyor.]

5 Yes I believe it'll work. Pictures helped to retain words in memory.

[Evet işe yarayacağına inanıyorum. Resimler akılda kelimelerin kalmasına yardımcı oldu.]

6 Yes. Since the MMSs that come to the mobile phones -always at hand- were read in any case, the meaning or pronunciation is retained in your memory.

[Evet. Sürekli elimizde olan cep telefonlarına gelen MMS ler illaki okunduğu için aklında anlamı ya da telaffuzu kalıyor.]

8 Yes, since learning with seeing the use of words helped me very much.

[Evet, çünkü kelimelerin kullanımını görerek öğrenmek çok yararlı oldu.]

9 Yes because it improved my vocabulary.

[Evet çünkü kelime dağarcığımı geliştirdi.]

10 Yes. Being related with technology attracted my attention.

[Evet düşünüyorum. Teknolojiyle ilgili olması ilgimi çekti.]

11, 14, 15 Yes, it's catchy with pictures and example sentences.

[Evet resim ve cümlelerle akılda kalıcı oluyor]

12 Yes because even if we just browse, at least, the pronunciation is retained in the memory.

[Evet çünkü öylesine bile baksak aklımızda en azından telaffuzu kalıyor.]

13 No because the messages that were sent systematically make me uncomfortable and after awhile it becomes boring.

[Düşünmüyorum çünkü sistemli bir şekilde gönderilen mesajlar insanı rahatsız ediyor ve bir süre sonra sıkıcı oluyor.]

16 Yes because pictures and example sentences are very instructive.

[Evet çünkü resimler ve örnek cümleler çok öğretici.]

17 Yes because I learned the words easily with this method.

[Düşünüyorum çünkü bu yöntemle kelimeleri kolayca öğrendim.]

18 Yes because it attracts attention and since the phone is always with us messages were generally read.

[Evet çünkü ilgi çekiyor ve zaten telefonda hep yanımızda olduğu için mesajlar çoğunlukla okunuyor.]

4.2.6. Results of the Instructional Materials Motivation Survey

The mean scores for the Instructional Materials Motivation Survey (IMMS) are 134.97, 123.06, and 108.56 for mobile, printed, and web groups respectively (Table 4.38). The results indicate that mobile groups' ARCS scores are greater than printed and web groups as illustrated in Figure 4.7.

Table 4.38. Means and standard deviations of the groups for the instructional materials motivation survey

	Mobile		Printed		Web	
Group	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Elementary	132.17 (n=18)	14.35	118.47 (n=17)	14.72	106.22 (n=18)	24.89
Pre-intermediate	137.94 (n=17)	17.54	127.65 (n=17)	19.31	111.19 (n=16)	14.24
Total	134.97 (n=35)	16.01	123.06 (n=34)	17.54	108.56 (n=34)	20.44

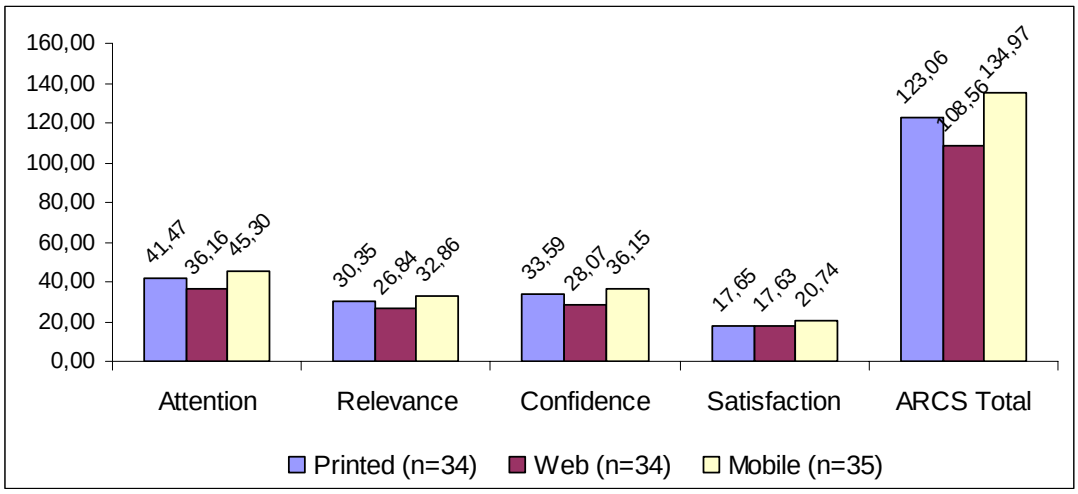


Figure 4.7. Comparison of mean ARCS scores on instructional materials motivation survey

In order to understand whether the differences are statistically significant or not, one-way ANOVA was conducted. The ANOVA was significant, F (2, 100) = 18.468, p = .000 as shown in Table 4.39. This result indicates that the means for IMMS total scores are different for web, printed and mobile groups. Therefore,

follow-up test was conducted to evaluate pair-wise differences among the means. Because the Levene's test of homogeneity of variance was nonsignificant (p=.509), indicating that the assumption of the equality of variances was not violated, Tukey HSD test was conducted for the post-hoc comparisons. Tukey HSD test showed that there was a statistically significant mean difference between mobile, printed, and web groups with p values smaller than .05 (Table 4.40). Therefore, the results suggest that students who were sent multimedia messages were motivated more than students who studied the web- and paper-based materials.

Table 4.39. The results of ANOVA analysis concerning scores on IMMS

ANOVA Keller IMMS Scores	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Between Groups	12059.191	2	6029.596	18.468	.000	.270
Within Groups	32649.236	100	326.492			
Total	44708.427	102				

Table 4.40. The results of homogeneity of variance test and post-hoc comparisons

Levene's Test of Equality of Error Variances
Scores on Keller IMMS

F	df1	df2	Sig.
.681	2	100	.509

Multiple Comparisons
Dependent Variable: Keller IMMS scores

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Mobile	Printed	11.9126(*)	4.35098	.020	1.5611	22.2641
	Web	26.4126(*)	4.35098	.000	16.0611	36.7641
Printed	Mobile	-11.9126(*)	4.35098	.020	-22.2641	-1.5611
	Web	14.5000(*)	4.38240	.004	4.0738	24.9262
Web	Mobile	-26.4126(*)	4.35098	.000	-36.7641	-16.0611
	Printed	-14.5000(*)	4.38240	.004	-24.9262	-4.0738

* The mean difference is significant at the .05 level.

4.2.7. Interview Results

The interview questions were aimed to gather in depth opinions of the students about their mobile learning experience. The researcher conducted interviews with six students in each mobile group. The qualitative data collected through the interviews were analyzed to obtain the perceptions of students about the use of mobile phones for vocabulary learning, and to get students' suggestions concerning the improvement of the features used in the study. According to the results of the collected data, all students (n=12) believed that the use of mobile phones for vocabulary learning is very effective. The participants reported several positive aspects of the treatment in the interviews.

There were five questions in the interview. With the first question, the students were asked whether they studied the materials that were sent via mobile multimedia messages or not. All students (n=12) stated that they studied the materials. These statements were in parallel with the results of the questionnaire analysis and the log data. The second and third questions were very interrelated. The purpose of the second question was to gather students' opinions about the positive aspects of the application, and the aim of the third question was to gather students' opinions about the negative aspects of the application. All of the students (n=12) provided positive feedback about the mobile learning application used in this study. The students stated that they enjoyed the instructional materials sent to their mobile phones during the study. For example, one interviewee stated,

> "There was nothing that I dislike or negative point. To me, everything was as it should be."
>
> [Herhangi olumsuz ya da hoşlanmadığım bir nokta yoktu. Bence herşey tam olması gerektiği gibiydi.]

Another interviewee found the visual representations as useful and voiced that,

> "Especially, the visual representations of the words in multimedia messages helped us to understand the words' meanings easily. When I came across the word in reading, I remembered the pictures and I could easily remember the word's meaning."

> [Özellikle MMS lerdeki görsel anlatımlar kelimeyi anlamamıza yardımcı oldu ve okuma parçalarında kelime ile karşılaştığımda resimler aklıma geldi ve kelimenin anlamını kolayca hatırladım.]

Another participant emphasized the push aspect and anytime-anywhere accessibility of mobile phones, and stated,

> When a message is received, even while walking on the street, information is gathered from it by all means. Since phone is always at my hand you read it no matter what. Therefore, it's very helpful indeed.
>
> [Yolda boş boş yürürken geldiğinde bile mesaj geldiğinde bir bilgi ediniliyor mutlaka. Elimin altında olduğu için telefon illaki bakılıyor gönderilen mesajlara o yüzden çok yararlı oluyor gerçekten.]

Only two students mentioned some negative aspects of the application. One of them stated:

> "As a negative aspect, I can say that there were some words repeated. For example, a word's both verb and noun forms were sent. Instead of this there might be new words and it'd be better. In addition, the number of words were few, I'd like more words to be included."
>
> [Olumsuz olarak tekrarlananan bazı kelimelerin olmasını söyleyebilirim. Örneğin bir kelimenin hem verb hem de noun hali gönderildi. Bunun yerine yeni kelimeler olabilirdi ve daha iyi olurdu. Ayrıca kelime sayısı azdı, daha fazla kelime olmasını isterdim.]

Another interviewee voiced:

> "The 4 MMSs in a day were fine but 80 words in 4 weeks in total were too much. They should have been sent in longer period of time. I didn't like to receive messages every day."
>
> [Günde 4 kelime sayısı iyiydi fakat toplamda 4 haftada 80 kelime çok fazlaydı. Daha uzun süreye yayılmalıydı. Hergün mesaj gelmesi hoşuma gitmedi.]

Although a great majority of the participants did not state any negative aspects of the application, the comments voiced by these two students should be taken into consideration in the future mobile applications.

With the fourth question, students' opinions on whether the method was appropriate or not for learning vocabulary were asked. Most (n=10) of the students stated that it would be better if they were always supported with instructional materials via mobile phones like the ones used during this study. Almost all of the participants (n=11) stated that the content itself and the organization of the content, especially audio-visual representations of words were very effective for vocabulary learning. Most of the students found the pronunciations included in the MMSs very useful. Two students also voiced their ideas related with the pronunciations as follows:

> "The audio component in the multimedia messages together with the visual representations were very effective in helping us learn pronunciation of words accurately."
>
> [Mesajlarda görsel anlatımlarla birlikte sunulan seslendirmeler kelimelerin telaffuzlarını doğru olarak öğrenmemizde çok etkiliydiler.]

> "Because the content was delivered via multimedia messages to my cellular phone, I was able to learn how to pronounce words correctly and easily. The messages remained accessible on my phone and in my memory."
>
> [Kelimeler cep telefonuma MMS olarak geldiği için kelimeleri nasıl telaffuz edildiğini doğru ve kolay bir şekilde öğrenebildim. Ayrıca mesajlar hem telefonumda hemde hafızamda kalıcı oldular.]

As another advantage of this treatment, one of the students stated,

> "I had the chance of repeating the content as many times as I wanted and this was an important advantage of using mobile phones for vocabulary learning when compared with the other methods."
>
> [Kelime öğrenmek için cep telefonu kullandığımda istediğim zaman istediğim kadar tekrar yapma şansım vardı. Diğer yöntemlerle karşılaştıracak olursak bu cep telefonlarının önemli bir avantajıdır]

All of the participants indicated that they did not face with any difficulties while using the mobile learning application and that it was easy-to-use since they were used to using SMS and MMS in their daily lives.

4.3. Summary of Results

The results suggest that students who were sent multimedia messages through mobile phones studied supplementary vocabulary materials more than students who studied the web- and paper-based materials and this frequent supplementary study helped to better acquisition of words. The findings of the study suggest that sending multimedia messages via mobile phones uses the push aspect of mobile technology, and encourages regular study. Therefore, the delivery of foreign language study materials as multimedia messages via mobile phones may lead to better learning.

Interestingly, gain scores on vocabulary and pronunciation tests are the same for printed and web groups and they are very close in vocabulary assessment tests. Although web group students had chances to access pronunciations via Internet at any time, their performance is the same with printed groups who had no chances to access pronunciation audios outside the classroom. This result suggests that using web pages for vocabulary learning does not encourage regular study and therefore does not lead to better performance that can be achieved through traditional ways like handouts and classroom activities. Moreover, findings obtained from questionnaires and the interview data indicated that students believed that the use of mobile phones for vocabulary learning is very effective.

CHAPTER 5

DISCUSSIONS, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

The purpose of this chapter is to discuss the research findings in this study, draw conclusions, suggest some implications for practice, and offer some recommendations for future research. The study had four research questions. The results of each research question were discussed and compared to the previous research studies.

5.1. Purpose of the Study

The primary aim of this study was to investigate the potentials and effectiveness of using mobile phones in foreign language education. More specifically, this study investigated how the use of multimedia messages (MMS) via mobile phones affects the students' English vocabulary acquisition. The study also investigated the students' opinions regarding the use of mobile phones for vocabulary learning and their preferences in using instructional materials provided via mobile phones.

5.2. Discussion of Results

The discussion of the research findings is organized by the study's research questions. The discussion first provides a summary of the results and then their relationship to previous research studies.

The first research question of this study addressed the effects of the use of multimedia messages via mobile phones on student achievement on pronunciation and vocabulary assessment tests. There were three sub-questions of the first research question: (a) Does the gain scores (the difference between pre and post tests) in the vocabulary achievement test differ among the three groups: mobile, web, and printed? (b) Is there a significant difference between three groups' (mobile, web, and

printed) English language vocabulary retention? (c) Does the gain scores (difference between pre and post tests) in the pronunciation test differ among the three groups: mobile, web, and printed? These three sub-questions were answered through the use of analysis of variance (ANCOVA). The independent variable for this study was presentation mode (mobile, printed, and web). The dependent variables for this study were the students' performances on vocabulary assessment and pronunciation tests and the covariate was the pre-test scores.

5.2.1. Research Question 1-a

Research question 1-a asked if the use of multimedia messages via mobile phones as a supplement to classroom instruction had any effect on student performance on a vocabulary assessment test. In this study, three different study modes (mobile, printed, and web) were used as a supplement to regular classroom instruction in order to explore the comparative effectiveness of supplementary materials delivered through 3 different means: mobile phones, web pages, and printed in improving learners' acquisitions of the word items. There were three levels as beginner, elementary, and pre-intermediate at the English preparatory school. The elementary and pre-intermediate levels were included in this study. Therefore, the discussion is presented for each level separately.

Vocabulary Gains of Elementary Level Students

It was determined from the analysis that the students in elementary level mobile group improved their vocabulary significantly better than students in the printed and web groups. In other words, the elementary level students who were sent multimedia messages learnt more word items than students supported by web- and paper-based materials. These results are also consistent with the results of the first phase of the study in which mobile learning supported classroom instruction was compared with the regular classroom instruction. The analysis in the first phase revealed that the students in the elementary level mobile group performed significantly better than the students in the elementary level traditional group.

Vocabulary Gains of Pre-intermediate Level Students

Similar to the elementary level findings, the analysis revealed that the students in the pre-intermediate level mobile group improved their vocabulary significantly better than the students in the printed and web groups. More specifically, the pre-intermediate level students who were sent multimedia messages gained more word items than students supported by web- and paper-based materials. These results are also consistent with the results of the first phase of the study in which mobile learning supported classroom instruction was compared with the regular classroom instruction. The analysis in the first phase revealed that the students in the pre-intermediate level mobile group performed significantly better than the students in the pre-intermediate level traditional group.

5.2.2. Research Question 1-b

Research question 1-b asked if the use of multimedia messages via mobile phones as a supplement to classroom instruction had any effect on students' retention of word items. In order to compare the students' retention of word items, a retention test was conducted 1 month after the post-test.

Vocabulary Retention of Elementary Level Students

Students in the elementary level mobile group increased their scores from post-test to retention-test by 1.63 (on an average). On the other hand, students in elementary level printed and web groups decreased their scores by -1.69 and -.26 respectively. The analysis revealed that the students in the elementary level mobile group retained significantly more words than the students in the elementary level printed and web groups. These results are also consistent with the results of the first phase of the study in which mobile learning supported classroom instruction was compared with the regular classroom instruction. Students in the elementary level mobile group increased their scores from post-test to retention-test by .52 (on an average). On the other hand, students in elementary level traditional group decreased their scores by -2.90. The analysis revealed that the students in the elementary level mobile group

retained significantly more word items than the students in the elementary level traditional group in the first phase.

Vocabulary Retention of Pre-intermediate Level Students

Students in the pre-intermediate level mobile group increased their scores from post-test to retention-test by 1.28 (on an average). On the other hand, students in pre-intermediate level printed and web groups decreased their scores by -.94 and -1.59 respectively. Similar to the elementary level findings, the analysis revealed that the students in pre-intermediate level mobile group retained significantly more words than the students in pre-intermediate level printed and web groups. These results are also consistent with the results of the first phase of the study in which mobile learning supported classroom instruction was compared with the regular classroom instruction. Students in the pre-intermediate level mobile group increased their scores from post-test to retention-test by 1.12 (on an average). On the other hand, students in the pre-intermediate level traditional group decreased their scores by -2.32. The analysis revealed that the students in pre-intermediate level mobile group retained significantly more word items than the students in pre-intermediate level traditional group in the first phase of the study.

5.2.3. Research Question 1-c

Research question 1-c asked if the use of multimedia messages via mobile phones as a supplement to classroom instruction had any effect on students' pronunciations of word items. In order to compare the students' pronunciations of word items, the students' pronunciations were recorded by using digital voice recorder just before and after the treatment. Pronunciation retention test could not be employed due to time restrictions. A native rater and a nonnative instructor from the preparatory school evaluated the recordings according to the Educational Testing Service (1985) rubric explained in the method chapter. There were three levels as beginner, elementary, and pre-intermediate at the English preparatory school. Only the elementary level was included in this part of the study. Therefore, the discussion is presented for the elementary level only.

Pronunciation Gain

The analysis revealed that mobile group students' gain scores (the difference between post- and pre-tests) were nearly double the gain scores of the students in the printed and web groups. It was determined from the analysis that the students in the elementary level mobile group improved their pronunciations significantly better than the students in the printed and web groups. The results suggested that the elementary level students who were sent multimedia messages pronounced the word items better than students supported by web- and paper-based materials.

5.2.4. Discussion of the Impact of the Multimedia Messages Delivered via Mobile Phones on the Learners' English Language Vocabulary Acquisitions

The findings of this study indicated that students in both elementary and pre-intermediate levels who were sent multimedia messages learned more word items than the students who studied the web- and paper-based materials. The findings also indicated that the students supported with multimedia messages via mobile phones retained more words than students who studied the web- and paper-based materials. In addition, the findings suggested that the delivery of foreign language pronunciation study materials as multimedia messages via mobile phones led to better pronunciation learning. To sum up, the results of the study suggested that multimedia messages helped to better acquisition of words.

There is scarce research on the use of mobile phones in language learning contexts in the literature. As one of the related studies in the literature, Thornton and Houser (2005) compared the use of pull (web-based) and push (mobile e-mail) approaches in delivering English vocabulary content to mobile phones. They used text only messages in their study. Although they did not deliver the information rich content using multimedia messages, comparison between pre- and post-tests indicated that participants who learned vocabulary through Internet e-mails via mobile phone had significantly more vocabulary gains than those who learned through the web via PC. The results of the subsequent experiment showed that another mobile phone group gained significantly more vocabulary than the group using paper materials. Corresponding to the results in Thornton and Houser (2005), mobile groups in the

present study had greater vocabulary gains than their web- and printed-groups counterparts. This superiority was also retained in the delayed tests conducted 1 month after the implementation. It can be concluded that students in mobile groups studied supplementary materials more than students who studied the web- and paper-based materials and this frequent supplementary study helped to better acquisition of words.

In this study, the students are encouraged to study by sending exercises and also practice materials via multimedia or short messages. Thereby, the students were able to practice independent from time and space, without opening the course book or lecture notes, without connecting to a web site or sitting in front of a computer or using educational software. In other words, the distinctive features of mobile phones such as portability (fit in a student's pocket) and immediacy (always with students) allowed students to study whenever and wherever they want, and this resulted in increased rate of retention. In addition, learners were able to use any wasted time (on the bus, on their way back and to school) on learning languages with the chance of repeating the mobile content as many times as they want conveniently as the words would be at their finger tips on their mobile phones. On the other hand, in cases where computer technology is used in education, requirement of the students to access a computer for learning a material restricts the learning process to place, time and opportunity. As the student is required to be at a specific place at a specific time, learning process is considerably hindered.

The findings of this study are consistent with the empirical evidence in the literature that constant and distributed practice has a more beneficial effect on memory and learning than massed practice. In the literature, the spaced delivery of information is referred to as 'spacing effect', and the reviews of instructional materials to be acquired are most effective if they come at spaced intervals (Braun & Rubin, 1998). Baturay (2007) found that spaced delivery of target words via Internet web pages increased the learners' vocabulary retention levels. In addition, Nation and Meare (2002) found that more word items are retained when they are introduced separately than when they are introduced together at the same time. In their study, Thornton and Houser (2005) concluded that the regular messages sent by mobile phone could

generate the spacing effect, which facilitated vocabulary retrieval. The 'push' aspect of mobile phones also allows cumulative lessons which augment the exposure to the information (Thornton & Houser, 2005). Over time, this frequent exposure leads to greater retention (Braun & Rubin, 1998). On the other hand, the web- and paper-based instructional materials which usually contains intensive presentations of vocabulary lessons, has no such significant advantages. For example, the web- and paper-based instructional materials are unable to deliver pushing messages like mobile phones can. In addition, their intensive presentations may also be unmanageable and, consequently, may cause students to get bored. The use of mobile phones allows delivering the small chunks of lessons that are more manageable than the lengthy and usually too detailed lessons on paper and web. Mobile phones best suit to present these small chunks of information in their small screens. Moreover, the advantage of mobile phones' portability and immediacy may not be realized with web- and paper-based instructional materials all the time.

The theory of multimedia learning proposed by Mayer (2001) asserted that the use of multimedia within an instructional material can assist a learner in understanding and recalling information from the instruction compared to an instructional material that only used text. In this study, two treatments (mobile and web) had multimedia components (text with picture and audio), and printed study materials only included texts and pictures. It was expected that the pictures which were associated with the texts would support the students in building a mental representation of the word items. The analyses of vocabulary assessment tests indicated that the gain scores (average difference between post- and pre-tests) were 20.37, 13.87, and 11.15 for the elementary level mobile, printed, and web groups respectively. Similarly, the gain scores (average difference between post- and pre-tests) were 21.60, 11.40, and 8.86 for the pre-intermediate level mobile, printed, and web groups respectively. These scores revealed that all of the treatment groups increased their vocabulary. These findings may suggest that the use of multimedia within an instructional material can assist vocabulary learning. Previous research studies have shown that instruction supported with multimedia was more effective in assisting students in learning the content material than instruction that contained only text (Chun & Plass, 1996;

Mayer, 2001; Mayer, Hegarty, Mayer & Campbell, 2005). Therefore, the findings of the present study are consistent with the literature in this respect.

The theory of multimedia learning (Mayer, 2001) was based on the integration of Cognitive Load Theory (Kalyuga, Chandler, & Sweller, 1999), and Dual-Coding Theory (Paivio, 1991). Reducing the amount of information per multimedia message can reduce the amount of cognitive load on the student's working memory (Kalyuga, Chandler, & Sweller, 1999). In this study, each multimedia message presented one English word so that the learner would not be overloaded with too much information at one time. The decision to present one word per multimedia message was based on the theory that the human brain can process only small amounts of information at one time. According to Miller (1956), short-term memory can hold seven units of information, plus or minus two, in at a time indicating that short-term memory is limited in capacity. Cognitive load theory (Kalyuga, Chandler, & Sweller, 1999) is based on the work of Miller (1956), which proposed that the aim of instruction is to construct knowledge by making small incremental changes in long-term memory. Cognitive load was minimized in this study by keeping the multimedia messages consistent with each other by having the same sequence of content design layout and small amount of information in each message. Since mobile phones use the standards presented by the International Telecommunication Union (http://www.itu.int/net/home/index.aspx), they share common conventions in navigation and layout for multimedia messages. According to Schneiderman (1997), a screen that used standard conventions in navigation and layout is more usable and as a result has a much lower cognitive load.

There were word's dictionary definition, exemplary sentences showing the uses of words in different contexts, an animated picture where there is an image which facilitates understanding and remembering of the lecture, and an audio file containing pronunciation in the contents of the MMS. The majority of the participants stated various benefits of using the exemplary sentences and images in multimedia messages. They mostly indicated that they liked the images and exemplary sentences because they were very useful for learning and retaining words in memory. The analyses of retention tests also supported the students' statements.

Both elementary and pre-intermediate level students in mobile groups retained significantly more word items than the students in printed and web groups. In addition, the analysis revealed that there was an increase in mobile groups' scores in the retention tests when compared with the post-tests. On the other hand, both printed and web groups' retention test scores were decreased when compared with the post-tests. These findings are also consistent with the literature that a word learned in a meaningful context is best acquired and remembered (McCarthy, 1990). Therefore, providing exemplary sentences showing the uses of words in different contexts and related images in multimedia messages should be considered as useful components in mobile assisted vocabulary learning.

As stated in the literature review chapter, there were two different views in the literature regarding the roles of media for learning. On the one side, Clark (1983) is pioneering the view that it is not the medium that affects learning; it is the method or strategy used in the instructional process. On the other side, Kozma (1994) is pioneering the view that different media have different characteristics and one medium may produce more or different learning than another for different learning contexts. The findings of the study suggested that the use of MMSs and SMSs was significantly effective to improve students' vocabulary acquisition. In this study, the instructional media were the MMSs and SMSs delivered via mobile phones, but the medium itself did not yield this effect. The instructional media were supported with the instructional method which was designed in light of the learning and cognitive theories. It can be concluded that the suitable media and method supported each other, and resulted in improved performance in student learning in this study.

5.3. Discussion of the Learners' Perceptions Regarding the Use of Multimedia Messages Delivered via Mobile Phones for Vocabulary Learning

The second research question in this study addressed the students' opinions regarding the use of mobile phones for vocabulary learning. A semi-structured interview and a questionnaire involving open-ended questions were employed to answer this question of the study. The responses show that nearly all of the students (only one student in the elementary group stated "partly") found it very useful for vocabulary learning. The students were also asked their reasons as to why they gave

this answer, and the responses were varied. A great majority of the students noted that the anytime, anywhere access to mobile phones was the main factor for this method's success. For example, a student in the pre-intermediate group stated "…a good opportunity to review anytime you want". In addition, nearly all of the students stated that the pictures used in the MMSs were helpful to retain words in memory. These findings are consistent with the findings reported by Ring (2001). Ring (2001) sent textual course content, quizzes, reminders, and human prompts to students' mobile phones as a supplement to an online business course. All of the participants thought mobile learning adds value to the course. Ninety three percent of them thought mobile learning useful while commuting.

Although a great majority of the participants did not state any negative aspects of the application, a negative response was stated by one student in the elementary group as "…because the messages that were sent systematically make me uncomfortable and after awhile it becomes boring". The comments voiced by this student should be taken into consideration in the future mobile applications sending contents through messages.

Earlier studies such as those by Thornton and Houser (2001) cited the technical limitations of mobile phones including the size of the screen and the difficulties of inputting text. On the other hand, the small screen problem of the mobile phones was not reported in this study. The only technical limitation reported by some participants (n=4) is the limited storage capacity of mobile phones that prevent them saving multimedia messages for later use. Since most of the mobile phones available today have expansion slots for memory cards, this would not be a problem for the mobile learning applications in the near future.

5.4. Discussion of Learners' Usage Patterns of Multimedia Messages for Vocabulary Learning

The third research question in this study addressed the students' preferences in using instructional materials provided via mobile phones. In order to identify the participants' mobile phone based supplementary material use and to reveal their experiences with the instructional materials, a checklist (in instructional materials

evaluation questionnaire, see Appendix C) was delivered to all participants just after the treatment. In the phase II of the study, 94% of the participants (n=35) in two mobile groups reported that they read all the multimedia messages that were sent throughout the study. This result is consistent with the results of the first phase of the study. All of the participants (n=31) in mobile groups in the phase I reported that they read all the multimedia messages that were sent throughout the study.

Repetition is especially important in vocabulary learning, and has a significant effect on vocabulary acquisition (Rott, 1999; Johnson & Heffernan, 2006; Webb, 2007). As Wallace (1982) states "There has to be certain amount of repetition until there is evidence that the student has learned the target word" (p. 29). Therefore, the question "On an average, how many times did you read each MMS throughout the study?" was posed to find out participants' average number of repetitions. In the phase II of the study, only 15% of the students stated that they read the MMSs only once. 85% of them stated that they read the messages more than once. Twenty seven percent of the participants reported that they read the multimedia messages more than twice. The average number of times that students read MMS is 2.32. In addition, a great majority of the students (85%) reported that they saved the multimedia messages on their phones for future use. In the first phase of the study, 65% of the participants stated that they read the messages more than once. Thirty five percent of the students stated that they read the MMSs only once. Thirty percent of the participants reported that they read the multimedia messages more than twice. The average number of times that students read MMS is 2.03. In addition, a great majority of the students (89%) reported that they saved the multimedia messages on their phones for future use. The findings gathered from two subsequent mobile learning implementations suggest that the multimedia messages encouraged the students to repeat the study materials.

There has been a great deal of research on how items should be repeated, specifically on the number of repetitions. It is not easy to state a specific number of repetitions for learning to occur since students differ in their abilities and preferences to learn a language (Tinkham, 1993, cited in Nunan, 2001). On the other hand, some studies can give a general idea about the number of repetitions for

vocabulary items to be learned. For instance, Kachroo (1962, cited in Nation, 2002) reported that most learners can remember and use the words which are repeated 7 times or more. Crothers and Suppes (1967, cited in Nation, 2002) also indicated that most vocabulary items are learned after 6 or 7 repetitions. Although the average number of repetitions reported by students in this study was approximately 2, the mobile application was not the only study material for the students' vocabulary learning. The application was used as a supplement to their regular language learning process. The use of multimedia messages as a supplement to regular classroom instruction during the four weeks encouraged the students to repeat the vocabulary study materials and improved the students' vocabulary acquisition. Therefore, the results of the study are consistent with the literature in this respect.

It was one of the aims of this study to find the most suitable scheduling for MMS delivery. Students were sent three multimedia messages in a day on lecture breaks with two hours time space between messages in the phase I. A majority of the participants (58%) found three multimedia messages in a day just right, 39% of them found it to be few, and only 3% of them found it too many. Participants reported that two hours time space is a suitable interval between messages. Sixty one percent of the participants reported that two hours time space is enough, 36% of them found it to be too long and only 3% of them found it short. Since 39% of the participants in the phase I reported that 3 MMSs in a day were few and 36% of them found the two hours time space between MMSs too long, students were sent 4 MMSs in a day on lecture breaks with an hour time space between messages in the phase II. A great majority of the participants (73%) found four multimedia messages in a day just right, 18% of them found it to be few, and 9% of them found it too many. Similarly, participants reported that an hour time space is the most suitable interval between messages. Seventy nine percent of the participants reported that an hour time space is enough, 9% of them found it to be short, and 12% of them found it too long. To sum up, the results of the questionnaire indicate that participants made use of the study materials that were sent as multimedia messages via mobile phones and they found the scheduling used in the study to be appropriate for them.

These results are a little different than the results reported by Levy and Kennedy (2005). They conducted a study for Italian learners in Australia, sending vocabulary words and idioms, definitions, and exemplary sentences via SMS in a spaced and scheduled pattern of delivery. They also requested feedback in the form of quizzes and follow up questions from the learners. They investigated the best times and scheduling of message delivery. The findings from student surveys indicated that the best times to send messages are between 9 a.m. and 10 a.m. and two messages a day is the best rate at which to send. Therefore, we need more research investigating the best rate and the best scheduling for message delivery in mobile learning applications in order to offer reliable suggestions for message delivery.

5.5. Discussion of Learners' Motivation Regarding the Use of Instructional Materials Used in the Study

The fourth research question in this study investigated the students' motivation regarding the use of instructional materials used in the study. In order to evaluate learners' motivation, a motivation survey which is based on Keller's (1987) Attention, Relevance, Confidence, Satisfaction (ARCS) model of motivational design was employed just after the implementation. The mean scores on Instructional Materials Motivation Survey (IMMS) were 134.97, 123.06, and 108.56 for mobile, printed, and web groups respectively. The analysis revealed that mobile groups ARCS scores were significantly greater than printed and web groups. Thus, the results suggested that students who received multimedia messages were more motivated than students who studied the web- and paper-based materials. This high motivation may have resulted in mobile group students getting higher scores in vocabulary achievement tests. In this study, motivation was one of the factors in vocabulary learning that affect student achievement. Therefore, both instructional designers and instructors should consider the importance of motivation in mobile learning so as to enhance student achievement.

Studies in the literature illustrated that motivational issues are influential on instructional outcomes since they are the fundamental factors that affect student's academic performance (Weiner, 1985; Oxford, Park-Oh, Ito, & Sumrall, 1993). The results from these research studies are similar to the findings in this study. The

students who received multimedia messages were more motivated than students who studied the web- and paper-based materials during the study. Interview and questionnaire results indicated that students liked the use of mobile phones for vocabulary learning. The majority of the students stated that it would be beneficial to integrate such a method in all language learning environments. Exemplary sentences showing the uses of words in different contexts and animated pictures which facilitate understanding and remembering of the lecture would be motivational factors to learn, because the students stated that they liked the pictures and exemplary sentences most. In addition, the students stated that they liked the method because it was useful for learning and retaining words in memory. This could be another motivational factor for them.

The push aspect of multimedia messages delivered via mobile phones may also help the students build intrinsic motivation. The problem of motivation for starting to study which is difficult to overcome for many students is overcome by a stimulus coming from an external source. The students were encouraged to study by sending them exercises and also practice materials via multimedia or short messages. Thereby, the students were able to practice independent from time and space, without opening the course book or lecture notes, without connecting to a web site or sitting in front of a computer or using educational software. All of the participants in mobile groups reported that they read all the multimedia messages that were sent throughout the study. This finding shows that all of the mobile group students read the MMSs at least once. Therefore, it can be concluded that the use of multimedia messages as a supplement to regular classroom instruction during the four weeks encouraged the students to study the vocabulary learning materials and increased the students' intrinsic motivation.

5.6. Implications

Both learner reactions to mobile technologies and the possible effects on language acquisition have been very promising. According to pre- and post-tests, learners demonstrated vocabulary gains as a result of multimedia messages they received via mobile phones. It is also indicated in the findings that language learners find studying on a multimedia messages delivered via mobile phones effective, unique

and interesting. Moreover, learners emphasized that the distinctive features of mobile phones such as portability (fit in their pockets) and immediacy (always with them) allowed them to study whenever and wherever they want. Therefore, embedding such mobile phone based study materials in language programs is worthwhile as a supplementary material as these materials encourage learners to revise the previously learnt vocabulary and practice them out of the classroom.

It is important to bear in mind that not all feedback regarding the use of mobile phones for learning has been positive. Some learners may complain about frequent delivery of learning materials via mobile phones. Therefore, it is important to fine tune the best rate and scheduling of content delivery. Piloting and receiving participants' feedback are highly recommended for deciding on the best rate and scheduling for any mobile application.

Educational institutions that use technology to improve student learning in their learning environments should consider using interactive mobile phone based learning materials. These materials should use multimedia and provide practice with feedback. The presentation modality (text with picture) in this study enhanced the students' performances on a vocabulary assessment test and the students' motivation. The presentation modality in this study reflected the principles of Mayer's (2001) multimedia learning theory. Therefore, instructional screen designs should have a limited amount of information per message with a related multimedia component (audio, picture or video). The instructional design in mobile learning should not place too much information on instructional materials, which would negatively affect the learners' cognitive process. In addition, instructors and instructional designers should integrate examples and animations showing the uses of subject matter in different contexts. The findings of the study indicated that examples and animations in mobile learning study materials were important motivational factors in promoting effective learning.

This study recommends the use of animated pictures when explaining a process, a concept, or a skill in instructional materials delivered via mobile phones for the second generation (2G) mobile communication services. Many mobile phones now support streaming video and polyphonic sound with the third generation (3G)

mobile communication services that provide more bandwidth for transferring large files. Therefore, if third generation (3G) mobile communication services are available, it is recommended that the streaming video which provides a more detailed explanation than a picture (a still shot) is used in learning contexts.

5.7. Recommendations for Further Research Studies

New opportunities and exciting prospects afforded by innovative technologies are unfolding in teaching vocabulary. More research to enhance our knowledge of the nature of mobile vocabulary learning and to inform us on alternative ways to improved vocabulary is called for. English language teachers, material writers, and researchers should juggle around with these new developments in vocabulary teaching/learning and redefine their teaching, assessment and research priorities in the light of these new prospects.

Although mobile phones might appear to be more suited to individual learning activities, they might also be ideal tools to support collaborative learning. For example, instructional design for second language learning might contain collaborative listening and speaking activities via mobile phones. In addition, a mobile learning system can be developed to allow each individual learner to prepare and share content using the phones' capabilities to take pictures, capture sound, and input text.

Future research could investigate the integration of automated evaluation of pronunciation and speaking into the mobile application. Learners may submit sound files captured by their mobile phones for automated evaluation. This requires a special computer program having advanced voice recognition capabilities. An implementation of such a mobile system requires further research.

The method followed in this project can be used on its own or integrated with traditional teaching methods in any subject area. The processes and results of this study may lead to other studies which may incorporate second generation GSM technology with teaching/learning processes in various subject matters in different parts of the world. For example, the study can be designed for usage of the mobile

learning while teaching mathematics, science, and engineering courses. Such investigations regarding the use of mobile phones for learning could provide valuable information for the literature.

This study has some limitations. Therefore, keeping in mind the limitations of the study, the study can be redesigned accordingly, covering the same subject area and for the same grade level but for a longer period of time with much more word items. Such an investigation regarding the foreign language teaching could provide valuable information for the literature.

The study's participants were the English preparatory school students. A future research may examine the same effects of the use of multimedia messages for vocabulary acquisition on a different population. This study's population could be employees learning second language from a small company or a large corporation. Another study could examine the two separate population groups and determine whether there were any differences between them. The differences between these two population groups is that university students are taking classes to earn a degree and to get a job while the employees are taking training classes to improve their positions. Each population group has a different purpose in taking the class, which affects their motivation. Therefore, this study will yield valuable information to the literature regarding comparison of the use of mobile phones in formal and informal learning settings.

5.8. Conclusion

Mobile phone learning is a young discipline that is gaining more and more attention because of its promises for education (Chinnery, 2006; Kiernan & Aizawa, 2004; Thornton, & Houser, 2005). On the other hand, some people have still serious doubts to adopt mobile devices into learning environments. They think that the user interface of mobile devices is quite limited and cannot display information-rich content in a useful way. We believe that this is not a significant constraint for today's technology considering the explosive development of the Information and Communication technologies. The processing and storage capabilities of mobile devices have improved for the last five years, and this resulted in high voice and

graphic quality, and ease of use. This study showed that carefully designed instructional materials for mobile devices can display information-rich content such as visual representations, textual information, audio, animations, etc.

This study has contributed to a better understanding of the use of multimedia messages via mobile phones in a traditional learning environment, which can affect student learning and motivation. The results suggest that students who were sent multimedia messages studied supplementary materials more than students who studied the web- and paper-based materials and this frequent supplementary study helped to better acquisition of words. The students in general took positive perceptions about learning vocabulary via mobile phone for its portability, immediacy, and the spacing effect it generated. Moreover, the students believed that the use of mobile phones for vocabulary learning is very useful educational method.

The results of this study indicate that majority of the students own and frequently use mobile phones. This study extends the use of mobile phones, which are already used for communication and entertainment, to education. The findings of this study suggest that using mobile phones in educational settings may help learners be more motivated and might make it possible to overcome the difficulties teachers or parents experience in order to make learners start studying. The results also indicate that sending multimedia messages via mobile phones uses the push aspect of mobile technology, and encourages regular study. Therefore, the delivery of foreign language vocabulary study materials as multimedia messages via mobile phones may lead to better pronunciation of words.

Furthermore, learners able to use any wasted time (on the bus, on their way back and to school) on learning languages with the chance of repeating the mobile content as many times as they want conveniently as the words would be at their finger tips on their mobile phones. The results of this study suggest that learners can improve their pronunciation on their own with the use of mobile phones and the implications of this study point to a possible new pedagogy.

There is still much to be learned in regard to the utilization of the mobile phones in the delivery of the instruction to the students. Mobile learning is a rapidly growing

delivery medium in the corporate world and in the field of education. That is why it is important to explore the effectiveness of mobile-based learning and the instructional design of its interface in further studies.

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APPENDIX A

PRE-STUDY MOBILE PHONE USE QUESTIONNAIRE

Cep Telefonu Kullanım Anketi

Açıklamalar: Bu anket, TUBİTAK tarafından desteklenen SOBAG-105K070 numaralı ve "Öğrencilerin İngilizce kelime kazanımlarının cep telefonu üzerinden çokluortam iletileriyle desteklenmesi araştırma projesi" başlıklı proje kapsamında öğrencilerin cep telefonu ve İnternet kullanımları hakkında bilgi toplamayı amaçlamaktadır. Soru seçenekleri kutucuk ile belirtilmiş ise "X" işareti yazınız. Diğer sorularda büyük harf kullanılarak okunaklı ve düzgün bir şekilde cevap veriniz. Lütfen cevapsız soru bırakmayınız. Anket kapsamındaki bireylerle ilgili kişisel bilgiler rapor edilmeyecek, paylaşılmayacak, satılmayacak ya da herhangi bir şekilde kötüye kullanılmayacaktır. Veriler yalnızca araştırma amaçlı kullanılacaktır. Yardımlarınız için teşekkür ederiz.

Bölüm I. Kişisel Bilgiler

1.Öğrenci numaranız		**2. Adınız ve soyadınız**	
		3. Bölümünüz	
4. Sınıfınız	**5. Cinsiyetiniz**		**6. Doğum yılınız**
☐☐☐	Kız ☐	Erkek ☐	1 9 ☐☐

Bölüm II. Cep Telefonu Kullanımı

1. Ne kadar zamandır cep telefonu kullanıyorsunuz?

0 – 6 ay ☐ 6 – 12 ay ☐ 1 – 2 yıl ☐ 2 – 4 yıl ☐ 4 yıldan fazla ☐ Hiç kullanmadım ☐

2. Kendinize ait cep telefonunuz var mı?

1 adet ☐ 2 adet ☐ 2'den fazla ☐ Cep telefonum yok ☐

3. Cep telefonunuzun <u>markası</u> ve <u>modeli</u>?		**4. Varsa ikinci cep telefonunuzun <u>markası</u> ve <u>modeli</u>?**	
<u>Marka</u>	**<u>Model</u>**	**<u>Marka</u>**	**<u>Model</u>**
_____	_____	_____	_____

5. En sık kullandığınız cep telefonu hattınız ve numaranız nedir?

Avea Faturalı ☐ Faturasız ☐ **Telsim** Faturalı ☐ Faturasız ☐ **Turkcell** Faturalı ☐ Faturasız ☐

Cep telefonu numaranız: ☐☐☐☐☐☐☐☐☐☐

6. Varsa ikinci cep telefonu hattınız ve numaranız nedir?

Avea Faturalı ☐ Faturasız ☐ **Telsim** Faturalı ☐ Faturasız ☐ **Turkcell** Faturalı ☐ Faturasız ☐

Cep telefonu numaranız: ☐☐☐☐☐☐☐☐☐☐

ANKET BİTMİŞTİR, TEŞEKKÜR EDERİZ.

APPENDIX B

ENGLISH LANGUAGE VOCABULARY ASSESSMENT TESTS

VOCABULARY TEST PART 1 (PHASE I: Elementary level)

<u>Part I</u> Fill in the blanks with the correct words from the box. Use each word only once.

difference	change	similar	happen	believe
feelings	same	equal	think	get
important	get angry	apologize	worry about	fix

1. They always fight about everything because they don't have _____ opinions. They are really quite different from each other.
2. Teachers always _____ when students come late to class.
3. When you do something wrong, you should always _____ for that behavior.
4. Mothers _____ their children very much, but that kind of behavior isn't very good for the development of children.
5. After you become an adult, the _____ in opinions won't affect you very much. You'll learn to understand other people.
6. When something nice _____, we feel very happy and lucky.
7. Do you _____ in God? I do because life is really full of miracles.
8. I used to feel different about her, but now my _____ changed because she doesn't care about other people.
9. Racists don't believe that white people and black people are _____.They think that white people are better than the black.
10. Your advisor is here to help you, so you can _____information from her when you need to.
11. These twins in my class are almost the _____! I don't understand which one is Kübra and which one is Bengü.
12. You hurt your friend's feelings, so you must apologize and _____ this situation.
13. The temperature at this time of the year used to be higher, this climate _____ causes a lot of problems.
14. What is more _____ to you? Money or love?
15. I _____ that money really brings happiness.

<u>Part II</u> Fill in the blanks with the correct words from the box. Use each word only once.

volunteer (v)	loneliness	hardship	plant (v)	homeless
environment	take care of	shelter	accept	volunteer (n)
cut down	luck	feed	become	invite

1. My aunt is away on holiday so everyday I go to her house and _____ her flowers.
2. Business life is full of many _____ and problems.
3. _____ is an important factor if you want to open a new restaurant. There shouldn't be alternative places around.
4. Winter is the worst month for _____ people. Every year many of them die because of cold and snow.
5. Every year our school gives tons of used paper to Tüyap and they _____ baby trees.
6. _____ is very sad and difficult. Everybody needs someone to talk to.
7. Government made a new _____ for the poor. They provide food and accommodation.
8. Every year farmers _____ trees to have more fields for farming.
9. _____ work in disaster areas to help the citizens in need.
10. Every week I buy lottery tickets but I never win any money. I don't have any _____ at all.
11. I often _____ birds, especially in winter because it is difficult to find food in winter.
12. I _____ to work in Africa to help poor children.
13. I didn't _____ the job because they want me to work for 7 days a week.
14. I _____ him to have a cup of coffee but he was busy.
15. Shopping on the internet _____ very popular among people who have no time to go shopping.

<u>Part III</u> Fill in the blanks with the correct words from the box. Use each word only once.

evidence	complicated	anxious	repair	evolve
confident	relaxed	terrific	waste	cause
depressed	strange	produce	realize	decide

1. The police are trying to find _____ such as fingerprints or blood stains on the floor and the victim in the house to solve that violent crime.

2-3. When a foreign student starts to learn English, s/he gets _____ if s/he can't _____ a written report or speak fluently.

4. Marissa has to get her car_____; otherwise, she may have an unexpected accident while driving one day.

5. My neighbor's cat _____ me trouble when they were away because I had to look after that cute animal but I had allergy and sneezed for half an hour after entering its room.
6. The teacher gave us such a/an _____ assignment that nobody in the classroom was sure what to do at the end of the lesson.
7. At the end of the meeting, the manager told Susan that she would get the job because she looked so _____, and he appreciated her self-esteem.
8. Jenny is very _____ about going to the school party on her own because she doesn't know anybody and this is her first social gathering in that town.
9. If you _____ an unusual behavior of that new worker, just call and inform me; otherwise, I will charge you of his faults.
10. She _____ that the dress was too expensive so she left the store and went to the old bazaar and found another beautiful one to buy.
11. Many scientists have claimed that men _____ from apes and still many are trying to prove this theory with scientific research.
12. Gabriella looks so comfortable and _____ with a smile on her face while she is lying on the beach under the shining sun on holiday.
13. They shouldn't _____ a lot of time trying to fix the computer themselves because they are not professionals, so the problem may get worse.
14. I had a _____ dream last night. I was with aliens from outer space and we were playing guitars and singing a song in an unusual language.
15. Losing his job was a _____ shock for him, so he had to get professional help from a counselor to overcome those depressing days.

<u>Part IV</u> Fill in the blanks with the correct words from the box. Use each word only once.

function (v)	customer	product	quit	function (n)
profit	vision	investment	invest	include
online	virtual	complete	basically	solve

1. Everybody in the world is trying to _____ the environmental problems because they are all afraid that the world will come to an end very soon.
2. In large supermarkets, _____ have the chance to find a great variety of food and vegetables.
3. The responsibilities of a teacher _____ preparing good materials for students and teaching them well.
4. The _____ of many national companies will go up after Turkey becomes a member of European Union.
5. Some companies become more successful than the others because they have a better _____ of the future and they can successfully predict the future needs of people.
6. Many international companies _____ in sectors such as computer technology and robotics because nowadays more and more people use computers and robots to do their jobs.
7. These days there is _____ one reason why people move to new places: to find better jobs.

8. There is no _____ in the markets in Bursa to die clothes in a washing machine.
9. Some companies' _____ are generally in one sector only, but some other companies are interested in more than one sector.
10. The main _____ of a manager in a company is to plan and organize all the jobs and responsibilities in that company.
11. Today, people _____ their jobs for various reasons such as low salary, too much work and limited social activities.
12. When you enter a chat room on the Internet, you see that many people from different parts of the world are _____all at the same time sharing ideas about various topics.
13. Addicts of computer games spend most of their time playing games on the Internet, so they live in a/n _____ world and therefore lose their connections with real life and real people.
14. After the company _____ the research about the negative effects its latest medicine for the flu and shows that it is safe, people can buy it at pharmacies.
15. In some people the immune system doesn't _____ as well as it does in some other people, so they must take medicine frequently to protect themselves against diseases.

VOCABULARY TEST PART 2 (PHASE I: Elementary level)

Part I Fill in the blanks with the correct words from the box. Use each word only once.

pollution	influence	damage (n)	accept	destroy
pressure	garbage	destructive	prove	allow
extinct	disappear	create	unfortunately	absorbs

1. In science classes, teachers expect students to form hypotheses and _____ these hypotheses by doing some experiments; for example, they want students to show that matter can change its form.
2. In some small traditional societies, like in some African tribes, there is a social _____ on girls to dress and act in certain ways, and they get some punishment if they don't follow there rules.
3. _____ is a serious problem in India, especially in its 14 major rivers, because factories throw their biological and chemical wastes into these rivers.
4. Computer games are really interesting and many teenagers like playing them; however, when you become a game addict and spend most of your time sitting in front of a computer, it might _____ all areas of your life, such as your school performance and relationships with other people.
5. In sports centers, they don't _____ small children to swim in the swimming pool on their own; they either want the parents to stay with their children, or they tell pool guards to take care of these children.
6. The recent earthquakes in the Marmara Region in Turkey often cause a lot of _____ in the buildings and many people can't live in their houses any more, but luckily they don't cause any deaths.

7. Sometimes strange things happen to people; for example, they say that objects seem to _____. This is because they leave something like a pen on the table and come back to the table a few minutes later to get it, but they can't find it there any more.
8. In summers it is not good to wear black clothes because the color black _____ a lot of sunlight and you get extremely hot.
9. When people give you _____ feedback about your performance, you may get really upset and may not want to do it again; however, as an adult, you must learn to be strong against negative criticism and try doing better in your next performance.
10. In the American culture, if people invite you to their house for dinner and if you _____ their invitation, you should take some drink with you, like a bottle of wine, when you go there. It will be impolite if you don't.
11. Parents have the greatest _____ on their babies between the ages of 0-2 because during this period babies spend all their time only with their parents, especially the mothers.
12. In order to _____ better job opportunities for themselves, young people try to get into universities to get a good diploma and have a prestigious job after graduation.
13. Scientists are afraid that pandas may become _____ very soon because there are only 800 pandas in the wild forests and 100 in the zoos.
14. Every day the cleaning staff at the school brings all the _____ in the school downstairs and puts it in front of the main gate.
15. European countries are trying hard to find solutions to food-related problems in Africa, but _____ they couldn't find any good solutions until now.

<u>Part II</u> Fill in the blanks with the correct words from the box. Use each word only once.

experiences	recreation	customs	assignment	requirement
tuition	citizens	immigrant	available	various
scholarship	loan	facility	individual	differ

1-2. My cousin got a _____ from UCLA, including his yearly _____ fees, accommodation and school expenses.
3-4. It is always difficult to be a/n _____ in a foreign country because the _____ of that country often regard you as an outsider.
5. The Chinese people still continue their traditional _____ such as religious celebrations, wedding and burial ceremonies.
6-7. The expectations of couples _____ a lot in every country according to their background and past _____ such as their childhood and adolescence.
8-9. The basic _____ of this course is being hard-working because you will need to complete a lot of _____ and reports before the final exam and there can be no delays.
10. Martin demanded a huge _____ from the national bank before he bought that house, but he couldn't get the money on time so his father supported him.
11. The only _____ that you can do at this campus site is to study because we only have an enormous library and research labs for the students.
12. There may be _____ reasons of this murder, but the police have focused on the main two reasons, money and hatred.

13. Macy went to the party unwillingly to be with her friends, but as a decisive _____, she shouldn't have done something she didn't want to do.
14. It is important that students should find time for _____ and leisure.
15. Whenever you are _____, just call me. Anytime is suitable for me nowadays because I am on holiday for two weeks.

<u>Part III</u> Fill in the blanks with the correct words from the box. Use each word only once.

effect	increase (n)	decrease (n)	extreme	minor
region	emotion	disorder	major	globe
sudden	affect	probably	increase (v)	decrease (v)

1. It was a wonderful, sunny day, but then there was a/n _____ change in the weather and it started to rain.
2. I don't know the results of the exam. _____, our professor will give the results in class.
3. The worst _____ of drugs is that you forget everything.
4. All around the _____, people share the same problems, so we should help each other.
5. He is trying to _____ the interviewers with his elegant resume, but they don't seem interested in him at all.
6. Some sports are really _____ because they are too risky. You can lose your life while you try these sports.
7. People aren't interested in reading any more, so there is a/n _____ in the number of books as well.
8. Some children have difficulty in writing, so parents should consult a doctor about this _____ before it's too late.
9. William is trying to _____ the number of his customers by giving them free products.
10. This city has many problems, but the _____ problem is pollution because it affects everyone's health.
11. 10 years ago, there weren't so many computers at homes, but nowadays, there is a/n _____ in the number of computers at each home.
12. Fortunately, the accident wasn't very serious. There were only _____ injuries.
13. The best _____ in the world is love, so it's really important to love someone.
14. Karadeniz is a famous _____ with all its natural beauties and warm people.
15. The Government is trying to find solutions to _____ the crime rates in the country.

<u>Part IV</u> Fill in the blanks with the correct words from the box. Use each word only once.

choice	nutrition	value	available	fix
certain	convenient	alike	raise	rent
identical	contain	support	order	clear

1. This red dress looks like the best _____ for the graduation party.
2. Canned food _____ a lot of dangerous chemical preservatives.
3. Our manager doesn't _____ our new project.
4. Desserts are not _____ places to live.
5. Fridge is making strange noises again. I need to _____ it.
6. Two cars are very _____ in every way. I cannot decide which one to buy.
7. The _____ of Kaşıkçı diamond is beyond imagination.
8. The king _____ his servants to clean the whole palace.
9. Mothers are very careful about the _____ of their children. They always choose healthy food.
10. I want to _____ a new flat. My flat is very cold and noisy.
11. Charity organizations _____ a lot of money every year to help the poor.
12. New materials are _____ for the students. They can take them from the materials office.
13. John and Mathew's tastes are _____. They both like Jazz music and horror films.
14. I am not _____ about the result. I have to solve the problem again.
15. The sky is very _____ tonight. You can see all the stars and the milky way.

VOCABULARY TEST PART 1 (PHASE I: Pre-intermediate level)

<u>Part I</u> Fill in the blanks with the correct words from the box. Use each word only once.

robberies	local	murdered	consist of	face
regulate	in effect	certainty	adopt	affected
declined	rise	custody	either way	regulations

1. In order to be able to _____ the workers' working schedules more effectively, the managers in the factory will have to apply new motivating methods to increase the production.
2. The police need to identify the reasons why that man _____ his wife violently and confessed this.
3. The _____ people of the neighborhood didn't want the newcomers in their safe street as they were criminals and had just been set free.

4. If you do not obey the rules and _____ in that college, you will be severely punished; thus, you will probably fail.
5. Parents _____ many difficulties and hardship during their children's adolescence, and they often need a professional support from a psychiatrist to help them.
6. The criminal investigation reveals that the devastating childhood memories such as torture and rape during infancy _____ the murderer a lot and turned him into a monster.
7. The crime rate in the city has been increasing so fast that the police themselves can't count the number of the _____ and thefts during the week.
8. After the dramatic _____ on fuel prices, the number of cars in the traffic went down sharply and so did the number of the cars on sale.
9. The mother of the baby sighed in relief when she was given the _____ of the baby after the long trial.
10. The detective claimed that it was difficult to say with absolute _____ what time the crime took place.
11. When she _____ his marriage proposal, he got so disappointed that he left the town and never returned and nobody heard anything about him after that.
12. Marissa has two options to get out of trouble and she is very lucky because she may choose _____ as she has complete support from her family.
13. The committee voted to _____ the new proposals of the workers' union to prevent from a sudden strike during that economic recession.
14. The courses at the college _____ many difficult and various task based assignments and report completions, which makes the process challenging but enjoyable.
15. The managers call this novelty a pay rise, but _____ our wages will fall because of the increasing taxes.

<u>Part II</u> Fill in the blanks with the correct words from the box. Use each word only once.

murder	violence	offense	leads	rob
regulations	variety	purpose	punish	vary
express	violent	find out	expression	widely

1. Some programs on TV should be banned because they have too much _____ in them.
2. The kinds of extreme sports _____ from bungee jumping to paragliding or parasailing.
3. It is not a good idea to _____ children when they do something wrong. It's better to talk to them.
4. The _____ "Crème de la Crème" means people of the highest social level or elite.
5. In order to stop crime, there should be more _____ in the laws.
6. Scientists are still trying to _____ the causes of obesity, but they haven't found an answer yet.

7. The biggest advantage of that hotel is that there is a/n _____ of activities such as workshops, tours, and organizations.
8. _____ is the worst of all crimes because a person is killed and there is no turning back.
9. The Internet wasn't that common 10 years ago, but now it is _____ used all around the world.
10. _____ behavior is related to violence experienced at home, at school, or at work.
11. It isn't easy to _____ a bank nowadays as all the security systems have improved dramatically.
12. Irresponsibility always _____ to failure in life.
13. The _____ of this meeting is to help homeless people and find them places to stay.
14. Men can't _____ their feelings as easily as women can.
15. Stealing someone's purse is a serious _____ and the punishment is quite severe for that.

<u>Part III</u> Fill in the blanks with the correct words from the box. Use each word only once.

sequence	beneficial	satisfied	recover	propose
reduce	focus	refuse	get the best of	raise
envy	investigate	capture	dissatisfied	envious

1. In order to be able to increase the workers' salaries, the managers in the factory will _____ some of the factory's other expenses by using cheaper production methods.
2. The police need to _____ this crime further in order to find the murderer and the reason behind this murder.
3. It is quite easy, even for the small children or for the elderly, to _____ from less serious diseases like the common flu or allergic reactions to food or dust.
4. When you fail to do something or make a mistake, there is no point in stressing or pitying yourself further about it. In such cases, the most important thing is to _____ this negative experience, learn from it, and try not to repeat it in the rest of your life.
5. Psychologists, as much as parents, are aware that children in a family _____ each other and this can be at serious levels; however, they haven't yet been able to develop any efficient methods to help to avoid such feelings among children.
6. In the world summit for environment protection, United Nations member countries weren't able to _____ any effective project because none of the countries could promise to provide the necessary budget for it.
7. When you face a very difficult and unfamiliar situation, it is always very _____ to get advice from older and more experienced people.
8. After the government decided to _____ the tax on fuel, the number of cars in the traffic went down dramatically and so did the number of accidents.

9. Most software companies in the computer market _____ their attention on translation programmes because more and more people prefer to translate their texts using these programmes rather than paying large sums of money to translators who get, for example, $15 per page for translating it from English to Turkish.
10. When you have a lot of chores to do, it is the best to put them in _____ according to their level of importance and then to start with the most important one.
11. These days everybody is _____ with his job and even the people with very prestigious jobs, such as doctors or engineers, complain about their low salaries and the demanding work load.
12. Sometimes the students in a class may be _____ of each other's performance; however, to create a friendly atmosphere in the class, it is the teacher's responsibility to motivate students towards a friendly collaboration rather than a violent competition.
13. When people offer you something, you don't have to accept it and you always have the right to _____ it; however, it is very important to choose the most suitable words to express yourself.
14. Children tend to develop a positive self image when they see that their parents are _____ with their performance at school and in the other areas of life.
15. It took the two professional hunters of the South African Zoo three days to _____ the rare cheetah and put it back into its cage.

<u>Part IV</u> Fill in the blanks with the correct words from the box. Use each word only once.

consumer	inhabitant	prevention	make an effort	combination
benefit from	accurate	consume	take advantage of	valid
claim	determine	prevent	cure	oppose

1. Drinking orange juice everyday can be a way of _____ from flu.
2. It is sunny today. I think we should _____ it and go to the beach.
3. It is hard to _____ the cause of the accident.
4. You have the wrong ticket! Look at the date. It says 11-11-2005. It is not _____ anymore.
5. Everybody _____ the technological developments. It makes everybody's life easier.
6. He _____ to win the race the last minute but it was useless.
7. _____ of this small village make their living by farming.
8. To stay healthy, you should _____ fat free and organic food.
9. Doctor Martin says sugar is very health but I totally _____ his ideas.
10. His calculations of the project are definitely _____. There are no mistakes.
11. Savaş Ay _____ that Cem Yılmaz stole his idea.
12. We should _____ the use of weapons to keep the world peace.
13. Doctors are trying to find a _____ for his illness for years.
14. Cigarette companies warn _____ about the dangerous effects of smoking.
15. A _____ of healthy diet and exercise can solve many health problems.

VOCABULARY TEST PART 2 (PHASE I: Pre-intermediate level)

<u>Part I</u> Fill in the blanks with the correct words from the box. Use each word only once.

aggressive	discouraged	courage	suspenseful	concentration
examine	tell the truth	fill out	transfer	consumption
optimistic	pessimistic	concentrate	combine	moderate

1. Some people have a/n _____ view about life and therefore they believe that all events bring sad results.
2. In court, everybody should _____ even if it is against their own benefit.
3. The key to success in any kind of work is to have good _____ skills; in other words, the person should be able to ignore everything in his environment and pay all his attention to his work.
4. Children tend to show _____ behaviors towards each other, like fighting or swearing, if they don't want to share something, like a toy or some nice food, or if they can't agree on a topic.
5. The temperature in a room for babies should always be kept at a _____ level: it shouldn't be too hot or too cold in the room.
6. To be successful, a student must be able to _____ theory with practice because otherwise, by using and discussing theory only, he can't produce anything practical to be used in real life.
7. In the sales department, after the accountants have entered all the data for that day, they _____ it to the main computer in the manager's office by using the local network.
8. Parents of hyperactive children generally complain that their children can't _____ on any work for a long time and even when they do so, they often make a lot of mistakes because they are extremely careless.
9. In order to relax their patients, doctors often start with a warm and friendly conversation with them before they _____ them.
10. These days in almost every shop, shop-assistants make you _____ a customer form and enter information such as your name, phone number and e-mail address to contact you whenever they bring new products.
11. One can get happy if he is brave enough and has the _____ to change the world according to his wishes and desires.
12. There has been a dramatic decrease in fuel _____ all over the country because of the increase in the fuel prices.
13. When you fail to do something, you shouldn't get _____ easily; on the contrary, you should find out the reason behind your failure and never repeat it in the future.
14. _____ people are not like that by nature; it is just that they prefer to see the good sides of life and act positively even in the worst situations.
15. In soap operas, the producers end each episode with a _____ situation so that they force the audience to look forward to the next episode.

<u>Part II</u> Fill in the blanks with the correct words from the box. Use each word only once.

construction	challenge (n)	drawback	construct	challenge (v)
secure	flexible	rigid	challenging	security
passionate	upgrade	distract	constructive	elaborative

1. All the assignments for our portfolio project are very _____.
2. Protecting a building from thieves is the job of _____ department.
3. All the programmes in my computer are out of date. I need to _____ them.
4. I can't concentrate on my work. All those noises outside _____ me.
5. The _____ site is not a playground for children.
6. Our teacher is very _____. She changes the programme according to our need.
7. He is an outlaw. I don't feel _____ when he is around.
8. They have to _____ a new building for the new department.
9. I am trying to quit smoking. It is a big _____ for me.
10. Connection failure is a serious_____ for internet users.
11. Our school has very _____ rules about doing homework.
12. The students in our school are very _____ about being successful.
13. I will _____ Andre Agassi for a game of tennis.
14. His criticisms are always very _____. They make you learn from your mistakes.
15. Japanese language has _____ rules. It is very difficult to understand.

<u>Part III</u> Fill in the blanks with the correct words from the box. Use each word only once.

motive	self-image	manufacturer	admit	advertise
defect	advertised	plain	manufacture	a piece of advice
reasonable	defective	misleading	exaggerate	exaggeration

1. The offer wasn't _____, so we decided not to buy that house.
2. The instructions of the exam were really _____, so most of the students gave irrelevant answers to the questions.
3. Let me give you _____: If you want to be successful, you should be self-confident and hardworking.
4. Their product wasn't successful in the market because it wasn't well _____.
5. The _____ of that murder isn't clear. The police couldn't understand if they killed that man for money or for other purposes.
6. You have to _____ that you weren't well-prepared for the exam because you see that you got the lowest mark in the class.
7. If you want your product to sell in the market, you have to _____ it.

8. No one believes what he says because he tends to _____ everything.
9. Everyone was over-dressed at the party, but his clothes were _____ as usual
10. I didn't like the movie because it didn't reflect reality. It was full of _____.
11. To be confident about yourself, you have to take a look at your _____ and detect your weakness.
12. After people liked her hand-made necklaces, she decided to _____ them in large numbers and sell them in the market.
13. The _____ of Nike sports shoes was sued by Human Rights Organization because he underpaid his workers.
14. After we saw the _____ of that blouse, we took it back to the store and got our money back.
15. Because of his _____ eyesight, he couldn't get a driving license.

<u>Part IV</u> Fill in the blanks with the correct words from the box. Use each word only once.

appreciation	spirit	grateful	rule	stuck
elaborate	appreciated	appropriate	theorize	considered
appreciate	considerate	celebrate	mixture	combination

1. The teacher showed no _____ to the students' projects, which offended all of them as they had done their best to complete them on time.
2. Before entering that college, Jack should have _____ all the advantages and disadvantages of living abroad without his family.
3. If you drink a special _____ of grape and orange juice, you will be healthier, especially in winters.
4. The team had to remove all the mud from the tires when the car got _____ at the very beginning of the rally.
5. Parents should _____ their children's behaviors so that they can feel encouraged and enthusiastic for the new tasks.
6. There should be a specific _____ about the mobile phones in all the classes to maintain discipline.
7. The _____ of education and talent forms a superstar. If you lack one of them, you can be a singer but not a star.
8. At the graduation party, the school principal reminded the college _____ which everybody felt deep inside once they started school.
9. The manager was_____ when he realized that the workers didn't leave the factory during the economic recession.
10. The materials must be _____ for the needs of all the students in the classroom so that they can improve their skills.
11. Students wanted to _____ their graduation at the school meeting hall with a big party but the director didn't allow that.

12. The police have taken _____ precautions to eliminate crime but it seems very difficult to be prevented without volunteer action in the neighborhood.
13. Research scientists _____ the existence of life on other planets before it is actually discovered.
14. The child's_____ assignment turned out to be his sister's. Then, the teacher got mad and punished him severely.
15. It is very _____ of you to remember my birthday.

VOCABULARY TEST (PHASE II: Elementary level)

Fill in the blanks with appropriate words' <u>numbers</u>. Use each word only <u>once</u>!

1)

1. accurate	**2.** confident	**3.** tiny	**4.** terrific
5. beneficial	**6.** aggressive	**7.** valid	**8.** strange

a. The weather was ___ and we decided to go for a walk.
b. Children tend to show ___ behaviors towards each other, like fighting or swearing, if they don't want to share something, like a toy or some nice food, or if they can't agree on a topic.
c. His calculations of the project are definitely ___. There are no mistakes.
d. Sometimes ___ things happen to people; for example, they say that objects seem to disappear.
e. At the end of the meeting, the manager told Susan that she would get the job because she looked so ___, and he appreciated her self-esteem.
f. You have the wrong ticket! Look at the date. It says 11-11-2005. It is not ___ anymore.
g. I could see some ___ fish just beneath the surface of the water.
h. When you face a very difficult and unfamiliar situation, it is always very ___ to get advice from older and more experienced people.

2)

1. flexible	**2.** empty	**3.** alike	**4.** plain
5. huge	**6.** homeless	**7.** dry	**8.** local

a. Two cars are very much ___ in every way. I cannot decide which one to buy.
b. Dancers and gymnasts need to be very ___.
c. I hung his wet trousers on the radiator, but they're not ___ yet.
d. Winter is the worst month for ___ people. Every year many of them die because of cold and snow.
e. Noticing her ___ wine glass, he refilled it.
f. We've chosen a/n ___ carpet and patterned curtains.
g. Many ___ shops will be forced to close if the new supermarket is built.
h. When their rent increased from $200 to $400, they protested against such a/n ___ increase.

3)

1. depressed	**2.** dissatisfied	**3.** violent	**4.** optimistic
5. pessimistic	**6.** complicated	**7.** relaxed	**8.** satisfied

a. The teacher gave us such a/n ___ assignment that nobody in the classroom was sure what to do at the end of the lesson.

b. ___ people are not like that by nature; it is just that they prefer to see the good sides of life and act positively even in the worst situations.

c. I'm not really ___ with the way he cut my hair.

d. She became deeply ___ when her husband died.

e. Gabriella looks so comfortable and ___ with a smile on her face while she is lying on the beach under the shining sun on holiday.

f. If you're ___ with the service, why don't you complain to the hotel manager?

g. He's very ___. He always thinks something bad is going to happen to him.

h. I worry about the destructive effect that ___ films may have on children.

4)

1. become	**2.** capture	**3.** allow	**4.** claim
5. believe	**6.** cause	**7.** fold	**8.** decide

a. In sports centers, they don't ___ small children to swim in the swimming pool on their own; they either want the parents to stay with their children, or they tell pool guards to take care of these children.

b. Will you help me to ___ the sheets?

c. There are so many to choose from – I can't ___.

d. Shopping on the Internet ___ very popular among people who have no time to go shopping.

e. It took the two professional hunters of the South African Zoo three days to ___ the rare cheetah and put it back into its cage.

f. I ___ her to be the finest violinist in the world.

g. The manufacturers ___ that the car is the safest you can buy.

h. The recent earthquakes in the Marmara Region in Turkey often ___ a lot of damage in the buildings.

5)

1. destroyed	**2.** disappeared	**3.** included	**4.** cut down
5. examined	**6.** volunteered	**7.** reduced	**8.** declined

a. The doctor ___ his heart carefully.

b. The plane ___ speed as it approached the airport.

c. Most of the old part of the city was ___ by bombs during the war.

d. During the emergency many staff ___ to work through the weekend.

e. We looked for her but she had ___ into the crowd.

f. Tax and service are ___ in the bill.

g. Mary ___ Jay's invitation to dinner.

h. Large areas of forest have been ___ to provide space for farming.

6)

1. effects	**2.** consumers	**3.** ingredients	**4.** garbage
5. regions	**6.** investments	**7.** pressures	**8.** functions

a. The new telephone rates will affect all ___ including businesses.
b. The ___ of the disease are terrible.
c. Lighting performs several ___ in the home.
d. Some companies' ___ are generally in one sector only, but some other companies are interested in more than one sector.
e. Mix the ___ together in a bowl.
f. The new material allows the company to make gas pipes which withstand higher ___.
g. Snow is expected in mountain ___.
h. Our household ___ is collected every day by the cleaning staff.

7)

1. choice	**2.** decrease	**3.** disorder	**4.** robbery
5. loan	**6.** increase	**7.** evidence	**8.** luck

a. People aren't interested in reading any more, so there is a/n ___ in the number of books as well.
b. The house was in a state of complete ___.
c. The police are trying to find ___ such as fingerprints or blood stains on the floor and the victim in the house to solve that violent crime.
d. There wasn't much ___ on the menu.
e. 10 years ago, there weren't so many computers at homes, but nowadays, there is a/n ___ in the number of computers at each home.
f. We took out a ___ to buy our new car.
g. Every week I buy lottery tickets but I never win any money. I don't have any ___ at all.
h. He is in prison for armed ___.

8)

1. construct	**2.** consist of	**3.** prevent	**4.** recover
5. consume	**6.** determine	**7.** invest	**8.** realize

a. OSS tests ___ a number of multiple choice questions.
b. To stay healthy, you should ___ fat free and organic food.
c. They have to ___ a new building for the new department.
d. It is hard to ___ the cause of the accident.
e. The institute will ___ 5 million in the project.
f. We should ___ the use of weapons to keep the world peace.
g. He obviously didn't ___ the dangers involved.
h. It took her a long while to ___ from/after her heart operation.

9)

1. distract	**2.** vary	**3.** raise	**4.** invite
5. repair	**6.** function	**7.** lead	**8.** rob

a. I can't concentrate on my work. All those noises outside ___ me.
b. Our refrigerator stopped to ___ all of a sudden.
c. I ___ him to have a cup of coffee but he was busy.
d. I don't know the way, so you'd better ___.
e. They decided to ___ a bank.
f. The hotel bedrooms ___ in size from medium to very large.
g. Anyone wanting to go to the meeting, please ___ your hands.
h. How much will it cost to ___ the car?

10)

1. produce	**2.** waste	**3.** oppose	**4.** envy
5. evolve	**6.** cure	**7.** contain	**8.** differ

a. Try to avoid foods which ___ a lot of fat.
b. Doctors and researchers will meet this week in New York to discuss how to ___ cancer.
c. International law continued to ___ in the areas of human rights, international security, and trade.
d. Istanbul and New York may be similar in many aspects, but they still ___ in various other ways.
e. I don't want to ___ money buying books I won't read.
f. Car manufacturers should ___ vehicles which are more secure against theft.
g. Doctor Martin says sugar is very healthy but I totally ___ his ideas.
h. I ___ her ability to talk to people she's never met before.

VOCABULARY TEST (PHASE II: Pre-intermediate level)

Fill in the blanks with appropriate words' <u>numbers</u>. Use each word only <u>once</u>!

1)

1. accurate	**2.** confident	**3.** tiny	**4.** terrific
5. beneficial	**6.** aggressive	**7.** valid	**8.** strange

a. The weather was ___ and we decided to go for a walk.
b. Children tend to show ___ behaviors towards each other, like fighting or swearing, if they don't want to share something, like a toy or some nice food, or if they can't agree on a topic.
c. His calculations of the project are definitely ___. There are no mistakes.
d. Sometimes ___ things happen to people; for example, they say that objects seem to disappear.
e. At the end of the meeting, the manager told Susan that she would get the job because she looked so ___, and he appreciated her self-esteem.
f. You have the wrong ticket! Look at the date. It says 11-11-2005. It is not ___ anymore.
g. I could see some ___ fish just beneath the surface of the water.

h. When you face a very difficult and unfamiliar situation, it is always very ___ to get advice from older and more experienced people.

2)

1. flexible	**2.** misleading	**3.** sudden	**4.** plain
5. huge	**6.** homeless	**7.** stuck	**8.** local

a. It was a wonderful, sunny day, but then there was a/n ___ change in the weather and it started to rain.

b. Dancers and gymnasts need to be very ___.

c. This door seems to be ___ - can you help me push it open?

d. Winter is the worst month for ___ people. Every year many of them die because of cold and snow.

e. The instructions of the exam were really ___, so most of the students gave irrelevant answers to the questions.

f. We've chosen a/n ___ carpet and patterned curtains.

g. Many ___ shops will be forced to close if the new supermarket is built.

h. When their rent increased from $200 to $400, they protested against such a/n ___ increase.

3)

1. envious	**2.** dissatisfied	**3.** violent	**4.** optimistic
5. pessimistic	**6.** complicated	**7.** grateful	**8.** satisfied

a. The teacher gave us such a/n ___ assignment that nobody in the classroom was sure what to do at the end of the lesson.

b. ___ people are not like that by nature; it is just that they prefer to see the good sides of life and act positively even in the worst situations.

c. I'm not really ___ with the way he cut my hair.

d. I'm very ___ of your new coat - it's lovely.

e. The manager was ___ when he realized that the workers didn't leave the factory during the economic recession.

f. If you're ___ with the service, why don't you complain to the hotel manager?

g. He's very ___. He always thinks something bad is going to happen to him.

h. I worry about the destructive effect that ___ films may have on children.

4)

1. differ	**2.** take advantage of	**3.** oppose	**4.** envy
5. evolve	**6.** determine	**7.** recover	**8.** cure

a. It took her a long while to ___ from/after her heart operation.

b. Doctors and researchers will meet this week in New York to discuss how to ___ cancer.

c. International law continued to ___ in the areas of human rights, international security, and trade.

d. Istanbul and New York may be similar in many aspects, but they still ___ in various other ways.

e. It is hard to ___ the cause of the accident.
f. Everybody ___ the technological developments. It makes everybody's life easier.
g. Doctor Martin says sugar is very healthy but I totally ___ his ideas.
h. I ___ her ability to talk to people she's never met before.

5)

1. destroyed	**2.** disappeared	**3.** included	**4.** cut down
5. examined	**6.** volunteered	**7.** reduced	**8.** realized

a. The doctor ___ his heart carefully.
b. The plane ___ speed as it approached the airport.
c. Most of the old part of the city was ___ by bombs during the war.
d. During the emergency many staff ___ to work through the weekend.
e. We looked for her but she had ___ into the crowd.
f. Tax and service are ___ in the bill.
g. The school acted quickly once it ___ that the problem was serious.
h. Large areas of forest have been ___ to provide space for farming.

6)

1. distract	**2.** vary	**3.** raise	**4.** prevent
5. repair	**6.** function	**7.** lead	**8.** rob

a. I can't concentrate on my work. All those noises outside ___ me.
b. Our refrigerator stopped to ___ all of a sudden.
c. We should ___ the use of weapons to keep the world peace.
d. I don't know the way, so you'd better ___.
e. They decided to ___ a bank.
f. The hotel bedrooms ___ in size from medium to very large.
g. Anyone wanting to go to the meeting, please ___ your hands.
h. How much will it cost to ___ the car?

7)

1. exaggerate	**2.** benefit from	**3.** claim	**4.** find out
5. apologize	**6.** concentrate	**7.** face	**8.** capture

a. When you do something wrong, you should always ___ for that behavior.
b. It is sunny today. I think we should ___ it and go to the beach.
c. With all this noise, it's hard to ___.
d. It took the two professional hunters of the South African Zoo three days to ___ the rare cheetah and put it back into its cage.
e. No one believes what he says because he tends to ___ everything.
f. The manufacturers ___ that the car is the safest you can buy.
g. She must ___ the fact that she will never walk again.
h. Scientists are still trying to ___ the causes of obesity, but they haven't found an answer yet.

8)

1. violence	**2.** consumers	**3.** ingredients	**4.** garbage
5. hardship	**6.** investments	**7.** inhabitants	**8.** pressures

a. The new telephone rates will affect all ___ including businesses.
b. Some programs on TV should be banned because they have too much ___ in them.
c. ___ of this small village make their living by farming.
d. Some companies' ___ are generally in one sector only, but some other companies are interested in more than one sector.
e. Mix the ___ together in a bowl.
f. The new material allows the company to make gas pipes which withstand higher ___.
g. Business life is full of many ___ and problems.
h. Our household ___ is collected every day by the cleaning staff.

9)

1. choice	**2.** decrease	**3.** disorder	**4.** robbery
5. loan	**6.** certainty	**7.** evidence	**8.** murder

a. People aren't interested in reading any more, so there is a/n ___ in the number of books as well.
b. The house was in a state of complete ___.
c. The police are trying to find ___ such as fingerprints or blood stains on the floor and the victim in the house to solve that violent crime.
d. There wasn't much ___ on the menu.
e. The detective claimed that it was difficult to say with absolute ___ what time the crime took place.
f. We took out a ___ to buy our new car.
g. ___ is the worst of all crimes because a person is killed and there is no turning back.
h. He is in prison for armed ___.

10)

1. prevention	**2.** consumption	**3.** shelter	**4.** nutrition
5. explosion	**6.** sequence	**7.** luck	**8.** emotion

a. We need to cut down on our fuel ___ by having fewer cars on the road.
b. The best ___ in the world is love, so it's really important to love someone.
c. The fire was thought to have been caused by a gas ___.
d. Every week I buy lottery tickets but I never win any money. I don't have any ___ at all.
e. Mothers are very careful about the ___ of their children. They always choose healthy food.
f. Drinking orange juice everyday can be a way of ___ from flu.
g. For the sake of convenience the photographs are shown in chronological ___.
h. The line of trees provides ___ from the wind.

APPENDIX C

INSTRUCTIONAL MATERIALS EVALUATION QUESTIONNAIRE

ÖĞRETİM MATERYALLERİ DEĞERLENDİRME ANKETİ

Sevgili arkadaşlar,

Bu anketi cep telefonları üzerinden yürütülen uygulamayı ve onunla ilgili deneyimlerinizi göz önüne alarak cevaplamanız gerekmektedir.

Bu anket iki bölümden ve 4 sayfadan oluşmaktadır. 1. bölümde 36 madde, 2. bölümde 17 soru vardır. Lütfen her maddenin ve sorunun cep telefonları üzerinden gerçekleştirilen uygulama ile ilişkisini düşününüz ve sizin için en uygun yanıtı veriniz. Doğru olmasını istediğiniz ya da diğer insanların duymak isteyeceği yanıtları değil, size göre gerçekten doğru olan yanıtı veriniz.

Her maddeyi ve soruyu kendi içinde düşünerek yanıtlayınız. Diğer maddelere verdiğiniz yanıtlardan etkilenmeyiniz. 1. bölümde her cümleyi dikkatle okuduktan sonra size en uygun gelen seçeneği işaretleyiniz.

Örnek: Meyve suyunu çok severim. ○ ○ ○ ○ ●

Katılımcılarla ilgili kişisel bilgiler rapor edilmeyecek, paylaşılmayacak, satılmayacak ya da herhangi bir şekilde kötüye kullanılmayacaktır. Veriler yalnızca araştırma amaçlı kullanılacaktır. Katılımınız için teşekkür ederiz.

BÖLÜM 1	Doğru Değil	Biraz Doğru	Orta Derecede Doğru	Oldukça Doğru	Çok Doğru
1. Bu uygulama ile ilk defa karşılaştığımda, benim için kolay olabileceği izlenimini edindim.	○	○	○	○	○
2. Bu uygulama ile ilk defa karşılaştığımda ilginç özellikleri dikkatimi çekti.	○	○	○	○	○
3. Bu uygulamada sunulan materyallerin anlaşılması, olmasını beklediğimden daha zordu.	○	○	○	○	○
4. Uygulama başlamadan önce yapılan bilgilendirmelerden sonra, bu uygulamada neler öğrenmem gerektiğini anladım.	○	○	○	○	○
5. Bu uygulamada sorulan soruları tamamlamak bana başarı duygusunun sağladığı doyumu verdi.	○	○	○	○	○
6. Bu uygulamanın içeriği ile daha önce öğrendiklerim arasında ilişki vardı.	○	○	○	○	○
7. Bu uygulamada çok fazla bilgi sunulduğu için önemli	○	○	○	○	○

noktaları görmek ve hatırlamak zordu.					
8. Bu uygulamada sunulan materyaller dikkat çekici görünüyordu.	O	O	O	O	O
9. Bu uygulamada kullanılan kelime tanımları, telaffuz seslendirmeleri, resimler ve örnek cümleler bana bu uygulamanın İngilizce kelime öğrenimi için ne kadar önemli olabileceğini gösterdi.	O	O	O	O	O
10. Bu uygulamayı başarıyla tamamlamak benim için önemliydi.	O	O	O	O	O
11. Bu uygulamada kullanılan (kelime tanımlarının, örnek cümlelerin, resimlerin, telaffuz seslendirmelerinin ve quiz sorularının) içeriklerin kalitesi dikkatimi uygulamaya vermemi sağladı.	O	O	O	O	O
12. Bu uygulamada kullanılan içerikler dikkatimi veremeyeceğim kadar soyuttu.	O	O	O	O	O
13. Bu uygulamada sunulan içerikleri çalışırken, kelimeleri öğrenebileceğimden emindim.	O	O	O	O	O
14. Bu uygulamadan öyle keyif aldım ki, bu uygulamanın ileride tekrarlanmasını isterim.	O	O	O	O	O
15. Bu uygulama hiç çekici değildi.	O	O	O	O	O
16. Bu uygulamada sunulan materyaller, benim ilgi duyduğum şeylerle ilişkiliydi.	O	O	O	O	O
17. Bu uygulamada bilgilerin düzenlenme biçimi dikkatimi uygulamaya çekmeye yardımcı oldu.	O	O	O	O	O
18. Bu uygulamada öğretilen kelimelerin nasıl kullanılacağına ilişkin açıklamalar veya örnekler vardı.	O	O	O	O	O
19. Bu uygulamada sorulan sorular çok zordu.	O	O	O	O	O
20. Bu uygulamada merakımı uyaran anlatımlar, örnekler, resimler ve sesler vardı.	O	O	O	O	O
21. Bu uygulamada yer almaktan gerçekten zevk aldım.	O	O	O	O	O
22. Bu uygulamadaki tekrarların miktarı bazen sıkılmama neden oldu.	O	O	O	O	O
23. Bu uygulamadaki içerikler ve bunların sunuluş biçimini görünce bu uygulamanın benim için önemli olduğunu izlenimini edindim.	O	O	O	O	O
24. Bu uygulamadan tahminlerimin ötesinde beklenmedik şeyler öğrendim.	O	O	O	O	O
25. Uygulama başladıktan bir süre sonra, uygulamada gönderilen kelimelerin yer aldığı bir testte/sınavda başarılı olabileceğimden emindim.	O	O	O	O	O
26. Bu uygulama gereksinimlerime uygun değildi çünkü zaten içeriğinin çoğunu biliyordum.	O	O	O	O	O
27. Bu uygulama esnasında aldığım geribildirim, gösterdiğim çabanın ödüllendirildiğini hissetmeme yardım etti.	O	O	O	O	O

28. Bu uygulamadaki materyalin çeşitliliği (kelime tanımları, örnek cümleler, resimler, telafuz seslendirmeleri ve quiz soruları vb.) dikkatimi derste tutmama yardımcı oldu.	O	O	O	O	O
29. Bu uygulama sıkıcıydı.	O	O	O	O	O
30. Bu uygulamanın içeriğiyle, derste öğrendiğim bilgiler arasında ilişki kurabildim.	O	O	O	O	O
31. Bu uygulamada sunulan içeriğin yoğunluğu/çok sayıda kelime içermesi rahatsız ediciydi.	O	O	O	O	O
32. Bu uygulamayı başarıyla tamamlayınca kendimi iyi hissettim.	O	O	O	O	O
33. Bu uygulamanın içeriği benim için yararlı olacak.	O	O	O	O	O
34. Bu uygulamadaki içeriğin bir kısmını gerçekten anlayamadım.	O	O	O	O	O
35. İçeriğin iyi biçimde yapılandırılmış olması, sunulan İngilizce kelimeleri öğrenebileceğim konusunda kendimi emin hissetmeme yardımcı oldu.	O	O	O	O	O
36. Bu kadar iyi tasarımlanmış bir uygulamada yer almak benim için zevkti.	O	O	O	O	O

BÖLÜM 2

1. Size gönderilen MMS'leri okudunuz mu?
Evet ☐ Hayır ☐
Cevabınız "Hayır" ise neden okumadınız?
2. Her bir MMS'i ortalama kaç kere okudunuz?
1 ☐ 2 ☐ 3 ☐ 4 ☐ 4+ ☐ Hiç ☐
3. Size gönderilen mesajları sakladınız mı?
Evet ☐ Hayır ☐
Cevabınız "Hayır" ise neden saklamadınız?
Saklamak isterdim fakat hafıza yetersizdi ☐ Gereksiz bulduğum için ☐ Diğer* ☐ _____- ***Cevabınız Diğer ise lütfen açıklayınız:**
4. Mesajları nereden okudunuz?
Cep telefonu ☐ Arkadaşımın Cep telefonu ☐ Avea/Turkcell İnternet Sayfası ☐

5. Gönderilen MMS lerin günde 4 adet olan sayısı ile ilgili ne düşünüyorsunuz?					
Çok az ☐	Az ☐	Yeterli ☐	Fazla ☐	Çok fazla ☐	Günde __ adet MMS gönderilmeli
6. Gönderilen MMS'ler arasındaki ortalama 1 saat olan süre ile ilgili ne düşünüyorsunuz?					
Çok az ☐	Az ☐	Yeterli ☐	Fazla ☐	Çok fazla ☐	MMS'ler __ saat ara ile gönderilmeli
7. Bu uygulamanın hoşlandığınız yönleri nelerdir? Neden hoşlandınız?					
8. Bu uygulamanın hoşlanmadığınız yönleri nelerdir? Neden hoşlanmadınız?					
9. Bu uygulamanın İngilizce kelimeleri öğrenmek için iyi bir yöntem olduğunu düşünüyor musunuz ? Neden?					
10. Uygulama ile ilgili varsa diğer düşünceleriniz nelerdir?					

APPENDIX D

INTERVIEW FORM

GÖRÜŞME FORMU:

Giriş:

Merhaba. Bu görüşmeyi "Öğrencilerin İngilizce kelime kazanımlarının cep telefonu üzerinden çokluortam iletileriyle desteklenmesi araştırma projesi" başlıklı proje kapsamında Çankaya Üniversitesi Hazırlık Okuluna devam eden öğrencilerin İngilizce kelimelerin öğretiminde **"MMS"** kullanımı ile ilgili görüş ve düşüncelerinizi öğrenmek amacı ile yapıyorum.Görüş ve önerilerinizin bu uygulamayı geliştirme sürecine katkıda bulunacağına inanıyorum.

Yaptığımız bu görüşmedeki bilgiler sadece bu araştırmada kullanılacak ve kişisel bilgiler kesinlikle gizli tutulacaktır. Görüşmenin yaklaşık 20 dakika süreceğini tahmin ediyorum. İzin verirseniz görüşmeyi kaydetmek istiyorum. Bu şekilde hem zamanı daha iyi kullanabiliriz, hem de sorulara vereceğiniz yanıtların kaydını daha ayrıntılı tutma fırsatı elde edebilirim.

Bu araştırmaya katılmayı kabul ettiğiniz için teşekkür ederim. Eğer görüşmeye başlamadan önce bana sormak istediğiniz sorular varsa bunları yanıtlamak istiyorum.

Sorular:

1. Size gönderilen MMS'leri okudunuz mu? (Cevap Hayır ise neden okumadınız?)
2. Bu uygulamayı nasıl buldunuz? Size göre bu uygulamanın olumlu ve olumsuz yönleri nelerdir?(Neden? , avantajları , sınırlılıkları)
3. Size göre bu uygulamanın olumsuz yönleri nelerdir?(Neden? , avantajları , sınırlılıkları)
4. Bu uygulamanın İngilizce kelimeleri öğrenmek için iyi bir yöntem olduğunu düşünüyor musunuz? Neden? (Evet ve hayır cevapları için neden sorulacak)
5. Uygulama ile ilgili varsa diğer düşünceleriniz nelerdir?

APPENDIX E

SMS QUIZ QUESTIONS

Pre-intermediate Level

Quiz 1

1. Two of the soldiers were killed and the rest were _____.
   A. recovered
   B. captured
   C. opposed
   D. focused
2. These two tests _____ in only one aspect.
   A. various
   B. distinct
   C. similar
   D. differ
3. Flour, eggs, and sugar are the main _____ in the cake.
   A. regulations
   B. ingredients
   C. consumers
   D. members
4. During the bank _____ the thieves killed 3 innocent people.
   A. offense
   B. murder
   C. robbery
   D. criminal
5. The weather was _____ and we decided to go for a walk.
   A. terrific
   B. misleading
   C. tensed
   D. depressed
6. He gave me directions, but they were so _____ I got lost.
   A. essential
   B. complete
   C. various
   D. complicated

Quiz 2

1. It's a difficult _____, but I think I like the red dress best.
   A. function
   B. capture
   C. decide
   D. choice
2. Adverts must not create a _____ impression.
   A. various
   B. misleading
   C. similar
   D. different
3. His disability _____ him from driving.
   A. prevented
   B. claimed
   C. made
   D. determined
4. During the emergency a lot of people _____ to work through the night.
   A. happened
   B. explored
   C. volunteered
   D. controlled
5. She threw the bad cheese in the _____.
   A. pollution
   B. pressure
   C. garbage
   D. resource
6. Most of the old part of the city was _____ by bombs during the war.
   A. broken
   B. destroyed
   C. exploded
   D. cut down

Quiz 3

1. There is no scientific _____ to suggest that underwater births are dangerous.
   A. consulate
   B. claim
   C. evidence
   D. event
2. Kate feels _____ that she can pass the exam.
   A. evident
   B. confident
   C. discouraged
   D. effective
3. I can't _____ on my work with all that noise.
   A. explore
   B. decide
   C. study
   D. concentrate
4. There have been _____ changes in technology in the past five years.
   A. same
   B. pile
   C. huge
   D. efficient
5. The hotel room charge ____ breakfast.
   A. includes
   B. complicates
   C. costs
   D. pays
6. The rain forced them to take _____ under a tree.
   A. shell
   B. shelter
   C. back
   D. step

Quiz 4

1. _____ should complain if they are not satisfied with the service they receive.
   A. Clients
   B. Consultants
   C. Contacts
   D. Consumers
2. We looked for her but she had _____ into the crowd.
   A. reappeared
   B. appeared
   C. disappeared
   D. no longer appear
3. Dancers and gymnasts need to be very _____.
   A. efficient
   B. flexible
   C. adaptive
   D. considerate
4. The organization is committed to AIDS _____ and education.
   A. recommendation
   B. prevention
   C. cures
   D. against
5. Thieves _____ him of all his money.
   A. searched
   B. led
   C. hurt
   D. robbed
6. The _____ school is the center of the community.
   A. local
   B. region
   C. legal
   D. retail

Quiz 5

1. The _____ people usually do not have anything to eat.
   A. wealthy
   B. adaptive
   C. homeless
   D. helpful
2. Banks have made a big _____ in technology.
   A. investment
   B. profit
   C. production
   D. expectation
3. He _____ the store would be closing in a few minutes.
   A. determined
   B. asked
   C. found
   D. realized
4. They threatened to use _____ if we didn't give them the money.
   A. murder
   B. violence
   C. crime
   D. injure
5. My husband _____ our broken TV set.
   A. produced
   B. damaged
   C. repaired
   D. functioned

6. I can't back the car into that _____ space!

A. flexible
B. terrific
C. dry
D. tiny

Quiz 6

1. The clock isn't very _____.

A. essential
B. complete
C. various
D. accurate

2. Don't _____ me while I'm driving!

A. decide
B. decline
C. dictate
D. distract

3. A _____ person always thinks that what is going to happen will be bad.

A. pessimistic
B. confident
C. optimistic
D. accurate

4. The research _____ the effects of alcohol on long-term memory.

A. solved
B. examined
C. acknowledged
D. calculated

5. Would all those in favor please _____ their hands?

A. rise
B. raise
C. increase
D. increment

6. The doctor used _____ to stop the bleeding.

A. force
B. forge
C. pressure
D. press

Quiz 7

1. She is _____ about her chances of recovery.

A. respectful
B. emotional
C. optimistic
D. careful

2. These countries are _____ toward more democratic societies.

A. solving
B. revolving
C. involving
D. evolving

3. Your return ticket is _____ for three months.

A. valid
B. complete
C. quick
D. accurate

4. Just follow the signs and they will _____ you to the exit.

A. go
B. lead
C. invite
D. force

5. The police are looking for the knife used in the _____.

A. violent
B. kill
C. criminal
D. murder

6. The jury _____ that the men were guilty.

A. recommended
B. prevented
C. determined
D. combined

Quiz 8

1. It took her a long while to _____ after her heart operation.

A. propose
B. oppose
C. focus
D. recover

2. The hotel bedrooms_____ in size from medium to very large.

A. vary
B. varies
C. various
D. variance

3. We won, but I think it was _____, not skill!

A. good
B. luck
C. cause
D. effect

4. The demonstration started peacefully but later turned _____.
A. murder
B. challenge
C. violent
D. offense

5. She has a lifestyle most people would _____.
A. decline
B. propose
C. envy
D. decide

6. The students were _____ for the monetary support they received during university education.
A. appreciated
B. appealed
C. stuck
D. grateful

Quiz 9

1. We've chosen a _____ carpet and patterned curtains.
A. flexible
B. cheap
C. plain
D. motive

2. She's _____ to religious education in schools.
A. volunteered
B. fighting
C. claimed
D. opposed

3. You should read the chapters in _____.
A. upwards
B. sequence
C. disorder
D. focus

4. The manufacturers _____ that the car is the safest you can buy.
A. make
B. claim
C. describe
D. offer

5. The house was in a state of complete _____.
A. loan
B. robbery
C. disorder
D. increase

6. I had a _____ feeling that we had met before.
A. lost
B. difficult
C. important
D. strange

Quiz 10

1. The 1920s was a time of high unemployment and economic _____ in much of the Turkey.
A. hardship
B. difficult
C. strong
D. condition

2. Istanbul is a city of 15 million _____.
A. researchers
B. inhabitants
C. fishers
D. stores

3. You will have to _____ to your teacher for forgetting to do your homework.
A. describe
B. claim
C. investigate
D. apologize

4. They are _____ with major financial problems.
A. included
B. seen
C. claimed
D. faced

5. The improvement in sales figures had a _____ effect on the company as a whole.
A. resource
B. facial
C. beneficial
D. advantage

6. We need to cut down on our fuel _____ by having fewer cars on the road.
A. sale
B. resource
C. consumption
D. export

Elementary Level

Quiz 1

1. Two of the soldiers were killed and the rest were _____.
   A. recovered
   B. captured
   C. opposed
   D. focused
2. These two tests _____ in only one aspect.
   A. various
   B. distinct
   C. similar
   D. differ
3. They are demanding a large salary _____ in line with inflation.
   A. income
   B. increase
   C. pay
   D. money
4. During the bank _____ the thieves killed 3 innocent people.
   A. offense
   B. murder
   C. robbery
   D. criminal
5. She became deeply _____ when her husband died.
   A. depressed
   B. misleading
   C. tensed
   D. terrific
6. The clock isn't very _____.
   A. essential
   B. complete
   C. various
   D. accurate

Quiz 2

1. She is _____ about her chances of recovery.
   A. respectful
   B. emotional
   C. optimistic
   D. careful
2. Shall I take the _____ bottles for recycling?
   A. huge
   B. tiny
   C. similar
   D. empty
3. The manufacturers _____ that the car is the safest you can buy.
   A. make
   B. claim
   C. describe
   D. offer
4. His interest in the project _____ after his wife died.
   A. decided
   B. declined
   C. depressed
   D. dedicated
5. The hotel room charge _____ breakfast.
   A. complicates
   B. costs
   C. includes
   D. pays
6. Your return ticket is _____ for three months.
   A. valid
   B. complete
   C. quick
   D. accurate

Quiz 3

1. The weather was _____ and we decided to go for a walk.
   A. terrific
   B. misleading
   C. tensed
   D. depressed
2. We don't get very much snow in this _____.
   A. border
   B. central
   C. region
   D. local
3. Flour, eggs, and sugar are the main _____ in the cake.
   A. regulations
   B. ingredients
   C. consumers
   D. members
4. Don't _____ me while I'm driving!
   A. decide
   B. decline
   C. dictate
   D. distract

5. The Empire State Building was _____ in 1931.
   A. complicated
   B. costed
   C. constructed
   D. consumed
6. Your return ticket is _____ for three months.
   A. valid
   B. complete
   C. quick
   D. accurate

Quiz 4

1. Kate feels _____ that she can pass the exam.
   A. evident
   B. confident
   C. discouraged
   D. effective
2. There has been a steady _____ in the number of visitors.
   A. potential
   B. population
   C. decrease
   D. investment
3. There have been _____ changes in technology in the past five years.
   A. same
   B. pile
   C. huge
   D. efficient
4. Most of the old part of the city was _____ by bombs during the war.
   A. broken
   B. destroyed
   C. exploded
   D. cut down
5. The doctor's new appointments system doesn't seem to be _____ very well.
   A. examining
   B. funding
   C. constructing
   D. functioning
6. Parents are _____ to come to the school and meet the teachers.
   A. invited
   B. decided
   C. included
   D. accepted

Quiz 5

1. She was lying in the sun, looking happy and _____.
   A. complicated
   B. worrying
   C. discouraged
   D. relaxed
2. A _____ person always thinks that what is going to happen will be bad.
   A. pessimistic
   B. confident
   C. optimistic
   D. accurate
3. I can't _____ which dress to wear.
   A. think
   B. choice
   C. decide
   D. examine
4. The house was in a state of complete _____.
   A. loan
   B. disorder
   C. robbery
   D. increase
5. One mile is _____ to 1.609 kilometers.
   A. accurate
   B. included
   C. equal
   D. calculated
6. The _____ school is the center of the community.
   A. local
   B. region
   C. legal
   D. important

Quiz 6

1. We looked for her but she had _____ into the crowd.
   A. reappeared
   B. appeared
   C. disappeared
   D. no longer appear
2. She threw the bad cheese in the _____.
   A. pollution
   B. pressure
   C. garbage
   D. resource

3. _____ should complain if they are not satisfied with the service they receive.
   A. Clients
   B. Consultants
   C. Contacts
   D. Consumers

4. He _____ the store would be closing in a few minutes.
   A. determined
   B. asked
   C. found
   D. realized

5. The research _____ the effects of alcohol on long-term memory.
   A. solved
   B. examined
   C. acknowledged
   D. calculated

6. Would all those in favor please _____ their hands?
   A. rise
   B. raise
   C. increase
   D. increment

Quiz 7

1. The doctor used _____ to stop the bleeding.
   A. force
   B. forge
   C. pressure
   D. press

2. Just follow the signs and they will _____ you to the exit.
   A. go
   B. lead
   C. invite
   D. force

3. The jury _____ that the men were guilty.
   A. recommended
   B. prevented
   C. determined
   D. combined

4. You're not _____ to talk during the exam.
   A. possible
   B. asked
   C. invited
   D. allowed

5. I had a _____ feeling that we had met before.
   A. lost
   B. difficult
   C. important
   D. strange

6. The demonstration started peacefully but later turned _____.
   A. murder
   B. violent
   C. offense
   D. challenge

Quiz 8

1. It took her a long while to _____ after her heart operation.
   A. propose
   B. oppose
   C. focus
   D. recover

2. The hotel bedrooms_____ in size from medium to very large.
   A. vary
   B. varies
   C. various
   D. variance

3. During the emergency a lot of people _____ to work through the night.
   A. happened
   B. explored
   C. volunteered
   D. controlled

4. It's a difficult _____, but I think I like the red dress best.
   A. function
   B. capture
   C. decide
   D. choice

5. The _____ people usually do not have anything to eat.
   A. wealthy
   B. adaptive
   C. homeless
   D. helpful

6. He gave me directions, but they were so _____ I got lost.
   A. essential
   B. complete
   C. various
   D. complicated

Quiz 9

1. We've chosen a _____ carpet and patterned curtains.
   A. flexible
   B. cheap
   C. plain
   D. motive
2. She's _____ to religious education in schools.
   A. volunteered
   B. fighting
   C. claimed
   D. opposed
3. We won, but I think it was _____, not skill!
   A. good
   B. luck
   C. cause
   D. effect
4. Plants and fish are dying because of _____.
   A. damage
   B. effect
   C. influence
   D. pollution
5. My husband _____ our broken TV set.
   A. produced
   B. damaged
   C. repaired
   D. functioned
6. These countries are _____ toward more democratic societies.
   A. evolving
   B. solving
   C. revolving
   D. involving

Quiz 10

1. The theatre programme _____ two short plays.
   A. included of
   B. made of
   C. moved up
   D. consisted of
2. The institute will _____ 5 million in the project.
   A. include
   B. invest
   C. interest
   D. quit
3. The wind and rain _____ several accidents.
   A. gave
   B. damaged
   C. caused
   D. supported
4. Dancers and gymnasts need to be very _____.
   A. efficient
   B. flexible
   C. adaptive
   D. considerate
5. She has a lifestyle most people would _____.
   A. decline
   B. propose
   C. envy
   D. decide
6. Banks have made a big _____ in technology.
   A. investment
   B. profit
   C. production
   D. expectation

CURRICULUM VITAE

1. PERSONAL INFORMATION

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2. EDUCATION

Degree	Institution	Year of graduation
BS	Middle East Technical University, Department of Computer Education	1999
MS	Middle East Technical University, Department of Computer Education and Instructional Technology	2003

3. WORK EXPERIENCE

Year	Enrollment	Institution
2004-	Instructor	Cankaya University, Department of Computer Engineering
1999-2004	Research Assistant	Cankaya University, Department of Computer Engineering

4. SELECTED PUBLICATIONS

Journal articles

Saran, M., Seferoglu, G., & Cagiltay, K. (2009). Mobile Assisted Language Learning: English Pronunciation at Learners' Fingertips. *Eurasian Journal of Educational Research*, 34, 97-114.

International conferences

Saran, M., Saran, N., & Yildirim, Z. (2008). *The use of audio playback rate control tool in multimedia learning: a case study.* Proceedings of E-Learn 2008, (pp 3893–3901). Las Vegas, NV, USA.

Saran, M., Cagiltay, K., & Seferoglu, G. (2008). *Using mobile phones in pronunciation teaching in English-medium universities in Turkey.* International Conference 2008: Language Issues in English-medium Universities: A Global Concern, Hong Kong.

Saran, M., Cagiltay, K., & Seferoglu, G. (2008). *Use of mobile phones in language learning: developing effective instructional materials.* Proceedings of 5th IEEE International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008), (pp 39–43). Beijing, China.

Saran, M., Cagiltay, K., & Seferoglu, G. (2007). *Technology enhanced learning in foreign language education: the use of mobile phones.* AECT 2007, p. 53. Anaheim, CA, USA.

4. PROJECTS

Researcher in the project "Exploring the use of mobile phones for supporting English language learners' vocabulary acquisition", The Scientific and Technological Research Council of Turkey (TUBITAK), No: 105K070