

**THE EFFECTIVENESS OF
COMPUTER-ASSISTED GLOSSES
ON VOCABULARY LEARNING
L1 OR L2 GLOSSES :
WITH OR WITHOUT PICTURES ?**

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YÜKSEK LİSANS TEZ ÖZÜ

BİLGİSAYAR DESTEKLİ KELİME AÇIKLAYICILARIN KELİME ÖĞRENMEYE ETKİSİ

ANADİL Mİ İKİNCİ DİL Mİ? RESİM DESTEĞİ OLMALI MI OLMAMALI MI?

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Bu çalışma çoklu ortamda sunulan okuma parçalarında geçen yabancı kelimelerin açıklamalarının, öğrencilerinin ana dilinde mi öğrendikleri ya da yabancı dilde mi verilmesinin kelime öğrenimi üzerinde daha etkili olduğunu araştırmıştır. Ayrıca açıklamaların resimle desteklenmesi daha fazla kelime öğrenmeye teşvik edip etmediğine bakılmıştır.

Eskişehir’de bir devlet Lisesi’nde (Süper Lise) okuyan 79 öğrenci, rastlantısal olarak dört gruba atanmıştır. (1) Türkçe açıklamalı grup , (2) İngilizce açıklamalı grup, (3) Türkçe +resim açıklamalı grup, (4) İngilizce resim açıklamalı grup. Bu öğrencilere, bilgisayar ortamında içinde on bir yabancı kelime geçen bir okuma parçası okutulmuştur. Okuma sonrası öğrencilere hatırlama düzeyinde üç ayrı test uygulanmıştır. Aynı testler iki hafta sonra tekrar verilmiştir. Öğrencilerin, okuma parçasını okurken üzerine tıkladığı açıklayıcı notların bir kaydı alınmıştır. Bu kayıtlar, öğrencilerin kelimeleri tıklaması ile testleri arasında bir korelasyon’un olup olmadığını incelemek amacıyla kullanılmıştır.

Genel linear modeli (MANOVA) sonuçları, okuma parçasını Türkçe açıklamalı olarak okuyan grubun, kelimeleri İngilizce açıklamalı olarak okuyan gruba göre daha iyi öğrendiğini göstermiştir. İki hafta sonra yapılan sınav sonuçlarında da aynı şey söz konusudur. Genel linear modeli, açıklama notlarına resim ilave edilmesinin, her iki gruba da ayrıca bir etki sağlamadığını göstermiştir. Araya zaman girdiğinde, kelimeleri hatırlama düzeyi resim destekli grupla, resim destekli olmayan gruplar arasında farklılıklar oluşmaktadır. Türkçe resim açıklamalı grup, iki haftanın sonunda üç testten de öğrenilen kelimelerde istatistiksel olarak önemli bir düşüş göstermektedir. Fakat İngilizce resim grubunda böyle bir fark görülmemiştir. Öğrencilerin okuma parçasını okurken kelimelere tıklaması ile kelime öğrenimi arasında bir ilişki saptanmamıştır.

Bulgular, çoklu ortamda sunulan bir okuma parçasındaki yabancı kelimelerin Türkçe açıklamalarının verilmesinin daha etkili olduğunu göstermektedir. Çoklu ortamda kelime öğrenmeye, İngilizce ya da Türkçe açıklamalara resim eklenmesi durumunda, en etkili yolun İngilizce + resim açıklayıcılarıdır. Fakat öğrencilerin görsel ve sözel bilgilerin etkili kullanılması konusunda önceden eğitim almaları gerekmektedir.

ABSTRACT

The study, investigated the effectiveness of L1 glosses (Turkish definitions) and L2 glosses (English definitions) on vocabulary learning in a multimedia environment. Additionally, it investigated whether pictures attached to L1 glosses or L2 glosses have maximizing effects on vocabulary learning.

79 high school learners of English were randomly assigned to L1 gloss, L2 gloss, L1+picture gloss and L2+picture gloss and were required to read a computerized text with eleven glossed words. They were given three vocabulary recognition post tests immediately after reading and two weeks later. Subjects' clicks on target words were recorded and used to verify that each subject clicked on target words. Moreover, whether there is any correlation between subjects click on words and their post test scores was examined.

General Linear Model-GLM (MANOVA) results indicated that the group that received L1 gloss performed significantly better on immediate and delayed post tests than the group that received L2 gloss. GLM results revealed no significant differences between picture groups and no picture groups. The retention of picture glosses and no picture glosses showed different patterns of retention over time. L1+picture group decreased their vocabulary scores in all of the three tests over time. However, L2+picture group did not significantly increase their vocabulary scores in all of the three tests. Students' click on target words and their vocabulary scores did not reveal any correlation.

Findings suggest that L1 glosses are more effective than L2 glosses for vocabulary learning of high school subjects studying English as a foreign language in Turkey. However, addition of pictures to glosses can best be provided via L2+picture, but training on how to use visual and verbal information effectively should be given previously.

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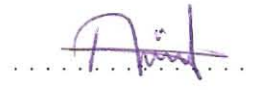
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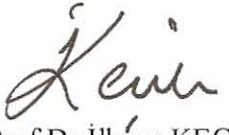
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JÜRİ VE ENSTİTÜ ONAYI

Sevgi BAYRAKTAR'ın, "The Effectiveness of Computer-Assisted Glosses on Incidental vocabulary learning L1 or L2 glosses: with or without static pictures?" başlıklı tezi 02.05.2008 tarihinde, aşağıda belirtilen jüri üyeleri tarafından Anadolu Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca Yabancı Diller Eğitimi Anabilim Dalı İngilizce Öğretmenliği programı yüksek lisans tezi olarak değerlendirilerek kabul edilmiştir.

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CHAPTER 1

INTRODUCTION

1.1.Introduction

Vocabulary acquisition is an essential component to the development of second language proficiency (Harley, 1996). It has been regarded to be “the single most important factor in reading comprehension” (Nation and Coady, 1988:97). Therefore, second language reading experts pay close attention to vocabulary teaching in foreign language teaching environment. Numerous studies have been conducted on vocabulary acquisition on students’ learning behaviors in order to acquire the vocabulary of a foreign language (Gu, 2003;).

Researchers have shown that in the early stages of learning a foreign language, students learn high frequency of words and as their language proficiency improves, they are challenged with larger amount of vocabulary size (Groot, 2000). As Groot (2000) points out that there is a general consensus that 5000 words are the minimum requirement for English language learners, to have as a base. Studies have shown that readers learn 1-5 new words in a text of over 1000 words (Knight, 1994; Hulstijn, 1992). Considering this rate of growth, a second language learner would have to read eight million words of text to achieve a vocabulary size of 2000 words (Hill and Laufer, 2003). Moreover, many EFL readers tackle with the problem of ‘lack of vocabulary’ and it is frustrating for most EFL readers to consult the dictionary for every unknown word (Birch, 2002), which in turn may prevent them learning new words.

Consequently, researchers have investigated ways to promote effective vocabulary learning. Glosses are one of the main aids that play an important role in facilitating vocabulary learning. Researchers have investigated the effectiveness of glosses on vocabulary learning and/or reading comprehension: Glosses are explanations of the meanings of words (Lomicka, 1998); they aid readers in understanding a written text (Jacobs, 1991; Davis and

Lyman- Hager, 1997 ; Lomicka, 1998); they provide a modification of unknown words and promote incidental vocabulary learning (Chun and Plass, 1996 ; Hulstijn et al.,1996; Laufer and Hill, 2000).

Studies have proven that gloss conditions have advantages over non-gloss conditions (Jacobs,1994; Spahiu,2000; Lomicka,1998). Research investigated which type of gloss is most effective in facilitating vocabulary learning and/or reading comprehension. Studies have been applied to L1 glosses over L2 glosses. Studies revealed mixed results about which type of gloss has advantage over the other. Spahiu (2000) proposed that L1 gloss condition is more effective than L2 gloss condition among Turkish university students. Jacobs et. al (1994) investigated glosses under three conditions. L1 English gloss, L2 Spanish gloss and no gloss group. They revealed no significant difference between the groups. Laufer and Hill (2000) conducted an experiment to students from university of Haifa and university of Hong Kong to investigate learners' look up preferences- which type of gloss they preferred to use by adding a tracker into the multimedia programme. They revealed that Israeli and Chinese students have different preferences regarding gloss use. Hong Kong subjects preferred to use L2 glosses whereas Israel subjects preferred to use L1 glosses.

Glosses have widely occupied researchers in the field of advanced technology in education. Computer technology has a great potentioin to enhance process of language learning. As Lee (2000) points out, computers can offer students learning motivation and emphasize the individual needs . Large number of studies have been conducted on Computer Assisted Language Learning (CALL) which enables to perform multiple tasks such as organizing, selecting and presenting multiple "sensory components" (Al Seghayer, 2001). This issue has been narrowed to the investigation of using multiple modalities such as text, audio, still picture, and dynamic videos (Ariew and Erçetin, 2004). This is the field of Hypermedia, which is an 'extension to include a variety of symbolic expressions beyond texts

such as a word that is coupled with a dictionary definition, or a diagram, or a sound or picture' (Kozma,1991), that are 'designed to help readers to make connections among texts and other symbolic expressions and construct meaning based on these relationships' (Kozma , 1991). Related studies on this field examined computerized glosses and their effects on incidental vocabulary learning (Ariew and Erçetin, 2004; Aust and Roby, 1993; Lomicka, 1998; Şakar and Erçetin, 2005). These studies declare that glosses with textual information and visual information (pictures , videos) are more effective than solely textual information. These researchers' basis for proof is that dual-coding is the reason that help learners perform better under visual and textual information than on visual information alone. Paivio's (Clark and Paivio, 1991; Paivio, 1986) dual coding theory assumes that humans possess separate information processing channels for visually (visual / pictorial) and auditorially (auditory / verbal) represented material. It assumes that words annotated with both verbal and pictorial modes are learnt better than when they are annotated only in verbal mode because learners can construct referential connections between two forms of representations (Al Seghayer, 2001). This means that images provide another source of conceptual linkage and therefore strengthen links between words and concepts (Yoshii, 2006). Dual coding theory is a base theory for multimedia learning. Generative theory of multimedia learning is grounded on Paivio's (1986) dual coding theory and cognitive load theory of Chandler and Sweller (1991). Cognitive load theory explains on how multimedia instructions should be used and/or presented. It focuses on the issue that human cognition is limited in capacity and that visual and verbal instructions should be so designed that they should reduce overload of the working memory. Recent studies on multimedia learning take generative theory of multimedia learning into consideration since it permits to identify the pitfalls and/or advantages of data obtained from multimedia presentations more in depth.

Visual information is known to help human mind to record information, to promote discovery, to lighten the burden of working memory (Tversky et al.,2006). However, studies also reveal that visual information may hinder comprehension by triggering human cognition to overload visual channel. Studies revealed different effects of visuals when they are presented together with verbal information (definitions of words). On the one hand, studies showed negative impact presenting pictures and texture together (Gyselinck et.al.,2002; Şakar and Erçetin, 2004). Şakar and Erçetin (2004) conducted a study on 44 subjects. Subjects read a computerized text and answered a comprehension test. They found out that subjects preferred to use visual glosses (pictures /videos) rather than textual glosses. Negative correlation between subjects clicks on target words and their reading comprehension was interpreted as a negative impact of visual information on working memory. In other words, they revealed that reading the text on screen (by using visual representation , not auditory) the visual channel might have been overloaded.

On the other hand, studies showed that pictures added to definitions resulted in a significantly more effective vocabulary learning and/or reading comprehension (Al-Seghayer,2001 ; Akbulut, 2007; Yeh and Wang, 2003; Yoshii and Flaitz, 2002; Yoshii, 2006).

Yoshii (2006) investigated the effectiveness of L1 and L2 glosses on incidental vocabulary learning in a multimedia environment. He also aimed to find out whether pictures added to L1 or L2 glosses will have an additional effect on vocabulary gain during reading a text. He investigated 195 students from two universities in Japan. They took a pre-test one week before the experiment. The subjects were divided into four groups of treatment: L1group, L2 group, L1+picture group and L2+picture group. After reading a 390-word story, they were tested on two vocabulary post tests that involved 16 target words (all verbs). The post tests were a definition test (the same test used in pre-test: students supplied the L1 equivalence of the target words) and a recognition tests (multiple choice test with four

multiple choice answers). The results of Yoshii (2006) revealed no significant difference between L1 and L2 groups. L1 group sustained their scores over time and they concluded that L1 revealed advantage over L2 considering retention. Picture groups outperformed textual only groups in definition supply test. There was no significant difference regarding recognition test. They concluded that it might rely on the nature of the task. They revealed that during definition supply test students had to rely on their memory since there were no cues to help them. They stated that the pictures might have helped them to recall the meanings. However, they revealed that in recognition test there were multiple choices as cues and this might have eliminated the effects of pictorial cues.

The study that Yoshii (2006) investigated reveals no significant difference regarding L1 gloss and L2 gloss. He conducted the study on university students in Japan. Most of the studies on single or multiple glosses have been applied to university students. There is need to observe high school subjects' gloss use and vocabulary outcomes in the literature. Moreover, there is only one study so far (Spahiu, 2000) that investigated L1 gloss over L2 gloss on Turkish students. Another point to state is that, Yoshii (2006) applied recognition and production tests in his study. Since it is believed that most vocabulary learnt through reading is through recognition (Warring, 1997; Webb, 2005), focus on recognition needs also investigation.

This study will therefore partially replicate Yoshii's (2006) study on high school subjects in Turkey. Considering the issues above, this study aims to investigate whether L1 gloss or L2 gloss promote higher vocabulary learning in reading a foreign language text. Moreover, it seeks to find out if single or multi gloss have a maximizing effect on vocabulary recognition.

1.2. Problem of the Study

Vocabulary is crucial for students learning a foreign language. Since there's a limited time in providing exposure of language to Grade 2 students at High school, it is believed that glossed texts could be an aid to contribute vocabulary learning.

Research in this field revealed that learners who took part in computerized glosses comprehended significantly more text than the traditional paper-based glosses (Taylor, 2006). However, it is not clear whether L1 gloss or L2 gloss is more effective in every L2 learning situation. There are conflicting results regarding this field. Taylor (2006) summarized researchers' for and against use of L1 gloss as follows: looking up words in L1 is much easier and saves time, attentional resources can be used elsewhere- why take time programming other aids when students don't use them, pointless to use other recourses. Researchers, who are against L1 gloss, support the view that L1 gloss might be an advantage taking short term memory into account. However, long-term benefits are not conclusive. "It's possible that the use of L1 computerized glosses has many short-term benefits but few long-term rewards"(Taylor, 2006:8). So, L1 and L2 gloss may have different outcomes over time. The reason may be that L1 gloss users may spend too little effort to understand a particular target item. The arguments mentioned above reflect researchers' view of reading comprehension of L2 readers. It may also reflect L2 vocabulary learning since they are somehow interconnected. More research is needed in clarifying which gloss, L1 or L2, is more effective in providing more opportunities for vocabulary learning.

Another area that needs investigation is which type of multi gloss leads to better vocabulary learning. Even though research showed that textual information coupled with visual information leads to better performance on both comprehension of text and recognition of target items (Akbulut, 2007; Aust, Kelley and Roby, 1993; Nikolowa, 2002; Yoshii,

2006;), this field still needs investigating. More research should be conducted to find out which multiple gloss type is more effective in providing vocabulary learning. There are few studies conducted in Turkey regarding the field of different gloss types. As Laufer and Hill (2000) state different students of different cultures may have different gloss preferences in reading a foreign language text.

To sum up, it is not clear whether L1 or L2 gloss would represent a better method of learning vocabulary. Moreover, investigation of the effectiveness of different gloss formats in a multimedia environment is needed because this investigation can provide a better understanding of how to adapt multimedia programs to our language classes to enhance vocabulary instruction.

1.3. Aim of the Study

Following the study of Yoshii (2006), the present study aims to find out which type of gloss L1 or L2 leads to better incidental vocabulary learning. Additionally, it seeks to find out whether pictures coupled to definitions have additional effects on vocabulary learning in foreign language texts.

1.4. Research Questions

Based on the purpose of the study, the following research questions are posed in the study:

1. Do L1 and L2 glosses interact with each other in terms of vocabulary learning regarding immediate and delayed post test scores?
2. Do picture glosses compared to no picture glosses show different interaction regarding vocabulary learning in terms of immediate and delayed post tests?
3. Do L1 gloss, L2 Gloss, L1 plus picture gloss, L2 plus picture gloss groups show different patterns of retention over time?
4. Do subjects' total click scores on target items and their post tests scores show any correlations?

1.5. Definitions of Important Terms

Gloss: A brief definition or synonym or a short explanation of an unknown vocabulary during reading.

Picture gloss: A multimedia gloss that uses pictures to describe/explain an unknown vocabulary.

L1 : The native language of a learner that he/she has acquired.

L2: Second or target language of a learner in which the language being studied is not the native language of the learner.

L1 Gloss: Definition or synonym of an unknown word in student's native language.

L2 Gloss: Definition or synonym of an unknown word in student's second/target language.

Computerized glosses: Glosses that are incorporated into computers.

Multimedia: Presentations of materials using both words and pictures.

Multimedia representations: Multimedia representations are concerned with how people store and process information.

Multimedia environment: This environment occurs when information is presented in verbal format and visual format.

Working memory: Refers to the structures and processes used for temporarily storing and manipulating information (it is a theoretical construct within cognitive psychology).

Student logs: They are trackers incorporated into computers to collect data about subjects' click on target words.

CHAPTER 2

REVIEW OF LITERATURE

2.1.Introduction

Current technologies have affected language learning environment and have brought new insights on how to create a better learning and teaching atmosphere. The technological advance comprises all skills in language learning providing new aspects for language learning including reading skill which is considered to be an important part in foreign language learning. A large body of research shows that ‘vocabulary’ is considered to be the most important factor in comprehending written texts. Technology is, therefore, a worthy component that may help readers comprehend texts more easily and with less effort since it can provide various opportunities to present vocabulary verbally and/or visually.

This chapter will present information on what is meant by visual and verbal learning. It will propose the effectiveness of different types of glosses on vocabulary learning in a multimedia environment. This chapter deals with the theoretical background of this study. Initially, we will discuss what it is actually meant by learning through multimedia. Second, we will discuss the definition of multimedia. Third, we will give a brief overview of media and learning. Forth, theories of learning through multimedia will be presented. Fifth, multimedia aids in foreign /second language learning will be discussed. Finally, research on the use of annotations/glosses on vocabulary learning will be reviewed.

2.2. Definition of Media and Multimedia

Media are defined as the tools to store, process and communicate information (Kommers,et al.,1996). It includes various tools such as pen and paper, books, computers etc.

On the other hand, multimedia is defined as computer-based delivery that is used to see and hear different types of information (Kommers,et al.,1996). Mayer (2001) defines

multimedia as the presentation of materials using both words and pictures. According to Mayer (2001:2) "text books consisting of printed texts and illustrations can also allow for multimedia". However, as a widely used term 'multimedia' is the integration of multiple forms of media. This includes text, graphic, picture, audio, video etc. For example, a presentation which involves text and picture would be considered a 'multimedia presentation'.

2.3. Advantages of Multimedia Presentations

Multimedia is viewed to be motivating and engaging. Learners can have quick and easy access to a wide range of new materials. "It can encourage students to autonomous learning (Collins,1997:2)". They are considered to be attention-drawing that improves vocabulary development (De ridder,2003, Shea,1996).

Najjar (1996:131-132) outlines the advantages of computer-based instruction over traditional classroom instruction as follows: (1)instructional method: instructional designer may be forced to better organize the learning materials. (2) Mutual interaction between the learner and the learning system appears to have a strong effect on learning. (3) Control of learning pace: Learners can have their own pace of learning during computer-based instruction. (4) Information presented through multimedia may be more novel and stimulating than traditional instruction.

Martínez-Lage and Herren (1998: 146-147) state that "technology-based annotated (glossed) texts present us with new opportunities to assist our students in getting beyond the 'mechanical' aspects of the reading process and to provide them with a means of developing good reading strategies." This shift towards non-mechanical characteristic may direct students towards a more individualized learning atmosphere. As Akbulut (2007) points out that in multimedia environment, reader and the text interaction provides individualized learning and promotes learner autonomy so students have control of their own learning and learn at their

own pace. Another point on individualized learning is stated by Lyman-Hager and Davis (1996) that computerized glosses provide subjects valuable information of target words and it leads students to an individualized learning experience by hiding the glosses until the students has the need for looking it up.

Akbulut (2007) states that presenting reading text with computerized glosses also aid for easier understanding of authentic input. He puts forward that these presentations provide more feasible natural L2 learning conditions than text simplifications.

2.4. Learning through Media

Computers have been used for language teaching since the 1960's (Warschauer, 1998). There are controverseries among researchers regarding the benefits or potentials that media has on learning.

Based on his meta-analysis, Clark (1983) claims that media does not influence learning in any condition. He puts forward that when a study finds obtained learning achievement or benefits, the reason might be the novelty of the instrument or the instructional methods rather than the type(s) of media. He claims that teaching methods are more important than any media type.

In response to Clark's proposal, Kozma (1991) points out that an effective method integrates both the medium and the method. According to Kozma (1991), method and medium is inseparable and so they have an integral relationship. Kozma (1991) points out that media should focus on technology, symbol systems and processing capabilities. Technology refers to the mechanical aspects that determine its functions. Symbol systems deal with the way how the information is presented: via pictures, videos etc. So it deals with a specific type of media that distinguishes it from other media since certain symbol systems may represent some tasks better than others and may also require different mental skills. Finally, processing

capabilities deals with on how these symbol systems are processed in learners' minds. This view considers media to be consisting of symbol systems.

Supporting the view that media is merely a symbol system, Salomon (1994:8) states that "the technology of a medium (any instrument that delivers information) effects the modes of interaction with users". For example a student might have different outcomes when a source is presented via computer-based instruction than when it is presented via a television show. Moreover, Salomon (1994:8) points out that "each medium delivers content via specific symbol systems." For example, television requires less mental skills than reading. Hence, the meanings obtained from watching television may be less elaborative than those from reading. Therefore, how media are used in learning make a change in the kinds of medium used.

In recent years, instead of discussing whether multimedia should take place in education or not, the topic shifted towards on how multimedia should be applied to educational settings. Researchers have investigated the most effective ways of different presentation modes of multimedia that is which type of presentation mode more effective is in educational settings.

Multimedia learning theories are grounded on the issue of how learning from verbal and visual information takes place. The next section will provide information on how learners process, store and retrieve information in a multimedia environment. This study aims to find out which kind of presentation mode best leads to vocabulary learning: L1 gloss, L2 gloss, L1+picture gloss or L2+picture gloss. Different computerized glosses in reading texts and their interpretations are explained by Generative Theory of Multimedia Learning.

2.5. Generative Theory of Multimedia Learning

Mayer's (1997) Generative theory of multimedia learning is an extension of Dual-coding theory and Cognitive load theory.

Dual-coding theory (Paivio, 1986) assumes that human cognition processes two separate information processing systems for storing verbal and visual information. The verbal information processing system deals with verbal information such as text or sound, the visual information processing system deals with nonverbal information in the form of images such as pictures, objects, animations or videos. In other words, dual-coding theory has two cognitive subsystems, one specializes in verbal input, and the other in nonverbal input.

According to dual-coding theory, verbal and nonverbal input is processed in three levels: (1) The representational level involves perceiving or recognizing information in either the verbal system or non-verbal system (for example: words or pictures). (2) The associative level involves the connections within the same verbal or non-verbal system. For example: words are joined to related words in the verbal system; images to other images in the nonverbal system. (3) Referential connections are the links between the verbal and nonverbal systems. Verbal information activates nonverbal information or vice versa.

Dual-coding proposes that the two subsystems function (a) independently since either system can be active without the other, (b) parallelly – that is they are parallel to each other, (c) interconnectedly. Activity in one system can trigger the other. For instance, pictures can be named and words can help to visualize images.

Dual-coding theory makes an important contribution to the way on how information is processed via words and images. It points out that verbal information is processed much better when it is supported by visual information or vice versa. Furthermore, it might be better if verbal and picture information is presented simultaneously which will be discussed in generative theory of multimedia learning.

Generative theory of multimedia learning is also effected by cognitive load theory. cognitive load is defined as the total amount of mental activity that short-term memory is imposed at a given time. Cognitive load theory of Chandler and Sweller (1991) focuses on the issue that working memory of humans are limited in their capacities to process information at a time. Information which exceeds this capacity is dropped from short-term memory without being processed. Therefore, instructional materials should be so designed that learners visual and/or verbal memory should not be overloaded (Sweller,1988). One way to reduce the overload on working memory and increase its capacity is to present information in dual channel (verbal and visual) rather than in single mode.

Dual-coding and Cognitive Load theories complement each other in that the former deals with how information is processed in humans minds and the latter emphasizes how information is obtained by the learners. Mayer extended the Dual-coding and Cognitive load theories and proposed a Generative theory of multimedia learning.

Generative Theory of Multimedia Learning views learning and cognition as active and dynamic processes. Generative theory of multimedia learning identifies three main assumptions (Mayer,2001). (1) Visual and verbal information are processed seperately (dual channel assumption). (2) Each of these channels are limited in their capacities (limited capacity assumption). (3) Learners are actively involved in knowledge construction (active processing assumption).

According to this theory, meaning is created through three cognitive processes. (1) Learner determines which parts of the presented information are most relevant and stores this information into either verbal or visual channel. Selecting only part of the information occurs because of limited capacity in each channel of the cognitive system. The selection process of the learners makes the learner an active participant which is important in this theory. (2) The learners organize the stored information into either auditory channel (textual information) or

visual channel (images). This process involves the same limited capacity limitations. Since learners have limited capacity to build all possible connections, they focus on organizing the stored information. (3) The last step involves integrating word-based and image-based information. So far learners are equipped with either auditory channel or visual channel. In the last step they integrate these two channels and combine them with their existing knowledge. To state differently, the integration of verbal and visual information requires the activation of prior knowledge from long term memory to help to coordinate the integration process.

Mayer's Generative Model of Multimedia Learning is illustrated in Figure 2.1 more clearly.

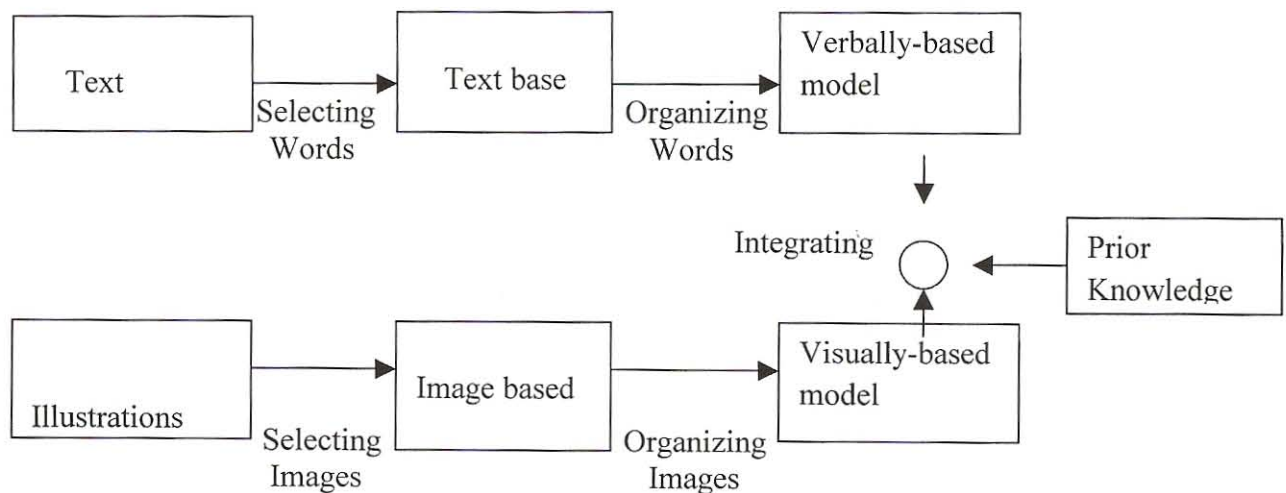


Figure 2.1 Mayer's Generative Model of Multimedia Learning (Mayer,2001:47)

Mayer and Moreno (2002:107) derived five principles for fostering multimedia learning.

Generative Theory of multimedia learning asserts that humans learn better with words and pictures rather than words alone. This is the first principle of the theory. This is grounded on the issue that when both pictures and words are provided, learners are better able to make referential connections between verbal and visual information. The contiguity principle deals with presenting words and pictures simultaneously due to minimizing the load in working memory. The coherence principle proposes that students learn better when extraneous material is excluded rather than included. Therefore, when irrelevant words, pictures, sounds, music are added to a multimedia presentation, students will have less capacity to process the information because of limited capacity assumption. The modality principle proposes that when the information is presented as a spoken text rather than printed text, the information is learnt better. The rationale for this principle is that when the information is presented both visually and verbally (text and pictures), the verbal channel will be overloaded. Therefore, when the information is presented auditorially, pictorial channel will be left only for pictures. The redundancy principle focuses on the issue that students will experience cognitive load if pictures and words are both presented visually, their visual channel will be overloaded. The rationale for these principles stated above lies in dual-coding theory (it is learnt better with words and pictures) and cognitive load theory (overload of verbal or visual channel).

Next section will provide information on L2 vocabulary learning and computerized glosses.

2.6. L2 Vocabulary Learning and Gloss Types

This part will present information about vocabulary learning and types of glosses.

2.6.1. Vocabulary Learning

Since second language learners are overwhelmed with many new words, researchers have investigated variety of modalities of vocabulary acquisition in the field of foreign language learning: intentional vs. incidental learning, explicit vs. implicit learning, guessing from context, using dictionary, glossing etc.

Incidental vocabulary learning occurs naturally while learners try to understand what they hear or read, the focus of the main activity is on understanding the message of the oral or written activity rather than on word learning itself (Paribakht and Wesche, 1999, De Ridder, 2003). Hulstijn et al. (1996) propose that words learned incidentally must have been 'picked up' during listening and reading activities while the reader's or listener's goal is to comprehend the meaning of the language rather than to learn new words. They refer to this 'picking up' as incidental vocabulary learning.

Explicit learning on the other hand, involves more conscious operation where a learner makes and tests hypothesis in a search for structure (Ellis, 1994:1). Laufer and Hulstijn (2001) have indicated that explicit learning can take place both intentionally and incidentally, however, implicit learning can only be incidental. They point out that incidental learning is a natural and simple process without any conscious operations of the learners.

Another way students learn vocabulary during reading is guessing meaning from context. Many researches in foreign language teaching support the view that readers can guess the meaning of unfamiliar words out of context. However research also shows that guessing from context has serious limitations. As De Ridder (2003:34) states, "successful guessing from context requires internal and external context cues as well as careful monitoring, good reading and prior knowledge".

Huckin and Coady (1999 , cited in Gu, 2003) state that guessing requires a great deal of prior training in basic vocabulary, word recognition, metacognition and subject matter. We can infer from this that without such a training one might not be successful to correctly guess meaning from context.

Moreover, it is not the training itself that matters; there are researchers who believe that reliance on context can be problematic (Frantzen, 2003; Dycus, 1997). For instance, Frantzen (2003) applied a study on 11 Hispanic students taking Spanish classes. She wanted to find out why the context where the word appears, does not always lead to accurate understanding of its meaning. In this study on average, the students were able to guess less than 30% of the unknown words provided in context. The study found out that context factors, student factors, and text factors determined if the participants could infer the meaning or not. She claimed that context can be “vague, ambiguous or misleading” and that context can deflect students from guessing although they actually know the word. Frantzen (2003) states that the context itself might not be beneficial to infer meanings and that most words suggest multiple meanings in contexts. It might be difficult for readers to solve the ambiguous context without knowing the multiple meanings of words. Mondria and Wit-de Boer (1991, cited in Nikolova, 2002) also supports the view that students may not acquire the new words although they have guessed correctly. This can be explained by assuming that learners, who guess the words correctly, may not learn them enough to store them in their lexicon. Another issue to consider is that low verbal ability readers are more dependent on vocabulary knowledge than high verbal ability subjects and the former ones might be at a disadvantage to make accurate guesses (Knight, 1994).

Dictionaries are another source of vocabulary learning during reading. An advantage of dictionaries may be that making dictionary available for students may avoid the problem of determining for which vocabulary item students will need help. Students will decide

themselves for which item they will look for. However, continual consultation to the dictionary may hinder students' reading processes and the readers when referring back to the text might forget what they were reading or forget the context of that particular word they were looking for. Moreover, a dictionary presents more than one entry of a lexical item, and the reader must figure out which one to choose during reading. This may need higher proficiency level of reading processing and low level readers might not know which entry to choose of the particular word. Additionally, Hulstijn (1996:11) asserts that students "tend to ignore unfamiliar words during reading except when they perceive the words as relevant for reaching their reading goal or when they notice that an unknown word keeps reappearing and might therefore be worth their attention". When we consider these, glosses may have more advantages than dictionaries in learning new vocabulary.

2.6.2. Gloss Types

Glosses aid for the particular context in which the word is glossed. Readers reading processes might not be disrupted and there may be a continual flow in their readings. Glosses seem to provide several advantages in teaching vocabulary in reading texts. Researchers believe that glosses not only aid comprehension, they also promote vocabulary learning (Chun and Plass, 1986; Hustijn, 1996, Ko, 2005). Since students have immediate access to annotations during reading, researchers revealed that glosses helped to read texts much quicker and that it promotes learner autonomy (Roby,1999).

Nation (1990:134) defines glosses as "short definitions located somewhere in the text". As defined by the Merriam-Webster Online Dictionary gloss refers to "a brief explanation of a difficult or obscure word or expression". Overall, there are four types of glosses: text glosses, picture glosses, audio glosses, and video glosses. A text gloss refers to textual definition/explanation of the unknown word. A picture gloss is usually equipped to text gloss to describe the meaning of the unknown word. An audio gloss presents the meaning

of unknown words usually by a native speaker's voice to read the word or read an example sentence that contains the word. Finally a video gloss presents the target word via a video clip. Considering the applications of the glosses, verbal messages can be presented through on-screen texts or sounds and visual information can be presented through static pictures or dynamic videos.

Roby (1999:96) offers a comprehensive taxonomy of glosses that divides glosses to six criteria: (1) Gloss authorship that is divided to either glosses that are generated by the learners or by professionals as instructors or material developers. (2) Gloss presentations that are either priming or prompting. Priming is referred to glosses that are prepared by the teachers or materials that precede a reading passage. Prompting is referred to glosses that readers consult during reading (Widdowson, 1978 cited in Roby.1999:94). (3) Glosses that can function to clarify important points (metacognitive, highlighting or clarifying) or they can provide lexical information (encyclopedic, Linguistic or syntactic). (4) The focus of glosses may be textual (for example definition of words) or they may be extra textual (for example extra information about words). (5) Glosses can be either in native language (L1) or target language (L2, L3). (6) The presentation of glosses can be with verbal, visual or audio gloss forms. An overview of Roby's (1999:96) taxonomy of glosses can be seen in Table 2.1.

Table 2.1. Table of Roby's taxonomy of glosses (1999:96)

I. Gloss authorship	II. Gloss presentation	III. Gloss functions	IV. Gloss focus	V. Gloss language	VI. Gloss form
A. Learners B. Professionals 1. Instructors 2. Materials developers	A. Priming Glossaries B. Prompting Glossaries	A. Procedural 1. Metacognitive 2. Highlighting 3. Clarifying B. Declarative 1. Encyclopedic 2. Linguistic a. Lexical i. Signification ii. Value b. Syntactical	A. Textual B. Extratextual	A. L1 B. L2 C. L3	A. Verbal B. Visual 1. Image 2. Icon 3. Video a) With sound b) Without sound c) Audio Only

In the present study glosses are defined as short definitions or explanations of words given to unknown words during reading. The glosses will be provided textual (L1 or L2) and/or visual (L1+ picture or L2+ picture). The glosses will be presented via computers where students can have access to by clicking on highlighted words in which a pop-up window appears on the right side of the text. The details of the usage of the programme will be explained in section 3.4.3.

2.6.3. Studies on Glossing

Early studies on glosses over vocabulary learning compared gloss condition with non-gloss condition (Roby, 1999). Research indicated advantage of glosses over non-gloss groups. Therefore, the focus of glosses shifted towards which type of gloss is more effective in facilitating vocabulary learning.

This section will review related literature regarding L1 vs. L2 glosses on vocabulary learning and multiple glosses on vocabulary learning in reading a text.

2.6.3.1. Studies on L1 vs. L2 Glosses

There have been mixed results regarding the effectiveness on L1 over L2 glosses. Some studies show that L1 gloss is more effective than L2 gloss in vocabulary learning and/or reading comprehension (Spahiu, 2000). Other studies show L2 gloss to be more effective than L1 gloss condition (Ko, 2005) and there are studies which found no difference on both types of glosses (Jacobs et al., 1994) regarding vocabulary learning and/or reading comprehension.

Spahiu (2000) conducted a research on 90 intermediate learners of English as a foreign language studying at Anadolu University, the college of Tourism and Hotel management. The study investigated three conditions: L1 gloss, L2 gloss and no gloss groups. The subjects read a text about tourist promotion. After reading, the subjects were tested on recall and

recognition of sixteen target items both immediately and after three weeks. The findings indicated that glossing significantly improved incidental vocabulary learning. L1 gloss outperformed L2 gloss significantly at immediate and delayed vocabulary post tests. When time was taken into consideration, subjects' delayed vocabulary decreased over time in all of the groups. They concluded that accessing word meanings in native language is a key factor understanding foreign language texts for Turkish foreign language learners. Therefore, students should be encouraged to use L1 glosses during reading a foreign language text.

Jacobs et al. (1994) compared L1 with L2 glosses with 85 English-speaking students studying Spanish. They read a Spanish text with three conditions: L1 gloss, L2 gloss and no gloss. After reading the text they were tested on two vocabulary post tests immediately and four weeks after the experiment. There was a significant difference between the glossed groups and no gloss groups. However, the research did not find any significance for L1 and L2 groups.

Ko (2005) conducted a study on one hundred and six undergraduates at a university in Korea. Twelve of the subjects took part in think aloud and the other part took part in the study. The aim of the study was to find out which type of gloss (1) no gloss, (2) L1 gloss (Korean) or (3) L2 gloss (English) conditions effect students' reading comprehension. The results showed that L2 gloss group significantly outperformed L1 gloss and no gloss. Think aloud results showed that both L1 gloss and L2 gloss made students' reading comprehension faster and smoother.

In his meta-analytic research Taylor (2006) examined nineteen studies that focused on L1 and L2 gloss conditions on reading comprehension. This meta-analysis has found that computerized glosses have a significantly stronger effect on reading comprehension than traditional glosses. Additionally, computerized L1 glosses perform consistently better than traditional L1 glosses. However, they could not indicate any significant difference regarding

L1 computerized gloss over L2 computerized gloss. They revealed both advantages and disadvantages for using L1 gloss. The advantages include that: L1 gloss may encourage positive impression towards L2 learning; L2 readers understand more with L1 glosses and may therefore focus more on background knowledge and other reading strategies; presenting students what they prefer may lead to better learning. These are the advantages of L1 gloss in a computer laboratory. However, there are also disadvantages that this meta-analytic research has summarized. The disadvantages are: the subjects may assume that there is a one-to-one correspondence between words in L1 and words in L2; the subjects may understand a written text by the help of L1 glosses, but their understanding of meaning may be quite different than that of a native speaker; the ease of learning with L1 glosses may minimize learners effort in using deeper level processing strategies while reading; L1 gloss may have many short term advantages but few long term rewards. They revealed that more studies should be applied on the different effects of L1 over L2 gloss and their short term and long term benefits.

2.6.3.2. Studies on multiple Glosses

Yoshii and Flaitz (2002) investigated incidental vocabulary learning using text and picture glosses with hundred fifty-one beginning and intermediate ESL adult learners. Students read a story (the same text used in this study), with 14 glossed words presented in three conditions: (1) definition only, (2) picture only, (3) definition + picture. Students in definition + picture understood significantly more vocabulary than students in the text or picture only conditions. Picture only group outperformed text only group significantly. The results showed that over time, the retention rate for the three groups were not significant. They concluded that the nature of pictures and texts used in glosses should be explored further.

Akbulut (2007) investigated different gloss conditions on vocabulary learning and reading comprehension. Sixty-nine freshman TEFL students studying at a Turkish university took part in the study. They were assigned to three conditions: (1) definition of words, (2) definition of words + pictures, (3) definition of words + short movies. The subjects took part in vocabulary pre-test, vocabulary post & delayed post test and a reading comprehension test. Results indicated that participants who had access to definition + pictures and definition + short movies had significantly higher scores than subjects who received definition only gloss. Comprehension test revealed no significant difference regarding the groups. They suggested that definitions + pictures can be as effective as definition + videos in facilitating incidental vocabulary learning. This study showed that multi glosses revealed significantly more vocabulary learning than single type of gloss.

A similar study was conducted by Al-Seghayer (2001). He investigated three glossed conditions on vocabulary acquisition. The participants were 30 ESL students at University of Pittsburgh with different native languages. The gloss conditions were: (1) definition of words, (2) definition of words + pictures, (3) definition of words + video. The subjects read a computerized reading text and were later tested on vocabulary both on recognition and production. Additionally, they participated in a face to face interview and filled in questionnaires. Results indicated that definition + video is more effective in teaching unknown words than definition + picture. They revealed that a video clip is better at building a mental image and awakens curiosity which leads to an increased concentration. They concluded that making connections with verbal and visual mode, helps linking the information into the long term memory.

Ariew and Erçetin (2004) explored the effect of different glosses on reading comprehension. They aimed to find out whether gloss usage depends on the proficiency levels of learners. 103 adult ESL learners at the University of Florida took part in the study. Students

were placed in classes according to their proficiency level: Intermediate or advanced. The glosses included definition of words, graphics, audio, and video glosses. After reading, subjects took part in a reading comprehension test, a prior knowledge test (about the reading topic), a background questionnaire and an interview. The computer registered subjects' click on target words, which gloss they preferred, how many times they clicked on target items and the amount of time spent on it. Results showed that Gloss use and reading comprehension did not show a significant difference regarding both groups. However, prior knowledge of a text has a significant effect on comprehension for both intermediate and advanced level of subjects. The results showed a negative correlation between video gloss and comprehension for intermediate learners. They revealed that video annotations seem to distract comprehension for intermediate learners. They stated that intermediate learners might have relied too much on videos to comprehend the text and therefore there might have occurred attention split between the type of information given.

Yeh and Wang (2003) investigated the effects of three gloss types on vocabulary learning with 82 EFL learners at a Taiwanese university. Second aim was to find out whether learners with certain perceptual learning styles benefited more from a particular type of vocabulary annotations. Subjects were divided into three gloss groups: (1) L1+L2 gloss; (2) L1+L2+Picture gloss; (3) L1+L2+Picture+audio gloss. The results of the study showed that L1+L2+Picture gloss was the most effective type of gloss. Perceptual learning styles did not seem to have a significant influence on the effectiveness of vocabulary annotations.

Gyselinck et al. (2002) investigated two presentation modes: text presentation alone and visual presentation. 33 college students in US read nine sentences on computers with glosses. The comprehension tests were paraphrasing nine sentences and the answers to inference questions. They found that definition alone had advantage to picture alone glosses.

Jones (2004) investigated how picture glosses and/or definition of glosses (L1 gloss) affect students' performance on incidental vocabulary learning tests. Eighty second-semester English-speaking beginning students of French, enrolled at the University of Arkansas took part in the study. They were divided into three gloss groups. (1) Definition only gloss(L1 gloss); (2) Picture only gloss; (3) definition gloss(L1 gloss) + Picture gloss. The students listened to a text that was presented on computer. After listening they took part in immediate and delayed post tests. Tests were picture recognition test and multiple choice test. The results of the immediate vocabulary recognition tests did not reveal significant difference between the groups. They revealed that the test types , recognition tests, are an important variable. They stated that selecting a particular word from given options is much easier than producing the word. Therefore, this might be the reason for the obtained results. Another result they revealed was that students in picture gloss and definition gloss group performed poorer on the delayed vocabulary matching test compared to definition only group. They revealed that student logs showed that the subjects in this group did not examine the two types of annotations in a balanced manner. They explained that this group initially achieved higher amount of information that was immediately helpful for producing written translations, with time, the information may have become messy and students might have experienced cognitive overload.

2.7. Student Logs and Vocabulary Learning

This part will provide information about student logs. It will present what student logs are and review studies which have used student logs during research.

2.7.1. What are student logs?

Student logs are trackers incorporated into computers to determine the number and/or types of glosses consulted during reading a computerized text. They are known to be more

effective than questionnaires since they provide detailed information on which vocabularies were looked up and how many times during reading a text. They can be valuable sources for instructors/researchers to analyze subjects' strategy use, gloss preferences and type of selected information. Studies investigated relationship between retention of looked up words and the type of information selected, and between retention and number of times a word was looked up (Salem and Aust,2007; Aust and Roby,1993; Bell and LeBlanc,2000; Chun and Plass,1996; Davis and Lyman-Hager, 1997; Şakar and Erçetin ,2004; Hulstijn,1993; Knight,1994; Lomicka,1998; Laufer and Hill,2000).

2.7.2. Studies on Student Logs

Lomicka (1998) explored how multimedia glosses influence the level of comprehension. It also investigated the relationship between the type of glosses, the number of glosses consulted during reading a text, and what inferences students induced during reading. 12 native students of English students enrolled in a second semester French course at Pennsylvania State University participated in the study. They read an excerpt from a poem under three conditions. First group had no access to glosses. Second group read the text with L1 Gloss. Third group had access to different kinds of glosses(L1, L2, images, references, pronunciation). Comprehension check was applied with think aloud procedure. A tracker recorded each subjects' number and type of glosses and students' length of time to which information they consulted. Think aloud data showed that there were no significant differences on the comprehension measures among the groups. After analyzing students' logs, they stated that students had a strong preference regarding L1 gloss. Their use of glosses aimed translation and paraphrasing in order to achieve a minimal level of comprehension. Moreover, they stated that computerized reading with full glossing may promote deeper level of text comprehension.

Şakar and Ercetin (2004) tried to find out learners' preferences for hypermedia glosses. They aimed to analyze whether multimedia glosses facilitate reading comprehension. 44 Intermediate Turkish students studying English for academic purposes at a university participated in the study. Data were collected through a tracking tool, a reading comprehension test, a questionnaire, and interviews. The text was adapted from The National Geographic Journal website and was glossed with information as text- 900 words, graphics, audio and video support by software. Total 104 textual glosses were present. The study contained two phases. During the first Phase: The subjects were asked to read the text for general understanding and use the glosses to help them. They were told to write anything they could remember from the text. During the second reading they were asked to answer a reading comprehension test of 20 questions while they were reading the text. After the test a questionnaire was given to the readers about their perceptions of glosses. Two logs were recorded for each participant. One record contained data of the students' interaction with the text during their first reading. The other contained data about their second reading during answering comprehension questions. During the second Phase: 12 voluntary students took part in a semi-structured interview. The results of the study indicated that learners preferred visual glosses (graphics, videos). A negative relationship was found regarding gloss use and reading comprehension. The researchers claimed it may be that glosses might have hindered reading comprehension. Audio recordings and videos might have interrupted readers and interfered with reading comprehension. Another explanation they provided was that 'redundancy effect' might have taken place by presenting text and videos together.

Bell and LeBlanc (2000) found out 40 students' gloss preferences of L1 gloss or L2 gloss. The subjects were studying third semester Spanish who read a computerized text with sixty seven glossed items. Their aim was to find out whether these subjects accessed to glosses more frequently when they were given L1 glosses (English) or L2 glosses (Spanish).

L1 gloss group clicked on twice as many to the words than the L2 gloss group. The findings did not show any significant difference regarding multiple choice comprehension questions. However, 100 % of the subjects in L1 gloss preferred to have access to L1 glosses when they were surveyed after the experiment. 90% of the subjects in L2 gloss preferred to use L1 gloss as well. They concluded that L1 glosses can be an efficient tool for comprehending a foreign language text and foreign language teachers should provide their students the gloss format which best fits to their students needs.

Laufer and Hill (2000) focused on the relationship of what student looked up while reading a text and how well they are remembered. 72 Students from two different universities, 32 students were from Israel and 40 were from university of Hong Kong. They were provided with different lexical information which they could look up on the screen. The subjects could look up to different gloss types: L1 gloss, L2 gloss, sound, root, and extra information about the target words. After reading the text with computerized glosses, the subjects were grouped under four gloss preferences (student logs showed which gloss each participant preferred mostly). The gloss preferences were L1 gloss, L2 gloss, L1 +L2 gloss and other (sound, root, extra information). Israeli subjects predominantly preferred to look up L1 glosses whereas Hong Kong subjects preferred to look up other group (sound, root, extra information) and L2 gloss. They could not indicate any difference between the number of times the word is looked up during reading, and its vocabulary recall. They revealed that the look up preferences may vary according to people from different countries. Hong Kong subjects preferred to use L2 glosses whereas Israel subjects preferred to use L1 glosses. Hong Kong subjects achieved higher vocabulary scores than Israel subjects. They revealed that Hong Kong subjects may have been trained to do more bottom-up reading processing –more vocabulary oriented. Whereas Israel subjects may have been trained to do more top-down processing.

Davis and Lyman-Hager (1997) studied the ways of forty-two intermediate college-level students of French employed on-line glosses in a multimedia computer program. The students read a glossed excerpt from *Une Vie de Boy* on the computer screen. The glosses included English and French definitions, pictures, videos, or audio glosses. After reading the text, participants performed a recall protocol, a multiple-choice task, and participated in an interview. They indicated that although learners had the options of various glosses they nevertheless tend to rely largely on L1 definitions and ignore other options. They revealed that subjects' use of glosses is focused on the goal of translation and paraphrasing to achieve basic comprehension.

These studies have investigated the preferences of students regarding various glosses and their relationship with vocabulary recall. The following studies will present results of students' click on target words and their vocabulary post tests.

Chun and Plass (1996) questioned the effects of multimedia glosses on vocabulary acquisition. They presented the results of three studies applied to second year German students in California. A hypermedia application (Cyberbuch) for reading German texts was used in this study which offers annotations in the form of pictures, text and video. They examined the effectiveness of incidental vocabulary learning when the goal is reading comprehension; the effectiveness of different types of annotations for vocabulary acquisition; the relationship between look-up behavior and the performance on the vocabulary test. Students were introduced to the Cyberbuch programme in the computer lab then they watched a video that gave an overview of the story. They read the story on the programme by using any multimedia annotations they wanted. After reading, a vocabulary test was given to the participants. Finally, they wrote a recall protocol in their L1. The results indicated that there was no one mode that aided to all learners. Students in that study preferred to use different types of glosses. They reported that availability of different types of glosses for target items

and ease of look up may encourage learners to more active behavior. They revealed that looking up a word more than once leads to better learning. With regard to the effectiveness of different types of glosses, a tendency for better recall was found for words with picture + text when compared to the words annotated with video + text. Visual imagery aided in the learning of foreign words. There was no correlation between look up behavior and vocabulary test . They reported that some other factors may influence the look up behavior and effectiveness of different types of multimedia programmes. They concluded that there is no one “mode” or “medium” that aids to all readers. Individuals look up different type of annotations and they learn better when glosses best suit to their cognitive styles.

Salem and Aust (2007) investigated the effect of five gloss types on reading comprehension and vocabulary acquisition of 93 second language Spanish learners (native speakers of English). They also investigated whether there is a correlation between gloss access and vocabulary learning. The subjects were divided in five gloss groups: (1) no gloss, (2) gloss+ L1, (3) text :audio (spoken in Spanish and English), (4) text, audio +picture, (5) text, audio, picture and writing. The subjects completed a multiple choice reading comprehension test and immediate & delayed vocabulary test. The results indicated that gloss users were more successful than no gloss users. Student log results indicated that the more students consult to glosses, the better comprehension they achieve. They revealed that text, audio and picture gloss group was particularly beneficial for word retention. This group had the highest correlation with students' clicks on words and their vocabulary scores.

Knight (1994) investigated the effects of on-line dictionary access (or no access) with high verbal ability and low verbal ability on vocabulary learning and reading comprehension. There were significant differences between low and high verbal ability groups in terms student logs and their proficiency level. High verbal ability of students learn more words than low verbal ability students. Low verbal ability students learned as many words as high verbal

ability student on the select definition test. They revealed that on-line dictionary access gave low verbal ability students a special advantage. Regarding student logs, high verbal ability subjects accessed more to on-line dictionaries than low verbal ability subjects. However, correlations were higher for low verbal ability on vocabulary and comprehension test than high verbal ability subjects. They revealed that low verbal ability subjects exhibited more from on-line dictionary access than high verbal ability students.

2.8. Conclusion

In the studies mentioned so far, the effects of glosses on vocabulary learning are generally positive, but which type of gloss and which type of gloss combination better leads to vocabulary learning are rather ambiguous. Additionally, subjects' click behaviors and their vocabulary scores during reading a text reveals conflicting results. In literature regarding this field, most of the studies did not involve Turkish students and gloss usage may vary according to different individuals and cultures.

Therefore, this study aims to find out which gloss type L1 or L2 facilitates more vocabulary learning. Moreover, which type of combination of gloss L1+picture or L2+picture encourages more vocabulary learning will be investigated. Additionally, it seeks to find out whether student clicks on target items and their vocabulary learning have any interactions to shed us light on whether the amount of clicks on words and post test outcomes are somehow interrelated.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This study aims to investigate which type of gloss L1 or L2 provides higher incidental vocabulary learning. It also intends to provide evidence on whether static pictures glosses have maximising effects on L1 or L2 glosses on incidental vocabulary learning. Considering the aim of the study, four gloss types L1 , L1+ picture, L2 , L2 + picture were compared. In this experimental study, quantitative data was examined and statistical data analysis was presented. This chapter explains the methods and the procedures used in this study. The chapter will first describe the subjects who participated in the study. Then it will describe the materials used to collect data. Finally, it will present data collection procedures and data analysis.

3.2. Research Design

This study investigated the effects of different gloss types on vocabulary learning. 79 subjects were randomly assigned to four different gloss groups. The subjects read a computerised text and were tested on three recognition vocabulary tests immediately and two weeks after the experiment. A detailed research design can be found in Figure 3.1.

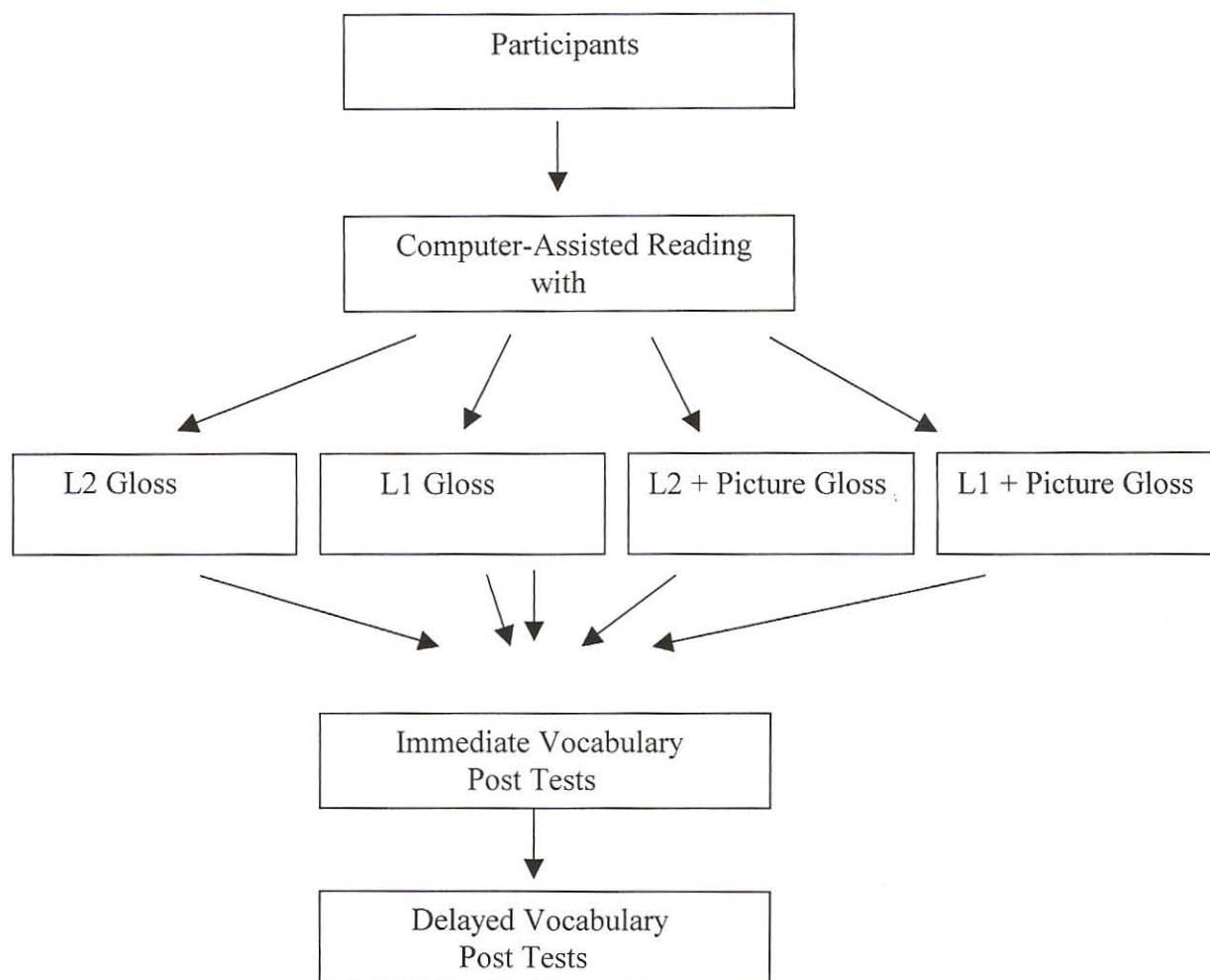


Figure 3.1. Research Design

For the vocabulary post tests , recognition tests were used. Recognition tests are used because it is believed that as one learns a word, the receptive knowledge comes before productive knowledge and that most vocabulary learnt through reading is receptive (Warring, 1997; Webb, 2005). Therefore this study focused on recognition only. Webb (2005:34) states that “if receptive learning is better suited to developing receptive knowledge, then it may not be efficient to use productive tasks in a learning programme in which the primary aim is to improve receptive skills”. The details of post tests will be presented in section 3.5.1.

Subjects were divided randomly into four groups. Figure 3.2. shows the distribution of participants according to groups.

Groups	n
L 2 Group	19
L 1 Group	21
L 2 plus Picture Group	19
L 1 plus Picture Group	20
Total	79

Figure 3.2. Distribution of participants according to groups

3.3. Subjects

The study was conducted at Hoca Ahmed Yesevi Highschool in the second term of academic year 2006-2007. A total number of 79 (Süper Lise) Grade 2 students took part in the study. They were taking English classes as compulsory lesson in this high school. All subjects were native speakers of Turkish and range in age from 17 – 18. They had five years of English in secondary school and attended preparatory class during their highschool education. Totally, they all had 7 years of English lessons previously.

The researcher herself was the instructor in computer laboratory class. The students attended to computer classes before, and were familiar with basic computer skills such as using Microsoft Word or Microsoft Excel. The subjects were randomly assigned into four groups.

3.4 Materials

This part will present the materials used in this study.

3.4.1. Reading Text

The reading text used in this study was designed by Yoshii (2006). It was specifically prepared for the purpose of her study which was similar to this study. The text "A scary night" (Appendix A) consisted of 390 words. According to Laufer and Nation's Lexical Frequency Profiler (2006; <http://www.lextutor.ca/vp/>) 92.54 % of the words in the text belonged to 1- 2000 frequency level. The target items in the reading text showed a tendency to belong to 2000 and higher frequency level.

3.4.2. Target Vocabulary and Glosses

Eleven vocabulary items were selected as target items according to following criteria:

- a. Sixteen subjects were asked to take part in a pilot study who were not included in the present study later on. The goal of the pilot study was to determine the possible vocabulary to be annotated. The target words were chosen from verbs since the researcher needed to illustrate them effectively.
- b. The subjects who took part in pilot study outlined sixteen words. The target items were : pondering ; burst ; startles ; shattered ; rake ; dawns on ; burglarizing ; dash ; yell ; tumble down ; grins ; sob ; inquires; scribbles ; shivering ; gape.
- c. Once the annotations were identified, beside the researcher, two colleagues explored for possible pictures to be used in the experiment. For each vocabulary item five pictures were present. Five ELT experts decided upon which picture best represented each particular target item. The ELT experts detected that pictures for startle and gape could be confused with each other. Therefore, the word 'startle' was removed from the target vocabulary list. As a consequence, fifteen words were left as the target items.
- d. These fifteen words were then prepared as vocabulary identification test which consisted of three tests. Namely multiple choice test, picture-matching test and Turkish-matching test.

Vocabulary identification test aimed to clarify whether the target words were familiar to the subjects or not.

e. The results of the identification test revealed that four of the target words were known by most of the subjects. These four words were eliminated from the study. As a conclusion, eleven target words were used for treatment. The same tests were used as post and delayed post tests involving eleven target words which will be discussed in section 3.5.

3.4.3. Visual Basic Microsoft Excel Programme

The computer programme was created for the purpose of the experiment by Visual Basic using Microsoft Excel Programme. Preparing the programme including all the piloting processes lasted three months. It was made sure that the annotations work properly and that the software's tracking tool functioned properly. The text 'A scary night' was integrated into the programme and the text was presented in one page so that subjects did not have to go backwards and forwards during reading.

Four parallel forms of the programme were prepared. First version includes L1 gloss (Appendix B); second version includes L2 gloss (Appendix C); third version incorporates L1 plus picture gloss (Appendix D) and last version includes L2 plus picture gloss (Appendix E).

The target words were highlighted in the text so that students knew which words they could gloss. On the right side of the text the target words which were visible for them appeared in the line where the word actually was in the text. When student clicked on a word, a pop-up window opened.

The pop-up window is the small screen which appeared next to the target words only when it was clicked on the target word, it appeared on the screen. Otherwise it was invisible

for subjects so as not to disturb students' reading processes. Al-Seghayer (2003, p.3) points out:

An ideal place for the annotated words display would be in an area separate from the text. When readers click on a word, the definition window immediately appears in a separate glossary window that is adjacent to or alongside the text being read. This location allows learners to see the word in its context while they are reading the definition.

A sample for screenshot for L1+picture gloss is shown below (Figure 3.3).

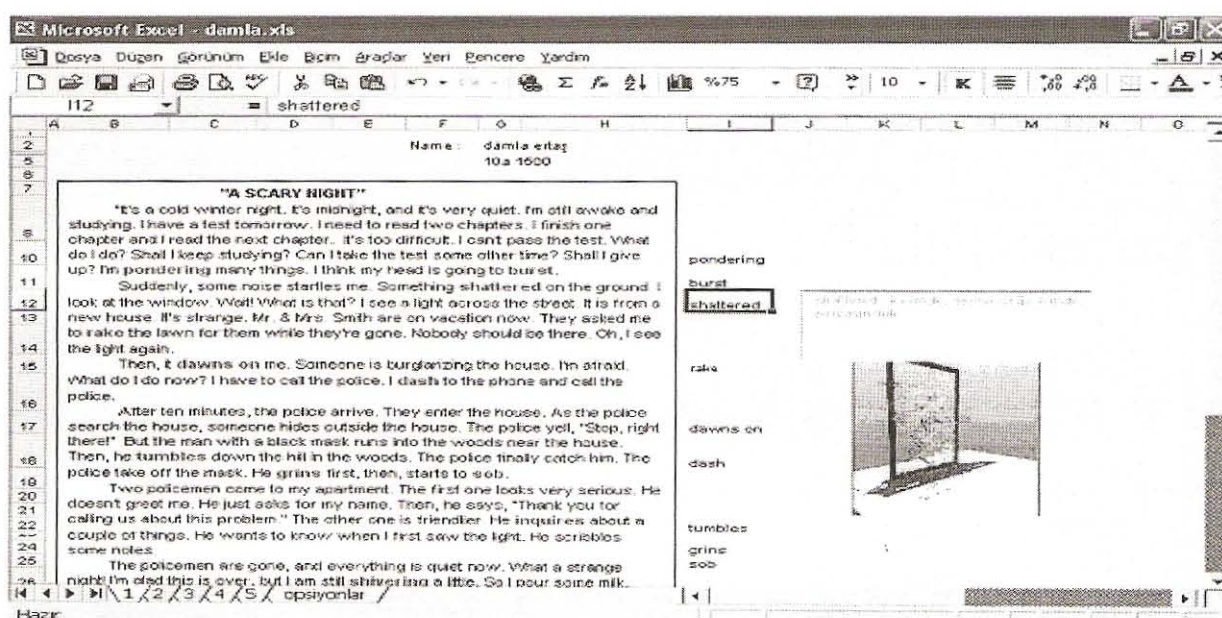


Figure 3.3. Screen shot of the Computer programme of L1+Picture Gloss

In order to identify subjects' clicks on each vocabulary item a tracker was built into the programme. Subjects were not told that the computer registered their actions. The data was saved as a log file and the tracking tool was hidden. Subjects did not have access to the log file. A sample log file is provided below (Figure 3.4.).

	L1 Gloss	L2 Gloss	L1+picture Gloss	L2+picture Gloss
pondering	5			
burst	6			
shattered	6			
rake	6			
dawns on	7			
dash	7			
tumbles	5			
grins	6			
sob	5			
inquires	3			
gape	4			
Total Click:	60			

Figure 3.4. Sample of a log file for a subject in L1 Gloss

This subject read the text with L1 glosses. She clicked on every eleven vocabulary item. The vocabulary item that received the least click is the word 'inquires' which was clicked three times. The words 'dawn on' and 'dash' were the most frequent looked up words with seven clicks on each. The total click amount of words of this subject is 60.

3.5. Instruments

The instruments used in this study will be presented in this part.

3.5.1. Post and Delayed Post Tests

Post tests were given right after the experiment. They are multiple choice test, picture-matching test and L1-matching test. In all of the three tests, the students received one point for each correct answer. The highest point for each test to achieve was 11 Points. These raw scores were converted to 100 scale scores (Figure 3.4.).

Target words	Points
11	100
10	91
9	82
8	73
7	64
6	55
5	46
4	36
3	27
2	18
1	9

Figure 3.5. Target words and their points

The same tests were given as delayed post tests two weeks after the experiment. Each time the post tests were given, the words in it were displayed in a random order to prevent rote learning.

3.5.1.1. Multiple Choice Test

Multiple Choice Test was prepared by the researcher (Appendix F) except for the words: ponder, shatter, grin and gape. The multiple choices for these words were retrieved from Yoshii (2006). The other seven words were defined via Collins Cobuild Dictionary, Cambridge Dictionary and Oxford Dictionary. The distractors belonged to the same word class. Moreover, the topic of the text was taken in account in providing challenging distractors. The aim of it was to elicit students who could not recognise the words.

The subjects were asked to select a synonym or definition of the target words among five options. Options included one 'correct', 'three distractors' and one 'I don't know' option. The last option was given in order to prevent attempts to guesses.

3.5.1.2 Picture-Matching Test

The picture-matching test involved matching associated pictures for the eleven target words including six distractors (Appendix G). Consequently, participants had to select proper

picture for a target word from out of seventeen pictures. For each target word, four picture options were available for the researcher. The pictures were backed up and 4 ELT teachers were asked to chose the most corresponding pictures for the eleven target words. The pictures were retrieved from <http://images.google.com> .

3.5.1.3. L1 -Matching Test

L1-matching test is a matching test where students were asked to match the accurate L1 meaning to the target word (Appendix H). It also composed six distracters as in the Picture Test. Eventually; subjects had to choose the correct meaning for a target word out of seventeen Turkish definitions. Longman dictionary was used for L1 equivalence.

3.6. Data Collection Procedures

Reading procedure and immediate post tests were applied to subjects during their regular 45 min. class hours by the researcher herself. Before subjects entered to the computer laboratory, the researcher herself arranged the computers considering the four groups of subjects.

After entering the computer laboratory, subjects were randomly assigned to the groups. Instruction on how the programme worked was given. They were asked to read the text on computer screen carefully for comprehension. They were told to click on a word as they wished and were not told that the programme registered their actions. Each subject's logs were saved on the computer. After the subjects read the text and checked the vocabulary items they wanted to, the immediate post tests (Multiple choice test, picture-matching test and Turkish-matching test) were distributed. Besides the researcher, a teacher helped to backup the students' files from computers.

The same Post Tests were applied two weeks later as Delayed Post Tests.

3.7. Data Analysis

How the data is analysed is discussed below with reference to each research question.

1. Do L1 and L2 glosses interact with each other in terms of vocabulary learning regarding immediate and delayed post test scores?

General Linear Model was conducted to identify the differences.

2. Do picture glosses compared to no picture glosses show different interaction regarding vocabulary learning in terms of immediate and delayed post tests?

To analyze the effectiveness in vocabulary learning of no picture glosses and no picture glosses General Linear Model was performed.

3. Do L1 gloss, L2 gloss, L1+picture gloss and L2+picture gloss show different patterns of retention over time?

To analyze the delayed effectiveness of the glosses, dependent t-test analyses was conducted on post and delayed post tests (multiple choice test, picture matching test and L1 matching test) of L1 gloss, L2 gloss, L1+picture gloss and L2+picture gloss.

4. Is there any correlation between the number of clicks and students' post test scores?

Immediate and delayed post tests mean scores were correlated with students' total click scores. In other words, post tests were analysed with students looking up words. Pearson product moment correlation (Wessa, 2008) version 1.1.22-r4 was used to identify if there were any correlations between students' post test, delayed post test and total click scores.

CHAPTER 4

RESULTS AND ANALYSES

4.1. Introduction

This study compared computerised glosses in terms of L1 glosses, L2 glosses, L1+Picture glosses and L2+Picture glosses. It aimed to find out whether L1 gloss or L2 gloss leads to higher vocabulary gain during reading a computerised text. Moreover, it aimed to find out whether pictures added to glosses have maximising effect on vocabulary gain during reading a text on computer. $P < 0.05$ was taken into account in statistical calculations.

The study followed a mixed design repeated measures. 2 (L1, L2) x 2 (picture, no picture) x 3 (Multiple Choice Test, Picture-Matching Test, L1-MatchingTest)

The data were analyzed in three steps:

1. Immediate vocabulary scores were compared among L1 gloss, L2 gloss, L1 +Picture gloss and L2+Picture gloss by using General Linear Model (GLM). Delayed vocabulary scores were compared among L1 gloss, L2 gloss, L1 +Picture gloss and L2+Picture gloss by using General Linear Model (GLM).
2. Paired t-tests were conducted on subjects' Post Test and Delayed Post Tests to find out the decline rate two weeks after the experiment.
3. Pearson correlation was used to find out whether students' total click on target words and their post tests had any correlations.

4.2. Research Question 1: Do L1 and L2 glosses interact with each other in terms of vocabulary learning regarding immediate and delayed post test scores?

In order to find out the interaction of L1 and L2 glosses with each other, first the means and standard deviations for immediate vocabulary post tests were investigated. Table 4.1. presents the results of these analysis.

Table 4.1. Means and Standard Deviations of Immediate Vocabulary Post Tests

Languages	L1 Gloss				L2 Gloss			
	No Picture (n=19)		Picture (n=19)		No Picture (n=21)		Picture (n=20)	
Pictures	$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
Multiple Choice Test	5.79	3.14	6.63	2.29	5.52	1.99	5.00	2.05
Picture-Matching Test	4.42	3.04	4.42	2.34	3.10	2.68	3.10	2.34
L1 - Matching Test	4.95	3.19	5.11	2.66	3.81	2.52	3.25	2.53

As the table indicates L1 glosses received higher mean scores than L2 glosses. These results were analyzed with a General Linear Model (GLM) repeated measures in order to find out whether these differences were statistically significant difference between different glosses. GLM results are presented in Table 4.2.

Table 4.2. General Linear Model (GLM) results for Immediate Vocabulary Post Tests

Source	df	sd	MS	F	p
Language	1	93.338	93.338	13.97	0.000
Picture	1	0.010	0.010	0.00	0.969
Test Type	2	165.702	82.851	12.40	0.000
Language*Picture	1	7.098	7.098	1.06	0.304
Language*Test Type	2	3.093	1.547	0.23	0.794
Picture*Test Type	2	1.284	0.642	0.10	0.908
Language*Picture*Test Type	2	4.635	2.317	0.35	0.707
Error	225	1503.415	6.682		

GLM results indicated a significant difference between L1 gloss and L2 gloss groups ($F_{(1,225)}=13.97$, $p<0.05$). The mean scores of L1 gloss were higher than L2 gloss (Table 4.1.) which shows that L1 gloss was significantly more successful in vocabulary learning than L2 gloss group.

Another significant difference that GLM recorded was for test types. Test types regarding immediate post tests showed a significant difference ($F_{(2,225)}=12.40$, $p<0.05$). After finding a significant difference among the three test types, a post hoc test was administered to compare the means of three groups. Table 4.3. reveals the results of Post hoc test for immediate post tests.

Table 4.3. Post Hoc Test results for Test Types of Immediate Post Test

Comparison	Mean Differences	95% CI of difference	t
MCT vs PMT	+ 1.98	+ 0.06 to + 3.90	* 2.482
MCT vs L1MT	+ 1.47	- 0.45 to + 3.39	1.843
PMT vs L1MT	- 0.51	- 2.43 to + 1.41	0.639

* $p<0.05$

According to these results, it is seen that the most significant difference is between multiple choice test and Picture matching test at the .05 level. Post hoc did not reveal any significant difference between Multiple choice test vs. L1 Matching test ($t=1.843$). Moreover, the difference between and Picture matching test and L1 matching test were non significant ($t=0.639$).

The same analyses were performed on delayed vocabulary post tests. The following part will present the results of delayed vocabulary post tests. In order to find out the interaction of L1 and L2 glosses with each other, the means and standard deviations for

delayed vocabulary post tests were investigated. Means and standard deviations for delayed vocabulary post tests are presented in Table 4.4.

Table 4.4. Means and Standard Deviations of Delayed Vocabulary Post Tests

Languages	L1 Gloss				L2 Gloss			
	No Picture		Picture		No Picture		Picture	
	(n=19)		(n=19)		(n=21)		(n=20)	
	$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
Pictures								
Multiple Choice Test	4.68	3.48	4.42	2.57	3.86	2.39	4.05	2.31
Picture-Matching Test	3.74	3.25	3.16	1.74	2.71	2.03	2.70	1.92
L1 - Matching Test	4.26	2.96	3.79	2.42	3.24	2.62	3.35	2.03

Similar to immediate post test results, L1 glosses achieved higher mean scores than L2 glosses in delayed post tests in all of the three tests. The results were further analyzed with GLM repeated measures, to examine whether these differences were statistically significant. GLM statistics are presented in Table 4.5.

Table 4.5. General Linear Model (GLM) results for Delayed Vocabulary Post Tests

Source	df	sd	MS	F	p
Language	1	28.202	28.202	4.44	0.036
Picture	1	1.727	1.727	0.27	0.602
Test Type	2	54.520	27.260	4.29	0.015
Language*Picture	1	4.239	4.239	0.67	0.415
Language*Test Type	2	0.248	0.124	0.02	0.981
Picture*Test Type	2	0.677	0.338	0.05	0.948
Language*Picture*Test Type	2	0.048	0.024	0.00	0.996
Error	225	1428.156	6.347		

The results, similar to immediate post test results, indicated a significant difference between L1 and L2 gloss groups ($F_{(1,225)}=4.44$, $p<0.05$). The mean scores of L1 gloss were higher than L2 gloss group (Table 4.3.) indicating that glosses with L1 were significantly more effective than glosses with L2. In other words, participants who read the text with L1 (no picture) gloss were significantly better in learning vocabulary than the subjects who read the text with L2 (no picture) gloss group.

GLM results revealed significant difference for test types regarding delayed post tests ($F_{(2-225)}=4.29$, $p<0.05$). After calculating that there is a significant difference among the three test types, a post hoc test was applied to compare the means of three groups. Table 4.6. reveals the results of Post hoc test for Delayed Post Tests.

Table 4.6. Post Hoc Test results for Test Types of Delayed Post Tests

Comparison	Mean Differences	95% CI of difference	t
MCT vs PMT	+ 1.18	- 0.70 to + 3.06	1.518
MCT vs L1MT	+ 0.60	- 1.28 to + 2.48	0.772
PMT vs L1MT	- 0.58	- 2.46 to + 1.30	0.746

$p<0.05$

According to these results, it is seen that Post hoc analyses could not reveal any significant difference when the groups' mean differences are compared at the .05 level. Multiple choice test and Picture matching test did not show significant difference ($t=1.518$).

Multiple choice test and L1 Matching test also did not reveal significant difference ($t=0.772$). Moreover, the difference between and Picture matching test and L1 matching test were also non significant ($t=0.746$).

4.3. Research Question 2: Do picture glosses compared to no picture glosses show different interaction regarding vocabulary learning in terms of immediate and delayed post tests?

This part will present the results of research question 2. In order to find out the interaction of picture glosses to no picture glosses first the means and standard deviations for immediate vocabulary post tests were investigated. Table 4.1. presents the results of these analysis.

The groups that received definitions along with pictures seem not to have performed better than definitions only groups. These results were further analyzed with General Linear Model in order to find out whether these differences were statistically significant. GLM results are presented in Table 4.2.

GLM results did not indicate any significant difference between picture and no picture groups ($F_{(1-225)}=0.00$, $p>0.05$). The absence or presence of pictures on glosses revealed no significant difference on students' immediate post tests. This can be interpreted as there is no additional aid of pictures on glosses during reading a text. Additionally, L1+picture group and L2+picture group also showed no significant difference for immediate post tests ($F_{(1-225)}=1.06$ $p>0.05$).

The same statistical analyses was performed on delayed post tests to find out if there is any interaction of picture glosses to no picture glosses for delayed post tests. The means and standard deviations for delayed vocabulary post tests for picture and no picture groups are presented in Table 4.4.

L1 gloss group obtained higher mean scores than L1 picture group. L2 gloss group attained higher mean scores than L2 picture group from multiple choice test and picture matching test. It seems that adding pictures to definitions does not have an effect on subjects' delayed vocabulary outcomes. These results were further analysed with GLM to identify whether these differences were statistically significant.

GLM results did not reveal a significant difference between picture and no-picture groups ($F_{(1-225)}=0.27$, $p>0.05$). Additionally, L1+picture group and L2+picture group also showed no significant difference ($F_{(1-225)}=0.67$ $p>0.05$).

4.4. Research Question 3: Do L1 gloss, L2 Gloss, L1 plus picture gloss, L2 plus picture gloss groups show different patterns of retention over time?

The results of retention effects of immediate and delayed post tests were examined. This part will show the results of whether there was a decrease in the vocabulary two weeks after the experiment. Paired t-tests were conducted on subjects' post test and delayed post tests to find out the decline rate two weeks after the experiment. Table 4.7. illustrates paired t-test results for L1 Group.

Table 4.7. Paired t-test Results for L1 Group

Group	Tests	n	$\bar{x}$	sd	t	p
L1 Group	Multiple Choice Test	Immediate Post	19	5,79	3,14	
		Delayed Post	19	4,68	3,48	2,74
	Picture Matching Test	Immediate Post	19	4,42	3,04	
		Delayed Post	19	3,74	3,25	1,41
	L1 Matching Test	Immediate Post	19	4,95	3,19	
		Delayed Post	19	4,26	2,96	1,36

Paired t-test results for L1 gloss group for immediate and delayed vocabulary tests indicate that subjects in this group decreased their scores two weeks after the treatment.

The decrease of vocabulary on multiple choice test for L1 gloss was significant ($t=2.74$, $p<0.05$), vocabulary loss for picture matching test ($t=1.41$, $p>0.05$) and L1 matching test ($t=1.36$, $p>0.05$) were not significant.

Paired t-test, which was used to examine the significant difference between immediate and delayed tests for L2 group can be seen in Table 4.8.

Table 4.8. Paired t-test Results for L2 Group

Group	Tests	n	$\bar{x}$	sd	t	p
L2 Group	Multiple Choice Test	Immediate Post	21	5,52	1,99	
		Delayed Post	21	3,86	2,39	2,62
	Picture Matching Test	Immediate Post	21	3,10	2,68	
		Delayed Post	21	2,71	2,03	0,68
	L1 Matching Test	Immediate Post	21	3,81	2,52	
		Delayed Post	21	3,24	2,62	1,02

Paired t-test results revealed a significant difference for multiple choice test at the 0.05 level ($t=2.62$, $p<0.05$). t-test did not reveal any significant difference regarding picture matching test ($t=0.68$, $p>0.05$) and L1 matching test ($t=1.02$, $p>0.05$).

In order to compare immediate and delayed post tests outcomes of L1+Picture group, paired t-test was used to find out if there is a decrease of vocabulary of L1+Picture group two weeks after the experiment. Results of t-test of L1+Picture group are presented in Table 4.9.

Table 4.9. Paired t-test Results for L1 + Picture Group

Group	Tests	n	$\bar{x}$	sd	t	p
L1 + Picture Group	Multiple Choice Test	Immediate Post	19	6,63	2,29	
		Delayed Post	19	4,42	2,57	3,11
	Picture Matching Test	Immediate Post	19	4,42	2,34	
		Delayed Post	19	3,16	1,74	3,46
	L1 Matching Test	Immediate Post	19	5,11	2,66	
		Delayed Post	19	3,79	2,42	2,48

Significant differences can be seen for each of the tests in decline in retention for the target words. L1+Picture group significantly decreased their vocabulary on multiple choice

test ($t=3.11$, $p<0.05$), picture matching test ($t=3.46$, $p<0.05$) and L1 matching test ($t=2.48$, $p<0.05$). Therefore, it can be said that L1+picture group showed a considerable decrease in the amount of target vocabulary in all of the three tests.

The last paired t-test was performed on L2+Picture group to identify retention effects for L2+picture group. Table 4.10 presents the result of t-test of immediate and delayed post tests of L2+picture group.

Table 4.10. Paired t-test Results for L2 + Picture Group

Group	Tests	n	$\bar{x}$	sd	t	p
L2 + Picture Group	Multiple Choice Test	Immediate Post	20	5,00	2,05	
		Delayed Post	20	4,05	2,31	1,71 0,10
	Picture Matching Test	Immediate Post	20	3,10	2,34	
		Delayed Post	20	2,70	1,92	0,80 0,43
	L1 Matching Test	Immediate Post	20	3,25	2,53	
		Delayed Post	20	3,35	2,03	-0,17 0,87

As can be seen from the table, there is no significant difference in multiple choice test ($t=1.71$, $p>0.05$), picture matching test ($t=0.80$, $p>0.05$) and L1 matching test ($t=0.87$, $p>0.05$). t-test did not compute any significant difference considering the three tests. We may infer from these results that L2+Picture is the only group that does not show any significant difference in vocabulary loss of two weeks time.

4.5. Research Question 4: Do subjects' total click scores on target items and their post tests scores show any correlations?

This section provides statistical information on whether there is any correlation between subjects' total clicks of target words and their post test outcomes. Each subjects immediate post test mean scores were calculated. Pearson correlation was conducted on each

subjects immediate vocabulary tests and their total click scores. The same procedure was applied to each subject's delayed post tests and their total clicks.

Table 4.11. shows the mean scores and standard deviations of subjects' total clicks and overall vocabulary mean scores and standard deviations of their post tests along with their correlations and p values.

Table 4.11 Correlation results for Total clicks of target words and subjects' post test outcomes

Group	Total Click	Immediate Post Test			Delayed Post Test		
		$\bar{x}$	sd	p	$\bar{x}$	sd	p
L1 Gloss	33,62	4,14	2,09	0.33	3,27	2,14	0.44
L2 Gloss	39.47	5,05	2,87	0.05	4,23	2,97	0.13
L1 + Picture	38.05	3,78	1,84	0.82	3,37	1,88	0.33
L2 + Picture	36.11	5,39	1,84	0.18	3,79	1,92	0.47

No correlation was found between subjects' total clicks and their post tests. The correlation results of L1 group showed that there was no correlation between subjects' total clicks and their immediate post test scores ($r=0,22$, $p>0.05$) and delayed post test scores ($r=0,44$, $p>0.05$).

Similarly, the correlation results for L2 gloss group revealed that there was no correlation between subjects' total clicks and their immediate post test scores ($r=0,46$, $p>0.05$) and delayed post test scores ($r=0,36$, $p>0.05$).

The correlation results for L1 + Picture gloss group revealed that there was no correlation between subjects' total clicks and their immediate post test scores ($r= -0,05$, $p>0.05$) and delayed post test scores ($r= -0,23$, $p>0.05$).

The correlation results for L2 + Picture gloss group revealed that there was no correlation between subjects' total clicks and their immediate post test scores ($r = 0,32$, $p > 0.05$) and delayed post test scores ($r = -0,01$, $p > 0.05$).

We may infer from these results that during reading a computerised text with glosses, the more click on a word does not lead to more vocabulary learning, or visa versa.

4.5. Conclusion

The results indicated that L1 (no picture) group outperformed L2 (no picture) group significantly on immediate post tests as well as on delayed post tests. No differences were found between the groups that received no picture glosses and the groups that received picture glosses. L1 and L2 gloss groups declined their vocabulary scores significantly in multiple choice test. L1+picture group is the only group which showed a significant decrease in the amount of vocabulary in all of the three tests. L2+picture group is the only group which did not show any significant decrease in retention. Moreover, subjects' total clicks on target items and their post tests outcomes did not show any correlation.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1. Introduction

The present study investigated the effects of computer assisted vocabulary gloss use (L1 gloss, L2 gloss, L1+Picture gloss, L2+Picture gloss) on Turkish highschool students' immediate and delayed vocabulary recognition. Whether there was a significant difference between L1 gloss and L2 gloss was investigated. Moreover, the effect of picture gloss use on recognition tests compared to no picture gloss use was examined. Additionally, it investigated the retention effects of L1 gloss, L2 gloss, L1+picture gloss and L2+picture gloss. Finally, the study also investigated whether there is a relationship between subjects' total clicks on vocabulary items and their post test outcomes.

This final chapter will interpret the results referring to each research question, explain the possible reasons for the results, and make references to findings of previous studies in the light of Generative Theory of Multimedia Learning.

5.2 Discussion

The first research question looked whether there was an interaction between L1 gloss and L2 gloss in terms of their post test scores. Both the immediate and delayed post tests revealed significant differences between the two types of glosses. L1 gloss group learnt significantly more vocabulary items than L2 gloss group. The results of the present study were consistent with findings of previous studies (Chen, 2002; Lyman-Hager and Davis, 1996; Spahiu, 2000). However, this study did not correspond with the study that Yoshii (2006) conducted. He did not find any significant difference between the two glosses. In his study, Yoshii used two types of tests: definition-supply test (participants supplied the meanings of

the target words in their native language- Japanese) and recognition test (participants selected the correct definition of a given word from four choices in L2). The different test types might have been an important variable in achieving different results since the present study focused only on recognition tests whereas the tasks that Joshii applicated are both recognition and production tests.

Additionally, another explanation for the different results of L1 gloss over L2 gloss may be explained in terms of habitude of learning styles, the way of how the students in this study process reading. The subjects in this study are from Turkey and it may be possible that students in this country may favor or have been trained to use bottom-up processing: reading a foreign language text with a focus on vocabulary rather than top-down processing: focusing more on comprehension of the text as a whole rather than knowing each vocabulary in the text. We can not, at this point, be certain which reading process the subjects favored (this study was not designed to do so).

In their study, Lyman-Hager and Davis (1996:62) identified that “the key factor in understanding the passage was accessing word meanings in their native language”. So the L1 gloss in this study might have helped them to better understand the text than L2 gloss. The role of accessing to target words in L1 glosses might have led them to reach significantly higher level of target vocabulary outcomes. Hence, this seems conflicting when we consider that L1 should not be used in L2 classrooms because learners need L2 input to understand target language.

The second research question compared the picture glosses with no picture glosses in terms of immediate and delayed post tests. The results did not imply significant differences between picture glosses and no picture glosses for both immediate and delayed post tests because students recognized vocabulary equally well, regardless of their gloss types. Thus, this study failed to support Generative Theory of Multimedia Learning particularly for the

dual-channel assumption which suggests that it is better to present an explanation in words and visuals than only in words. This result corresponded with the study of Jones (2004). They found no significant difference between definition only group and definition + picture group. The tests that student took after reading was testing retention skills.

The findings of this study did not correlate with findings of other studies regarding visual glosses and no visual glosses (Akbulut, 2007; Yoshii, 2006; Yoshii and Flaitz, 2002). The reason to obtain different results might be that these studies used both recognition and production tests in their studies. The production of words is much more difficult than retrieving the words (Cariana and Lee, 2001). This different result may show that visual support for definitions may not vary when the aim is retention.

Another explanation for the reason why picture gloss groups did not significantly outperform no picture gloss groups in learning vocabulary can be explained by that the subjects in this study might not be accustomed to learn effectively using visual and verbal channels together. They may have looked at the pictures only and tried to understand the words without deliberately paying attention to the given definition (L1 or L2) just above the picture. In other words, subjects may have stored only one type of information, the pictures, to their visual channel ignoring the verbal channel and therefore might be unable to construct and integrate visual and verbal representations. The lack of this learning behavior might have prevented them to make referential connections between the verbal and visual channels.

The results, where picture glosses did not significantly show advances over no-picture glosses, might be explained by that, the definitions of target words were presented visually (on screen) due to laboratory conditions. The definition of target words could not be given via auditory. We might have obtained different results when the definitions were presented auditorially. Generative theory of multimedia (Mayer, 2003) points out that when information in different presentation modes are perceived through the same channel (in this case 'visual

channel'), then the learner may experience working memory load. In the present study two presentation modes are used: verbal mode (definitions) and visual mode (pictures) using the same channel (visual channel not auditory channel). According to Moreno (2001:249), learners have to "split attention between both types of information" for meaningful learning to occur. He suggests that words should be presented auditorially (especially when visual and verbal information are presented simultaneously) rather than visually so that the two presentation modes do not compete with each other. Otherwise, he reveals, it serves back as limited capacity in visual channel because if it occurs only visually without a balance with auditory channel, then working memory will be overloaded. Therefore, presenting both pictures and definitions visually on screen during reading, might have caused overload on visual channel and that may be why we have not found significant differences between the no picture and picture glosses. Similar result was observed regarding the overload of visual channel by Şakar and Erçetin (2004). The subjects in their study preferred to use visual glosses more frequently than definitions. Negative correlation was found between subjects' click on words and their reading comprehension. They revealed that the visual glosses hindered students' reading processes. They stated that the subjects in their study retrieved verbal information from the text (reading the text through the eyes by using visual representation) and visual information from pictures or videos and therefore the subjects' visual channel was overloaded. They concluded that multimedia may have negative impacts when a single channel is overloaded.

Another result we have obtained from this study is that the L1 picture group and L2 picture group showed no significant differences in both immediate and delayed post tests. However, when the mean scores of both groups were taken into account L2 picture group tend to gain more advantage from pictures than L1 picture group. This result was consistent with the result of Yoshii (2006). The study Yoshii (2006) conducted on Japanese students also

showed that L2 group tend to benefit more from pictures than L1 gloss group. Yoshii (2006) explains this result as the nature of combining definition and picture cues. According to him, the pictorial glosses reflected the meaning of concrete verbs, and the L1 glosses were so clear for subjects to understand the target words that they may feel that supplementary pictures were not necessary. Thus, he concluded that adding pictures to L1 glosses might not have triggered more in understanding the meaning of new words. However, in the case of L2 glosses, he revealed that L2 gloss without pictures may not have been understood as much as L1 gloss and as a consequence, the pictures added to the L2 gloss might have helped to enrich the learning of new words. This study also found ground for this explanation.

The third research question examined whether L1 gloss, L2 gloss, L1+Picture gloss and L2+Picture gloss groups show different patterns of retention over time. L1 (no picture) gloss and L2 (no picture) gloss showed similar retention decline in which both revealed significant vocabulary loss in multiple choice test. The vocabulary decline for the picture matching test and L1 matching test for both groups were not significant. L1+Picture group decreased their vocabulary scores significantly in all of the three tests. On the other hand, L2+Picture showed no significant vocabulary loss in all of the three tests. The similar retention results for L1 (no picture) and L2 (no picture) glosses can be explained that both of the groups did not have access to picture glosses. In both groups, multiple choice test revealed the most vocabulary loss. This result is not surprising since multiple choice test was easier for subjects to perform than picture matching test and L1 matching test immediately after the experiment. Students chose the right answer from out of four options in multiple choice test. However for L1 matching test and picture matching test, they had to choose one out of seventeen options. They received their highest scores from multiple choice test in immediate test and in parallel the most forgetting rate of the tests was again their multiple choice test in delayed test. The long term effect of L1+Picture group is disappointing. This group achieved

the highest mean scores from immediate post tests compared to the other groups. However, it is again this group which showed the most decrease in retention. It seems that the more a subject learns with L1+picture glosses the more he/she forgets. On the other hand, L2+picture group is the only group which did not show any retention effects. In this case, it seems that the more a subject learns with L2 +picture group the better he/she remembers the words.

The last research question examined whether subjects' total click scores on target items and their post tests showed any correlations. The results indicated no interaction between subjects' click scores and their post test scores. This result is consistent with other studies (Chun and Plass, 1996; Elke, 2007; Knight, 1994; Laufer and Hill, 2000). It seems that the more click on a word does not necessarily lead to vocabulary learning. What matters is how someone processes the information. Additionally, we do not know whether subjects clicked on words to access to meaning of words exclusively. Roby (1999) emphasizes that 'click Happy' behavior (excessive clicking on target words) should be discouraged among subjects. There will be diligent participants who may click continual to discover what will happen. However, there is no research that investigated click happy behavior and the way on how it can be discouraged as far as the researcher knows.

5.3. Conclusion

The present study investigated the effectiveness of computerized L1 (no picture) gloss over L2 (no picture) gloss on recognition of eleven unknown vocabulary items. We found L1 gloss to be more effective than L2 gloss regarding vocabulary learning during reading a foreign language text. This result is in line with findings of previous research (Chen, 2002; Lyman-Hager and Davis, 1996; Spahi, 2000). This study favors L1 gloss to L2 gloss when the glosses do not include any pictures. When pictures are not taken into account, it might be worthy to present gloss information via native language since they learn more vocabulary in

this way. These are results we obtained from no picture glosses. We further investigated the picture glosses.

Multimedia, especially definitions and pictures may facilitate vocabulary learning in foreign language reading texts. Such presentations can provide information about target vocabulary in a reading text and can help readers to learn and visualize the unknown words which may lead to dual code the information via verbal and visual channel. This study failed to reveal significant differences between the picture and no picture glosses. Moreover, the study also found no difference between L1+picture group and L2+picture group. The students in this study might not have fully exploited the available recourses that multimedia offered. As Mayer and Moreno (2003) states, some learners may not benefit from multimedia. Multimedia can present rich information through images and this may lead to a reliance and increased attention to pictures rather than both definitions and pictures.

The present study investigated the retention effects of different gloss types on recognition. We found out that L1 (no picture) gloss and L2 (no picture) gloss decreased their scores in multiple choice test. The other two tests were not significant. L1+picture group was the only group that showed a significant decrease in all of the three tests. On the other hand, L2+picture group was the only group which did not show any retention effects of all of the three recognition tests.

Finally, we investigated the relationship between students' total clicks on the target words and their immediate and delayed post tests. We aimed to find out if there were any interactions between their clicks on the words and their post test outcomes. We obtained no correlation between their total clicks and their vocabulary scores.

5.4. Implications of the study

High school students learning English as a foreign language in Turkey who had seven years of English previously, were more successful in learning vocabulary during reading a computerized text when they had access to L1 glosses rather than L2 glosses. Although literature in EFL stresses the importance to use L2 in the classroom, this study reveals positive attitude towards L1 gloss use during reading a computerized text. However, when it is the case of using pictures in the glosses this may not be recommended.

Pictures added to glosses to provide additional aids to comprehend the target words better, did not indicate any significant differences. Therefore, the pictures added to glosses may not necessarily facilitate vocabulary learning. When retention is taken into account, L2+picture group did not reveal any retention effects. However, L1+picture group decreased their scores significantly. Students should be trained previously on how they can best benefit using glosses, on how to access to different glosses and on how to make referential connections between visual and verbal connections. Only when students acquire necessary skills, especially on how to manage verbal and visual aids, presenting glosses via L2+picture can facilitate effective vocabulary learning during reading a computerized text since L2+picture gloss tends to face retention effects whereas L1+picture does not.

Computerized glosses should include tracking devices that record each student's look-up behavior. With such a device the instructors can examine students' look up behavior whether they accessed to glosses or not. In the case when any interaction reveals, which was not the case in this study, instructors can examine the relationship of students click on words and their vocabulary outcomes which can show whether more/less click on words leads to better vocabulary learning and can supervise their students accordingly.

5.5 Suggestions for further research

This study is conducted on high school subjects who had seven years of English previously. A study on different age groups can be conducted to see whether the different gloss types may have different effects on them. Moreover, this study did not consider the proficiency levels of learners, a replication of this study can be applied to students from different proficiency levels to find out whether the different glosses show different effectiveness regarding proficiency level.

A study which provides training on how to use verbal and visual glosses effectively can be designed that can find out which type of gloss L1+picture or L2+picture is more effective in vocabulary learning during reading. Pre and post tests may reveal important findings regarding this field.

Consequently, another research investigating subjects' preferences of glosses during reading a computerized text can be suggested. This may shed light what glosses the subjects prefer during reading which may help to design glosses according to the subjects' needs.

5.6. Limitations of the study

Several limitations have been identified in this study, therefore, study findings should be taken into account accordingly.

First, this study is applied on high school subjects who had seven years of English instruction previously. Therefore, the results of the study can not be generalized to other EFL learners.

Second, subjects exhibited non-traditional classroom setting, but were tested with traditional testing procedures in this study. The tests were not given on screen and this may have effected the results especially for Picture Test. Computer screen might have reflected the pictures better than on print.

Third, this study investigated retention effects over two-week time due to time considerations. A study that examines retention effect over a longer time may provide more reasonable results.

Fourth, learning styles may be a factor that might effect students' interaction with computerized glosses. This factor was not investigated in this study which may effect the performance on post test outcomes.

Fifth, longitudinal studies would provide more valid insights on the effectiveness on different types of glosses.

Sixth, a comparison with a control group which did not have access to glosses might have brought some insight on the effectiveness of glosses.

As the last but not least limitation, we can say that focusing on verbs might have affected the results of the study. That is, since verbs are more difficult to illustrate than concrete nouns, students might have found them more difficult to learn. A future study with other parts of speech needs investigating.

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APPENDIX A – Reading Text

"A SCARY NIGHT " ¹

"It's a cold winter night. It's midnight, and it's very quiet. I'm still awake and studying. I have a test tomorrow. I need to read two chapters. I finish one chapter and I read the next chapter. It's too difficult. I can't pass the test. What do I do? Shall I keep studying? Can I take the test some other time? Shall I give up? I'm **pondering** many things. I think my head is going to **burst**.

Suddenly, some noise **startles** me. Something **shattered** on the ground. I look at the window. Wait! What is that? I see a light across the street. It is from a new house. It's strange. Mr. & Mrs. Smith are on vacation now. They asked me to **rake** the lawn for them while they're gone. Nobody should be there. Oh, I see the light again.

Then, it **dawns on** me. Someone is **burglarizing** the house. I'm afraid. What do I do now? I have to call the police. I **dash** to the phone and call the police.

After ten minutes, the police arrive. They enter the house. As the police search the house, someone hides outside the house. The police **yell**, "Stop, right there!" But the man with a black mask runs into the woods near the house. Then, he **tumbles down** the hill in the woods. The police finally catch him. The police take off the mask. He **grins** first, then, starts to **sob**.

Two policemen come to my apartment. The first one looks very serious. He doesn't greet me. He just asks for my name. Then, he says, "Thank you for calling us about this problem." The other one is friendlier. He **inquires** about a couple of things. He wants to know when I first saw the light. He **scribbles** some notes.

The policemen are gone, and everything is quiet now. What a strange night! I'm glad this is over, but I am still **shivering** a little. So I pour some milk. This might help me. I can't study any longer and can't sleep right away.

I decide to read a book. I got it at a bookstore yesterday. The title is "American Short Stories." I look at the first chapter. And I **gape** at the title. It says, "My Life as a Burglar" by A Man with a Black Mask.

¹ The text contains 390 word

APPENDIX B- Glossary of L1 Group

Ponder : düşünmek.

Burst : patlamak. dolup taşmak.

Shattered : kırılmak, darma dağın olmak, parçalanmak.

Rake : tırmıklamak. tırmıkla düzeltmek.

Dawn on : anlamak ; farkına varmak

Dash : hızlı hareket etmek, acele etmek

Tumble down: düşmek. yuvarlanmak

Grin: sırıtmak

Sob: hıçkırığa hıçkırığa ağlamak.

Inquire: bir konu hakkında soru sormak, tahkikat yapmak,

Gape: hayretten ağzı açık kalmak

APPENDIX C- Glossary of L2 Group

Ponder : to think or consider especially quietly, soberly, and deeply

Burst : to give way from an excess of emotion ; to be about to explode

Shattered : to cause to drop or be dispersed.

Rake : to gather, draw, or remove leaves with an instrument

Dawn on : Become evident or understood,

Dash : to move with sudden speed

Tumble down: to fall suddenly and helplessly

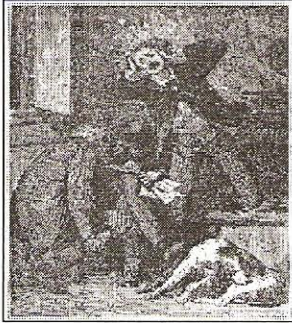
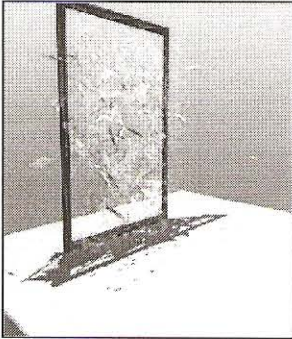
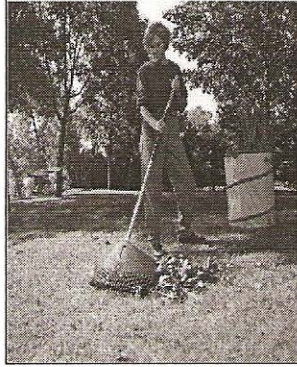
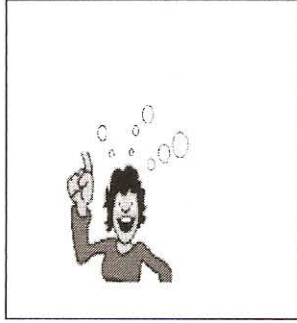
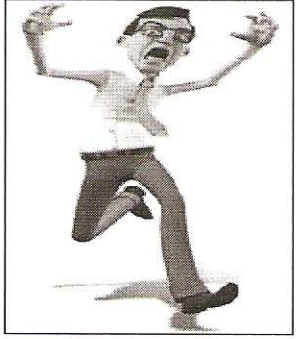
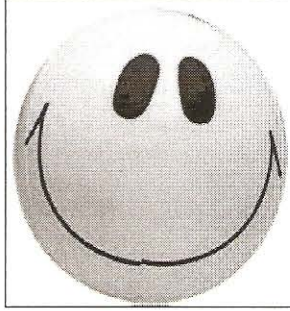
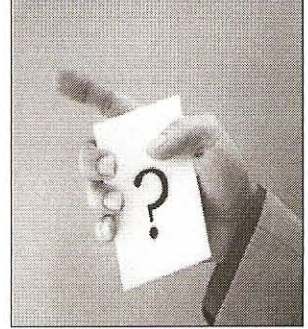
Grin: to smile; to draw back the lips so as to show the teeth especially in amusement or laughter

Sob: to cry or weep out loudly

Inquire: to ask a question about something

Gape: to look in openmouthed surprise or wonder

APPENDIX D- Glossary of L1 plus Picture Group

Ponder : düşünmek.**Burst :** patlamak.
dolup taşmak.**Shattered :** kırılmak,
darma dağın olmak,
parçalanmak.**Rake :** tırmıklamak.
tırmıkla düzeltmek.**Dawn on :** anlamak ;
farkına varmak**Dash :** hızlı koşma.
atılma**Tumble down:**
düşmek. yuvarlanmak**Grin:** sırıtmak**Sob:** hıçkırır hıçkırır
ağlamak.**Inquire:** bir konu
hakkında soru sormak,
tahkikat yapmak,**Gape:** hayretten ağzı
açık kalmak

APPENDIX E- Glossary of L2 plus Picture Group

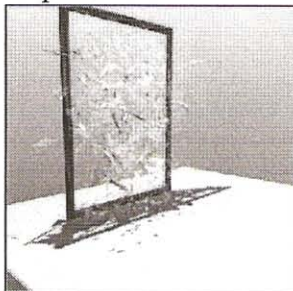
Ponder : to think or consider especially quietly, soberly, and deeply



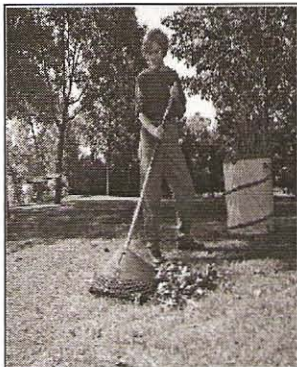
Burst : to give way from an excess of emotion ; to be about to explode



Shattered : to cause to drop or be dispersed.



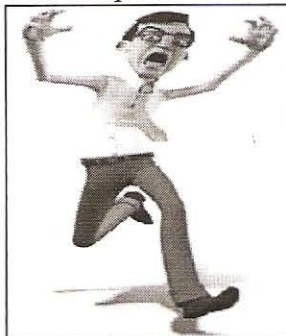
Rake : to gather, draw, or remove leaves with an instrument



Dawn on : Become evident or understood,



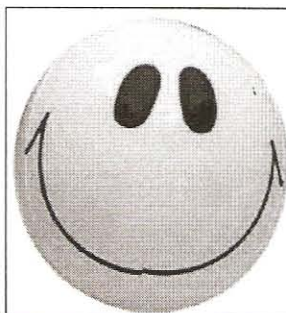
Dash : to move with sudden speed



Tumble down: to fall suddenly and helplessly



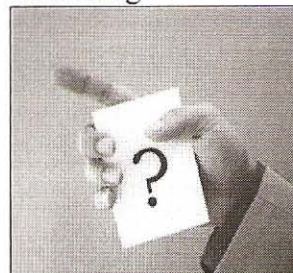
Grin: to smile; to draw back the lips so as to show the teeth especially in amusement or laughter



Sob: to cry or weep out loudly



Inquire: to ask a question about something



Gape: to look in openmouthed surprise or wonder



APPENDIX F **Name & Number:**

MULTIPLE CHOICE TEST **Class:**

(Post and Delayed Post Test)

- | | |
|-----------|--|
| 1. ponder | ☐ To study for a test
☐ To think very carefully
☐ To read something
☐ To break open suddenly
☐ I don't know |
|-----------|--|

- | | |
|----------|---|
| 2. burst | ☐ To fight with someone
☐ To reject studying
☐ To explode
☐ To harm someone
☐ I don't know |
|----------|---|

- | | |
|------------|---|
| 3. shatter | ☐ To surprise someone
☐ To fall suddenly
☐ To break something into pieces
☐ To look outside
☐ I don't know |
|------------|---|

- | | |
|---------|--|
| 4. rake | ☐ To spoil an event
☐ To gather, or remove leaves with an implement
☐ To get very nervous
☐ To investigate a house
☐ I don't know |
|---------|--|

- | | |
|------------|---|
| 5. dawn on | ☐ To become understood, evident
☐ To go downstairs
☐ To get very angry
☐ To cause to decrease
☐ I don't know |
|------------|---|

- | | |
|---------|--|
| 6. dash | ☐ To to move with sudden speed
☐ To cry out loudly
☐ To fell down suddenly
☐ To arrive somewhere
☐ I don't know |
|---------|--|

- | | | |
|----------------|--------------------------|--------------------------|
| 7. tumble down | ☐ | To cause to decrease |
| | ☐ | To write down carelessly |
| | ☐ | To fell down suddenly |
| | ☐ | To look seriously |
| | ☐ | I don't know |

- | | | |
|---------|--------------------------|--------------------------|
| 8. grin | ☐ | To thank to someone |
| | ☐ | To request information |
| | ☐ | To hide behind something |
| | ☐ | To have a big smile |
| | ☐ | I don't know |

- | | | |
|--------|--------------------------|----------------------|
| 9. sob | ☐ | To cry loudly |
| | ☐ | To criticise someone |
| | ☐ | To smile friendly |
| | ☐ | To begin with |
| | ☐ | I don't know |

- | | | |
|-------------|--------------------------|-----------------------------|
| 10. inquire | ☐ | To believe in something |
| | ☐ | To injure someone |
| | ☐ | To consider someone guilty |
| | ☐ | To ask questions to someone |
| | ☐ | I don't know |

- | | | |
|----------|--------------------------|--------------------------------------|
| 11. gape | ☐ | To open the mouth wide in a surprise |
| | ☐ | To get very angry |
| | ☐ | To laugh loudly |
| | ☐ | To shake from cold or fear |
| | ☐ | I don't know |

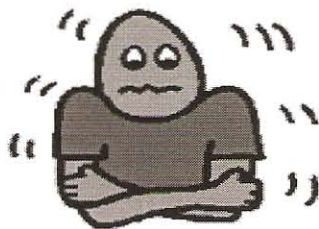
APPENDIX G
PICTURE MATCHING TEST
(Post and Delayed Post Test)

Name & Number:

- | | | | | |
|--------------------|---------------|----------------------|---------------|--------------------|
| 1. shattered | 2. rake | 3. tumble down | 4. gape..... | 5. burst..... |
| 6. dash..... | 7. sob | 8. pondering | 9. grins..... | 10. Inquires |
| 11. dawns on..... | | | | |



A)



B)



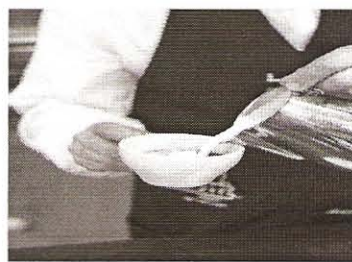
C)



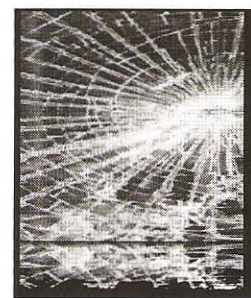
D)



E)



F)



G)



H)



I)



J)



K)



L)



M)



N)



O)



P)

APPENDIX H

L1 MATCHING TEST
(Post and Delayed Post Test)

Name & Number:.....

Class:

Match Column A with Column B

 A

1. gape
2. dash
3. inquires
4. rake
5. burst
6. dawns on
7. sob
8. tumble down
9. pondering
10. grin
11. shattered

Your answers here
 please:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.

 B

- a. düşünmek,
to think quietly
- b. bir yere çıkmak, tırmanmak,
to climb
- c. dökmek
- d. sırtmak
- e. hıçkırma hıçkırma ağlamak,
- f. patlamak, dolup taşmak,
- g. terlemek,
- h. bir konuyla ilgili soru
sormak,
- i. bir kişinin cüzdanını
çalmak,
- j. hayretten ağzı açık kalmak,
- k. anlamak, farkına varmak,
- l. kırılmak, darma dağın
olmak,
- m. toprağa bitki dikmek
- n. hızlı koşmak, atılmak
- o. düşmek, yuvarlanmak
- p. tırmıklamak, tırmıkla
düzeltmek
- q. gözlerini kapamak,