THE IMPACTS OF BRAIN-BASED VOCABULARY TEACHING ON YOUNG ADULTS

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MASTER OF ARTS THESIS

Department of Foreign Language Education
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İstanbul
T.C. Maltepe University
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JÜRİ VE ENSTİTÜ ONAYI

Bu belge, Yükseköğretim Kurulu tarafından 19.01.2021 tarihli "Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge" ile bildirilen 6689 Sayılı Kişisel Verilerin Korunması Kanunu kapsamında gizlenmiştir.

ETİK İLKE VE KURALLARA UYUM BEYANI

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DEDICATION

I am grateful to my thesis advisor Asst. Prof. Hakan Dilman for his benevolent support, educative feedback, and positive reinforcement. I am considering myself extremely lucky as I could find the chance to have conducted this research together with him.

I would also like to thank all my committee members for their considerate opinions and useful advice.

I must express my feelings about my father, Hasret and my mother, Dilek as well. I am thankful to you for contributing to me to become who I am.

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ÖZ

BEYİN TEMELLİ KELİME ÖĞRETİMİNİN GENÇ YETİŞKİNLER ÜZERİNDEKİ ETKİLERİ

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Yüksek Lisans Tezi
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İngiliz Dili Eğitimi Yüksek Lisans Programı
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Maltepe Üniversitesi Lisansüstü Eğitim Enstitüsü, 2022

Bu çalışmada Beyin Temelli Kelime Öğretiminin genç yetişkinler üzerindeki etkileri incelenmiştir.

İnceleme, yabancı dil olarak İngilizce öğreten 100 öğretmenin sınıflarda kelime öğretimi için tercih ettikleri uygulamaların belirlenmesiyle başlamıştır. Yapılan tespitlere göre öğretmenlerin, öğrencilerin anadilinin temel alındığı uygulamaları kullanmaya eğilimli oldukları belirlenmiştir.

Sonraki aşamada, Bloom'un Taksonomisi ve Jensen'in Beyin Temelli Öğrenme Modeli arasındaki örtüşme, Zihinsel Sözlük ve Kelime Öğrenme Varsayımları kuramsal alt yapısına oturtularak, 10 adet beyin temelli kelime öğretimi uygulaması geliştirilmiştir. Bu uygulamalar 10 hafta boyunca, Sancaktepe Teknoloji Anadolu İmam Hatip Lisesi'nde bulunan 14 öğrenciye uygulanmıştır. Geleneksel kelime öğretimi uygulamaları ve 100 öğretmen tarafından en çok tercih edilen uygulamalar da düzey olarak benzeşik olan ve diğer sınıfta bulunan 14 öğrenciye uygulanmıştır. Söz konusu iki grup arasındaki kelime öğrenme düzeyleri karşılaştırılmıştır. Ön test, son test ve kalıcılık testi sonuçlarına göre, beyin temelli kelime öğretimi uygulamaları ile kelime öğretilen sınıfta bulunan öğrencilerin kelimeleri öğrenme, hatırlama ve kullanmada diğer grupta bulunan öğrencilere kıyasla daha başarılı oldukları ortaya çıkmıştır.

Araştırmanın son aşamasında ise beyin temelli kelime öğretimi uygulamaları yapılan sınıfta bulunan öğrencilerin ilk hafta ve son haftadaki birer dersleri kamera kaydına alınmıştır. Bu kamera kayıtları bir psikolojik danışman ve psikolog eşliğinde izlenip, öğrencilerin davranışları betimleyici analiz ile yorumlanarak, söz konusu öğrencilerin duygu ve motivasyon düzeylerini gösteren bulgular elde edilmiştir. Videolardan elde edilen bilgilere göre, beyin temelli kelime öğretimi yapılan sınıfta bulunan öğrenciler aktivitelere katılma, dikkatini ders boyu sürdürme ve genel sınıf atmosferi konularında pozitif tutum sergilemişlerdir.

Anahtar Sözcükler: 1. Yabancı Dil Öğretimi, 2. İngilizce Öğretimi, 3. Sözcük Öğretimi, 4. Beyin Temelli Öğrenme, 5. Beyin Temelli Öğretim, 6. Bloom Taksonomisi

ABSTRACT

THE IMPACTS OF BRAIN-BASED VOCABULARY TEACHING ON YOUNG ADULTS

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Master's Thesis
Department of Foreign Language Education
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Thesis Advisor: Asst. Prof. Hakan Dilman
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In this study, the effects of Brain-Based Vocabulary Teaching on young adults were examined.
The research began by identifying the preferred practices of 100 teachers of English as a foreign language for teaching vocabulary in classrooms. According to the findings, it was determined that teachers tend to use applications based on the mother tongue of the students.
In the next stage, 10 brain-based vocabulary teaching practices were developed by taking the correspondence between Bloom's Taxonomy and Jensen's Brain-Based Teaching Model on the theoretical basis of Mental Lexicon and Word Learning Assumptions into consideration. These practices were applied to 14 students in Sancaktepe Technology Anatolian Imam Hatip High School for 10 weeks. Traditional vocabulary teaching practices and the most preferred practices by 100 teachers were also applied to 14 students who were similar in level and were in the other class. Vocabulary learning levels between the two groups in question were compared. According to the results of the pre-test, post-test and retention test, it was revealed that the students in the classroom where vocabulary was taught with brain-based vocabulary teaching practices were more successful in learning, remembering and using words compared to the students in the other group.
In the last stage of the research, the first and last week lessons of the students in the classroom where brain-based vocabulary teaching practices were applied were recorded on camera. These camera recordings were watched in the company of a psychological counselor and psychologist, and the behaviors of the students were interpreted with descriptive analysis, and the emotional and motivational outcomes of the students in question were obtained. According to the information obtained from the videos, the students in the classroom with brain-based vocabulary teaching showed positive attitudes towards participating in activities, sustaining their attention throughout the lesson, and general classroom atmosphere.

Keywords: 1. Foreign Language Teaching, 2. English Language Teaching, 3. Vocabulary Teaching, 4. Brain-Based Learning, 5. Brain-Based Teaching, 6- Bloom's Taxonomy

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ABBREVIATIONS

EFL **:** English as Foreign Language

BBL **:** Brain-Based Learning

LGS **:** Liselere Giriş Sınavı

L1 **:** Mother tongue

L2 **:** An additional Language

LTP : Long-Term Potentiation

1. INTRODUCTION

Humanity initiated civilization. It all starts with humans, and they are actively in the process since the beginning of the history. Everything has been changed through the active roles that humans took over the course of history. They have made these changes thanks to their ideas, efforts and emotions. To convey the ideas and emotions, at first, they used only meaningless sounds. However, when human needs were expanded, in other words, when there was a lot to understand and talk about, languages emerged. They are the primary units of the human history as they help humans to transfer knowledge, idea, and emotion.

Languages reflected the culture, lifestyle and feelings of a certain civilization. One who wishes to know more about the world needs to learn about the culture, lifestyle and feelings of other people in the world. To be able to do that, he or she needs to learn the language of the people he or she wishes to know more about. Language is composed of sounds. These sounds come together to make words. Words are combined to make sentences and sentences to paragraphs and so on.

In essence, it can be said that words are one of the most important points of the language as they represent ideas, efforts and emotions. To be able to know the words of a language, there are many ways that can be followed. Memorizing them by repeating, writing them for multiple times, listing them and reading the lists regularly to memorize and so on. These have problems in themselves. However, the brain makes the difference and any kind of learning that is constructed within the framework of the brain's learning principles will reach to success. This study will enlighten academical and emotional impacts of Brain-Based Vocabulary Teaching on young adult learners.

The start of the study will discuss introduction, background to the study, statement of the problem, significance of the study, assumptions, limitations, research questions and definitions of the terms used.

1.1 Background to the Study

Words in a language are described as the vocabulary of that language (McCarthy, 1990). Vocabulary is regarded as one of the significant components of a language. It can be seen as bricks to construct a building since vocabulary helps someone build language. “No matter how well the student learns grammar, no matter how successfully the sounds of L2 are mastered, without words to express a wide range of meanings, communication in an L2 just cannot happen in any meaningful way” (McCarthy,1990, p.9). That is why vocabulary knowledge is particularly important for a person to express himself and comprehend the messages in a language effectively. In other words, vocabulary can be likened to seeds used to sow fields – without the seeds, the crops will not grow. Without vocabulary, people cannot communicate.

Vocabulary encompasses the words in a language, however, there were discrepancies about what could be counted as vocabulary. Is it the words one by one? Or word groups and collocations? How can a person’s vocabulary size be measured? Is it possible to count every word that someone knows? To answer these questions, Nation and Read (1990) did research and they determined the impossibility of counting words one by one as they contain their derivative and inflected forms. So, they decided to categorize the words into word families. Exactly when words are gathered into world families including a base word, bended designs and clear inductions, Webster's Third Edition has around 54,000-word families (Nation & Read, 1990). This shows the difficulty of expressing vocabulary knowledge as there are too many word families in a language. They continued their research to understand and facilitate the understanding of the description of vocabulary size and asked the question of what is a native speaker’s vocabulary size? They found that a native speaker’s vocabulary size is around 20,000 world families. On the other hand, the vocabulary size of a second language learner for him to understand and convey messages in language was detected as at least 3,000- and 5,000-word families by these scholars. In the light of this information, it can be suggested that words should be comprehended in their families rather than isolated units and the amount of word families someone must know to use that language should be at least 3,000.To be able to understand what vocabulary is, it is not enough just to know the size of vocabulary someone must know in order to use the target language, but the description of knowing a word should

be understood as well. Therefore, it is crucial to understand what it means to know a word. Knowing a word refers to the ability to distinguish and recall the word from memory and it also means knowing the word's pronunciation, the word's meaning, its grammatical class and syntactic constraints, its collocations and syntagmatic associations, its lexical and conceptual associations, and its frequency of usage in a language (Nation et.al., 1990).

As it can be understood from these, knowing a word includes not only the meaning of it, but also some other components such as form, pronunciation, grammatical behavior, collocations, conceptual associations, and frequency. Hence, teaching vocabulary should take these aspects into consideration when designing any practices, tests and plans.

Language teachers have certain preferences such as giving bilingual word lists, having students memorize the target vocabulary by repeating or getting students to write multiple times to teach vocabulary. Additionally, they often prefer giving those lists including short definitions or L1 equivalents of the words, however, these lists may not work as expected since it would be quite difficult for students to remember those words after a certain period of time passed. The situation is the same when a teacher gives a reading passage and asks them to translate it into L1 (McCarthy, 1990).

However, in order for language users to learn new vocabulary, store, retrieve and use it when necessary, vocabulary should be taught in an integral way which will facilitate these processes and constitute permanent learning. The way to fulfill the requirements of an integral vocabulary teaching is to adapt it to the working principles of the brain. Since the brain is where learning happens just as breathing happens in lungs, seeing happens in eyes and hearing happens in ears. To understand the working principles of the brain with special reference to vocabulary teaching, there are a few questions that need to be answered such as how does the brain learn? How does it learn a word? How does it store the words learnt? How can someone learn words in a way that he or she does not have difficulty in storing, retrieving, and using them?

When these questions are posed, there appears to be answers which are helpful for understanding how the brain learns and hence can shed light onto these questions. These are Brain-Based Teaching (Jensen, 1995), Bloom's Taxonomy (Bloom, 1956), Mental

Lexicon (Aitchison, 1987) and Word Learning Assumptions (Markman, 1990). These four theories and how they can contribute to vocabulary teaching are to be discussed in this study. After taking all this theoretical basis into consideration, a Brain-Based Vocabulary Teaching activity checklist is set forth for teachers. This checklist distinguishes Brain-Based Vocabulary Teaching practices from the other vocabulary teaching practices. However, designing practices according to the checklist might not be the ultimate process as one of the most important factors in an educational setting is the characteristics of learners (Somyurek et. al, 2008). The characteristics of learners should be highlighted, and practices need to be designed accordingly. Learner characteristics are significant for teachers as they permit teachers to plan and make customized directions for an addressed classroom (Kirschner & Drachsler, 2012). Because for an activity to address learners' needs, it should be developed regarding the characteristics of learners. Park and Hannafin (1993) stressed that learning conditions can be all around as useful with respect to the degree that they are adjusted to individual student needs.

Every learner is special. However, to be able to identify the characteristics of learners, there are ways to categorize them in terms of their age, personality, ability and learning styles. The idea of categorizing learners into groups according to their characteristics might enable teachers to understand and address their needs (Kirschner & Drachsler, 2012). Among these criteria, age is commonly used one by schools. The same aged learners are put into the same classrooms. In schools, there are preschool, primary school, secondary school, and high school learners. Preschool, primary, and secondary school learners are named as young learners, whereas high school learners are called as young adult learners. In other words, in this study, young adult learners correspond to the learners whose ages differ from 14 to 17. They will be the participants of the study and how brain-based vocabulary teaching affects them both academically and emotionally will be dealt in detail.

Before offering Brain-Based Vocabulary Teaching practices to teachers, the practices that they have been using in the classrooms should be identified. In this way, the strengths and weaknesses of what they have been using in the classrooms will be overviewed and the benefits of using brain-based ones will be featured. For these purposes, 100 teachers participated in a questionnaire which is designed by this study and in which teachers are

asked what practices they have been using to teach vocabulary. The number of different practices used by teachers decreased when the age of learners they teach increased. Additionally, when the studies centering around Brain-Based Teaching are analyzed, it has been concluded that there are few studies to suggest Brain-Based vocabulary teaching practices for young adult learners. All these showed the necessity of the fact that there should be brain compatible classroom practices for young adult learners.

1.1.1 What is vocabulary teaching?

Vocabulary teaching is to teach words' meanings, forms, and usages in a language to learners so that they can understand and communicate with the help of them. "Knowing words is the key to understanding and being understood. The bulk of learning a new language consists of learning new words" (Vermeer, 1992). In other words, knowing a lot of words might contribute to a language user to communicate in the target language more effectively and easily. For these reasons, the importance of vocabulary teaching in EFL (English as a foreign language) cannot be underestimated as vocabulary plays an important role in language. "Learning vocabulary is *sine qua non* of language learning" (Chambers, 1999). In the event that students don't comprehend a sizable part of the vocabulary in the language that they are perusing or hearing, then this language is not fathomable and hence cannot be helpful for acquisition (Folse,2004). Thus, language teaching should not be considered as a proper one without integrating vocabulary teaching in it.

Learning a language starts by discriminating sound patterns and trying to discover the words of the language. In order for sounds to make sense, they should be included in a word. It can be said that the richer vocabulary a learner has, it will be easier for him to comprehend and express the messages in a language as words help to make sentences (Aitchison, 1989). Therefore, the importance of vocabulary teaching and how vocabulary of a language is taught cannot be underestimated. For these reasons, this study tries to put forward an effective way of teaching vocabulary by making use of the learning principles of the brain.

There were years of ignoring the importance of vocabulary in language teaching. Vocabulary was not seen necessary when teaching a language. Rather than vocabulary,

grammar, reading and writing stimulated interest in language teaching (Richards, 1976). Additionally, it was thought that traditional vocabulary teaching such as giving bilingual word lists and using rote memorization activities which centered around only the meaning of the words and assuming only limited word knowledge would be enough for a learner. Oxford and Crookall (1990) argued that word lists, particularly including L1 equivalents, are not exceptionally valuable since students probably will not have the option to involve the new words in any open manner without any additional help. Nevertheless, afterwards, vocabulary started to be realized as one of the significant skills in language teaching. "Vocabulary is no longer a victim of discrimination in second language learning research, nor in language teaching. After decades of neglect, lexis is now recognized as central to any language acquisition process, native, or non-native" (Zimmerman, 1997, pp.5-19). Therefore, it can be suggested that without giving importance on vocabulary, teaching a learner only limited words and grammatical structures is like teaching a person how to drive only under sunny weather. Because learners need rich vocabulary to use in different contexts just as drivers need to know more about driving so that they can drive under different conditions.

In essence, it is obvious that the importance of teaching vocabulary cannot be underestimated. However, it is also significant how vocabulary can be taught effectively so that it can be helpful for the ones who try to learn the vocabulary of a language. Now that it is known that the brain is where all types of learning occur, it is best to adapt vocabulary teaching practices within the framework of the brain's working principles. To be able to do so, as a first step, how the brain learns any kind of information should be understood. Then, the brain areas which are responsible for learning need to be pointed out. Next, the role of memory in vocabulary teaching, Bloom's Taxonomy of Cognitive Domain (1956), Brain-Based Teaching (Jensen, 1995), Arbitrariness of Linguistic Sign (Saussure, 1959), Word Learning Assumptions (Markman, 1990) and Mental Lexicon (Aitchison, 1987) ought to be enlightened so that what lies beneath a brain-based vocabulary teaching practice. After all these, the characteristics of the target group, young adult learners and their being regarded as Generation Z in 2022 are put forward so that brain-based vocabulary teaching practices identify the target group and be designed according to the needs of them.

1.1.2 How does the brain learn?

One of the aims of this research is to inspire and enable teachers to design activities for their students by making use of working principles of the brain. In other words, the usage of Brain-Based Approach might be a good idea in classrooms as the brain is where learning occurs. “The brain is like the heart or lungs. Each organ has a natural function. The brain learns because that is its job” (Caine & Caine, 1994, p.3). Brain-Based Learning is the set of practices which center around the brain’s working principles (Jensen, 2000). In order for a teacher to be able to use set of practices centering around the brain, working principles of brain should be comprehended very well. This is possible by understanding what happens in one’s brain when learning takes place.

The brain consists of neurons. Physiologically, these neurons work through electrical impulses provided by neurotransmitters. With the help of these electrical impulses, neurons are fired. However, firing only one neuron would not help the brain learn new information. Instead, it needs to activate and fire more than one neuron and create links between other neurons. There are over one billion neurons in brain. Making connections between them is not an easy process. Jensen (2009) describes learning as the making of connections and neurons’ talking to one another. When it comes to what happens for neurons to talk to each other, in other words, to connect to each other, it can be said that neurons through dendrites, which are the branches of neurons that help them to receive information from another neuron, receive electrical impulse and deliver it into the cell body which is also called soma. If these electrical impulses are strong enough to convey to the other neuron, they are directed to it with the help of axons, which are the ways to connect a neuron to the other, and which are covered with myelin that is a chemical facilitating the travel of electrical impulses, electrical impulses travel along these and reach synapses, which are located in the tips of the axons and which help electrical impulses coming from neuron to be delivered to other neuron (Kemerer, 2011). This process is called as learning.

To understand learning in an easier way, when one sees or hears something, his brain tries to construct meaning, to seek patterns for it and to process it. If it evaluates the input needed to be processed, the brain directs attention on it. The brain assimilates the data of

which it is straightforwardly mindful and to which it is focusing (Jensen, 2009, Caine & Caine, 1990). During learning, the brain processes visual and auditory information. Visual information is gotten through the eyes, when the eyes see something, the light waves, as electrical signs, are passed on to the thalamus and thalamus sends this data to the visual cortex. This data coming from visual cortex is enrolled by primary visual cortex and conveyed by two different ways, dorsal and ventral to be processed. Dorsal way finishes in the parietal lobes to concoct the course of action of development if vital, and ventral way finishes in temporal lobes which perceive and give meaning to the information (Carter et.al., 2009). According to Willis (2008), whilst reading, the brain processes written information in three phases:

"1-Information intake - focusing and attending to the pertinent environmental stimulus,

2-Fluency and vocabulary - associating the words on the page with stored knowledge to bring meaning,

3- Patterning and networking - recognizing familiar patterns"(p.11).

Auditory information is gotten through the ears. At the point when sounds are heard, as vibrations, they are shipped off the cochlear from the ears. These vibrations are changed into electrical signs by the fur cells in the korti organ. Then, at that point, these signs are conveyed to the thalamus by going through the cerebrum stem. Thalamus conveys these messages to the temporal cortex and in auditory cortex, these are deciphered as far as feeling, pitch and cadence in the particular regions which are liable for these. Amygdala attempts to give meaning to the emotions of these sounds and to create reactions. These sounds are settled in Wernicke region and anterior temporal lobe and inferior frontal lobe, which are situated in the two halves of the brain, give meaning to the sounds. For these sounds to be related with the words, memory is likewise involved in the process, and this happens in the frontal lobe (Carter et.al., 2013).

For a period of time, the brain keeps this new information taken in through the senses in short-term memory, which is also known as processing memory and which holds the information until it is unnecessary. Then, the brain tries to find associations between prior knowledge and new information, through association, repetition and stimulating

emotions. This information is conveyed to the long-term memory where the brain can hold the information to be able to use it later, provided that the information is important and repeated. This process is called as long-term potentiation (LTP) (Lynch, 2003). When these processes take place one after another, learning occurs.

To sum up, when the brain firstly takes new information in, it tries to find a connection with prior knowledge. It naturally seeks patterns. It tries to give meaning to all the input it receives. It receives information through our senses and tries to find associations with previous knowledge that it already has. If it can find related associations, it is automatically to evaluate this information as being worth storing. However, if it cannot find any patterns that it can adapt to, it does not even focus on that information by considering it something useless.

1.1.2.1 Brain areas that are responsible for learning

In the brain, there are areas which are responsible for learning. However, it cannot be stated that only one area is responsible for only one duty. Instead, the brain works in a synchronized way with its areas (Carter et.al., 2013). Thus, when learning about how brain works, teachers should understand that brain is not like a computer system in which each part has a specific responsibility, rather it is much more complex system which requires all its components to work with collaboration. Additionally, the brain has two hemispheres as right and left, each of which functions differently. Two hemispheres of the brain interact with each other during a specific activity (Jensen, 2000). However, this does not mean that individuals are right brained or left brained.

The thalamus deals with attention. When an input is received, the thalamus decides whether this input is worth processing. Then, attention is directed by it onto the input. It is located above the brainstem in the middle of the brain (Kemerer, 2011). All sensory input is delivered to the related areas through the thalamus and processed in the responsible areas to be registered in the memory. While the first attention is directed by the thalamus, the frontal cortex area is in charge of sustaining attention on the input (Carter et.al., 2013). By ignoring the distractions, frontal cortex area helps brain focus on the input for a period of time, while thalamus makes a decision about whether to send it to the related cortex areas.

The hippocampus is the area of the brain responsible for memory. It is located in the temporal lobe of the brain. After thalamus interprets and makes decision about an input to be processed, the input goes to the related processing areas in the brain and this is when the hippocampus is involved into the process with short-term memory, in other words processing memory (Jensen, 2000). It keeps the firstly delivered input in short-term memory until this input is unnecessary. If an input is necessary to be used later by the brain, it should be learnt and conveyed to the long-term memory by repetition, stimulating emotions and thus, forming memory.

Broca's area is responsible for language, sound processing and giving meaning to the sounds. It is located in temporal lobes. Specifically, Broca's area deals with phonological processing and motor image of the words. It is also in charge of speech production. Broca's area is the brain area discovered by the French doctor Pierre Paul Broca and located in the back of the left forehead area. It is found in Brodmann areas 44 and 45 in the outer part of the cerebral cortex (Kemerer, 2011).

On the other hand, Wernicke's area mainly deals with auditory image of the words and its other main duty is speech perception. The relation between these areas and learning can be explained by the fact that they are involved in auditory processes in the brain and that is one of the ways of the brain to receive input. Carl Wernicke discovered in his research that the Wernicke area is very important in understanding language and speaking and proposed a model (Kemerer, 2011).

In this model, Broca and Wernicke's area worked together in understanding and expressing language. Understanding and speaking the spoken language was the result of the coordinated work of these two regions. According to this model, the Wernicke area is responsible for planning for meaningful speech. Broca's area, on the other hand, transforms these plans into action and performs the necessary mouth and tongue movements for speech. In doing so, it sends signals to the primary motor cortex and activates the muscles. This model was expanded by neurologist Norman Geschwind in later years and was called the Wernicke-Geschwind model (Carter et.al., 2013).

Visual processing takes place in occipital lobe, the visual input sent by eyes to the thalamus is conveyed to the occipital lobes to be processed. This lobe is located in the

back of the brain. It has a part named angular gyrus which specializes on spatial recognition and visual awareness. The occipital lobe is responsible for learning as we take most of the information by our eyes (Kemerer, 2011). “Between 80 and 90 percent of all information that is absorbed by our brain is visual” (Jensen, 2000, p.55). For that reason, visual input is very important for learners’ brains.

High order thinking, processing sensory input and involving the emotions in the learning process are also important skills. All these happen respectively cerebrum, parietal lobe and amygdala in the brain.

Cerebrum, which is 80% part of the brain, is one the largest and the most developed area of it. It is in both hemispheres and has a significant role in high order thinking and decision making. It is a key area for learning as learning requires thinking critically which is a part of high order thinking (Carter et.al., 2013).

Parietal lobe, at the top back portion of the brain, has the duty of processing higher sensory input and some language functions that are delivered by Broca’s and Wernicke’s areas (Carter et.al., 2013).

The amygdala, one of the most primitive parts of the brain, is the center of emotions. It is very closely located to the hippocampus, and it is an almond shaped region of the brain (Carter et.al., 2013). It interprets all the input received through senses in terms of emotional states and brings emotional meanings to the memories. Amygdala has a foremost importance in learning as emotions strengthen information’s permanency in hippocampus. For teachers, learning must be permanent in learners’ minds, and this can be achieved through emotions as they play a significant role on the process of remembering something. What is more, Dopamine, known as the learning neurotransmitter in the brain (Ratey, 2002), is released during a state of happiness. All this information shows the importance of amygdala in learning.

1.1.2.2 Memory and its role in vocabulary teaching

Memory is defined in number of ways when the literature is reviewed. Two of the most striking ones can be "the ability to remember things" (Heacock, 2009, p.594) and "the recreation of past experiences by the synchronous firing of neurons that were involved in the original experience" (Carter et.al., 2009, p.154). It can also be described as the storage area which helps people store necessary information to do something. The function of the memory is important as it can be understood from its description. The necessary information needs to be kept somewhere so that the person who keeps it can use later. If the place that the necessary information is to be kept in the brain, it is nowhere but memory. Additionally, memory can be described in both functional and temporal terms. There are two main kinds of functional memory: declarative (or explicit) and nondeclarative (or implicit). Temporal memory has two types: short-term and long-term memory (Schumann,2004).

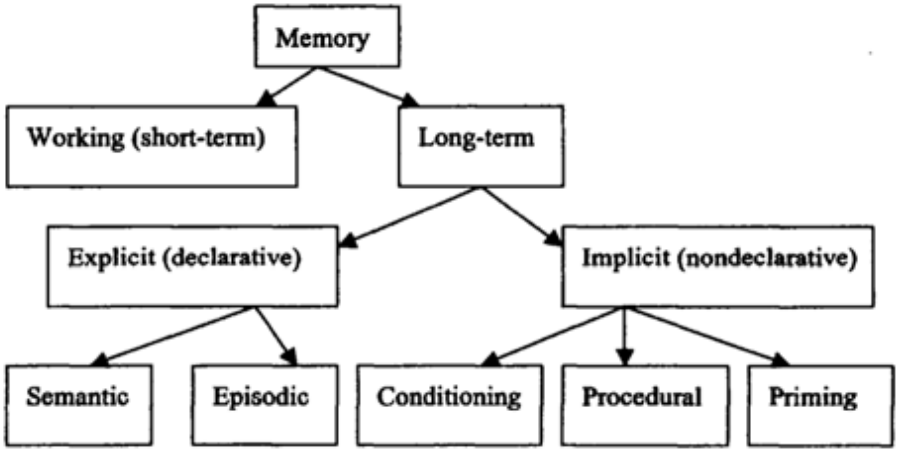


Figure 1. Hierarchical classification of memory (Schumann, 2004, p.4)

In functional terms, "declarative memories are memories for facts and events, and non-declarative memories are memories for habits, motor and perceptual skills, and emotional learning" (Fuster, 1995; Squire & Kandel, 2000, as cited in Schumann, 2004, p.5). Definitions of words and scientific facts such as the boiling degree of water can be exemplified under declarative memories, "explicit memory encodes factual knowledge—names, faces, events, things" (Ratey, 2009, p.73), whereas how to ride a bicycle and how to brush teeth can be under nondeclarative ones. Implicit memory is liable for the setting

down of abilities and propensities that, once educated, do not need to be intentionally contemplated, like chewing a gum, speaking, strolling and cycling (Ratey, 2009). The main distinction between these two types of memories can be about involvement of conscious as declarative memories should be consciously learnt and retrieved whereas nondeclarative ones can be type of behaviors that are learnt reflexively.

As shown in figure 1, declarative (explicit) memories are divided into two parts as semantic and episodic, on the other hand nondeclarative (implicit) memories are divided into three parts as conditioning, procedural and priming (Schumann, 2004). As the first part of declarative memory, semantic memory can be regarded as the registration process of the encyclopedic entries. Secondly, episodic memories are the past experiences and relevant details about them. As the first part of nondeclarative memory, conditioning are memories which require certain behavior patterns to certain stimuli. Secondly, procedural memory is considered as the habits that we learn since people were born. Lastly, priming memories can be described as the ones which facilitate retrieval process of a certain memory with the help of other one such as showing yellow color to someone to utter the word banana (Schumann, 2004).

In temporal terms, there are plenty of definitions of long-term memory and short-term memory. Long-term memory holds data for use in everything except the short term, whereas short-term memory is utilized to store or hold data while it is being handled (Schmitt, 2000). Working memory has generally been characterized as memory that is held for brief timeframe (under 20 seconds) to make progress at an errand (Schumann, 2004). When these definitions are considered, it can be concluded that short-term memory is where the information is held when it is taken into the brain, whereas long-term memory is the storage area of learnt information.

After enlightening what memory is, how these memories are formed should be explained too as knowing only the definitions of the memory types may not help teachers use the information while designing Brain-Based Vocabulary Teaching practices. There are two explanations that suggest how memories are formed. One of them is Long-Term Potentiation (LTP). Every single new experience makes the neuronal terminating across certain neurotransmitters fortify and others to debilitate. The example of progress

addresses an underlying memory of the experience. Notwithstanding, the example before long vanishes except if it is made more long-lasting by LTP, which is the cell component that makes neurotransmitters reinforce their association with each other, coding an occasion, upgrade, or thought as a progression of associations (Ratey, 2001). According to this information, it can be inferred that repetition and having a deeper understanding of the information are friends of the memory, whereas not dealing with the information in regular basis is an enemy.

The other explanation is memory process by Carter (2011). She describes memory formation in 5 stages: selection, lay-down, recollection, change, forgetting. These stages are shown as follows:

In the Selection Stage, the brain notices the information that is worth storing. In the Lay-down Stage, the brain associates the new information with the previous one. In the Recollection Stage, information about promising events that may be encountered in the future is retrieved. In the Change Stage, formed memory is altered every time it is remembered. In the Forgetting Stage, unimportant information is deleted and the other information starts to be forgotten if it is not repeated.

Memory is a crucial component for English Language learners too, as they will need to keep essential information such as vocabulary and grammatical structures of a new language in their minds. "A major aspect of the neurobiology of learning involves memory" (Schumann, 2004, p.4). The more grounded memory a student has, the simpler it becomes for him to learn new words and keep them to him. Assuming students fail to remember the new ideas that are educated effectively, they will experience issues in learning the following ones as learning ought to occur by partner the new information with the past one. Thus, teachers should be aware of the importance of memory and how to keep their learners' memories alive while teaching. Additionally, for teachers, knowing about memory is a great facilitator while planning activities to use in classroom. "By creating authentic learning experiences in which students related new information to something they had already experienced in real life, Sylwester found that students were able to recall that new information with greater ease than non-contextualized information" (Schmitt, 2000, p.251). Using activities that help students make their

learning permanent by keeping their memories alive will not only help teachers improve their teaching quality but also facilitate the process of teaching new things as learning should be associated with previous knowledge. For this reason, Brain-Based Vocabulary Teaching practices should take the information, mentioned above, into consideration.

In conclusion, knowing how memory works, how it stores the information and how attention is directed onto a new knowledge will enable teachers to understand what Brain-Based Vocabulary Teaching practices should be like. Schmitt (2000) states that "the object of vocabulary learning is to transfer the lexical information from the short-term memory, where it resides during the process of manipulating language, to the more permanent long-term memory" (p.131). To be able to accomplish this, teachers should be knowledgeable of the processes the brain goes through while involving the memory in learning. Additionally, knowing what is best for the memory and what keeps it alive will encourage teachers to use and design Brain-Based Vocabulary Teaching practices in a systematic way. Therefore, this study caters for memory and its working principles to set forth Brain-Based Vocabulary Teaching practices.

1.1.3 Bloom's taxonomy of cognitive domain

In learning, there should be some levels to follow for educators. When analyzed deeply, scholars such as Benjamin Bloom and Eric Jensen put a taxonomy and a model forward in this purpose. Their work will be overviewed deeply in the next chapter so that the core features of learning can be understood. In order to put an activity checklist for teachers, all of the steps should be analyzed. Hence, the model can be applied to the Brain Based Vocabulary Teaching.

A group of educators including Benjamin Bloom tried to understand and categorize the objectives in education. They divided educational domains into three parts: Cognitive, Affective and Psychomotor. Cognitive Domain was dealt by Benjamin Bloom. He put forward a taxonomy and gave his name to it. Vocabulary Teaching can get inspiration from this taxonomy if it is meant to be brain-based as Bloom's taxonomy is the core understanding of all learning.

It might be useful for teachers to analyze this taxonomy just because they are in an actual education setting. For this research, it is important in that it gives levels of learning which

can be related to the model that this research wants to put forward. The taxonomy has 6 levels. These levels are knowledge, comprehension, application, analysis, synthesis, and evaluation. The taxonomy is designed to show the difficulty of learning by starting from the easiest level to the most complex one. In Brain-Based Vocabulary Teaching activities, there should be the same hierarchy so that the target words can be resolved.

"Knowledge as defined here includes those behaviors and test situations which emphasize the remembering, either by recognition or recall of ideas, material, or phenomena" (Bloom, 1956, p.62). Knowledge level is about the information that is required to be learnt. In vocabulary teaching, knowledge level is about the target words and their association with previous knowledge. Before starting to teach any kind of target vocabulary, teachers should associate these words with the previously learnt or remembered words. Because in this level, remembering, recognition and recalling are necessary.

Comprehension level is about coming to the realization of newly taught information. In this level, learners will be able to realize the connection between the new knowledge and previous knowledge (Bloom, 1956). They make obvious that they could link the new information with previous knowledge. Additionally, in vocabulary teaching, they will differentiate the unfamiliar words from the previous ones and tell their differences.

In Application Level, learners complete a task by using the new information that they learnt or solve a problem by using that information (Bloom, 1956). In vocabulary teaching, learners might be given activities requiring them to fill in the blanks with the target words or put these target words into the necessary places in dialogues, reading passages or monologues.

In Analysis Level, students recognize and distinguish new data. They will find similarities and differences in the given content. Analysis underscores the breakdown of the material into its constituent parts and identification of the connections of the parts and of how they are coordinated (Bloom, 1956). In vocabulary teaching, learners should see some examples including target words and be required to analyze these target words in sentence examples by exposing them number of different examples.

In Synthesis Level, learners create a new thing by using the information that they learnt. This is a course of working with components, parts and consolidating them so as to comprise an example or construction not obviously there previously (Bloom, 1956). In vocabulary teaching, this level can be applied by asking students to create new sentences, differentiate the examples and write new paragraphs or stories including the target words that they learnt.

In Evaluation Level, learners make judgments about the things that they learnt. They think critically and try to understand where they can use this information in their lives. This level is characterized as the making of decisions about the worth, for some reason, of thoughts, works, arrangements, strategies, material, and so on (Bloom, 1956). In vocabulary teaching, learners should think deeply about the target words and what contexts they can encounter with these words. They should also work in groups to exchange opinions about what they learnt.

Vocabulary teaching can be designed according to these levels if it is intended to lead learners to learn more effectively. Taking into account of the brain's way of learning in the vocabulary teaching process is possible by aligning vocabulary teaching with Bloom's taxonomy. Therefore, it can be stated that Brain-Based Vocabulary Teaching corresponds with Bloom's taxonomy. The activities are centered around it.

1.1.4 Brain-based teaching

According to Jensen (1995), there are seven learning stages that are meaningful for the brain. These stages are: Pre-exposure, Preparation, Initiation and Acquisition, Elaboration, Incubation and Memory Encoding, Verification and Confidence Check, and Celebration and Integration. If teachers follow these stages when planning a lesson, their learners will learn the topic in a brain-based way. These stages can be resembled to the levels in Bloom's Taxonomy of Cognitive Domain. However, they are not the same. These stages are to be analyzed one by one and be related to the Brain-Based Vocabulary Teaching to draw an outline for teachers.

Stage 1- Pre-exposure

This stage gives the brain an outline of the new advancing before truly diving in: Pre-exposure assists the mind with growing better reasonable guides (Jensen, 1995). Giving a spoiler before watching any movie is not a pleasant behavior in the real world. Notwithstanding, prior to showing anything, giving a few signs, and showing the master plan will assist the instructing with handling be more successful and simpler. It's undeniably true that the brain learns better when the new information is related with past information.

Hence, this stage is significant, and it is like the Knowledge level in Bloom's Taxonomy. In Brain-Based Vocabulary Teaching, target words ought to continuously be related with the recently known words and information. Pre-exposing learners to new material will assist them with making more associations in their brains as the process takes place from familiar to the unfamiliar. Teachers ought to go on the way from the station of definitely known words to the station of new words.

Stage 2- Preparation

In this stage, learners' interest in learning can be increased with the help of activities designed for this purpose (Jensen,1995). Teachers need to attract students' attentions by using some practices and different activities. They ought to remember that learners should be curious about the new items to be learnt.

This stage can also be included in Knowledge Level in Bloom's Taxonomy (Bloom, 1956) as it tries to prepare students before starting to teach something. This phase requires students to relate the new item to be learnt to their personal lives and try to create emotional bonds with it. In Brain-Based Vocabulary Teaching, this phase can contain short dialogues in which students talk about their own lives by using the target words or their synonyms.

Stage 3- Initiation and Acquisition

In this stage, it is asked that various input should be given to the students so that they can benefit in terms of audial, visual, and kinesthetic senses. It is also stated that presenting

does not necessarily mean teaching as it gives passive role to the students. In this stage, it is recommended to be given an underlying virtual over-burden of thoughts, subtleties, intricacy and implications rather than the particular, lockstep, successive, each nibble in turn show (Jensen,1995). Furthermore, providing various input with students, they are expected to sort the input and show signs of comprehension. This makes this stage similar to the Comprehension Level in Bloom's Taxonomy.

In Brain-Based Vocabulary Teaching, this phase should be completed by giving various input about the target vocabulary such as presenting target vocabulary in videos, songs, passages, texts, poems, jokes etc. instead of showing only pictures or getting students to hear the pronunciations of the target vocabulary.

Stage 4- Elaboration

This stage is where information processing occurs. It involves critical thinking of students. In this phase, students understand and store the information in their minds to use in different situations (Jensen, 1995). It is similar to the Analyze Level in Bloom's Taxonomy.

In Brain-Based Vocabulary Teaching, target vocabulary can be used in different contexts. Teachers should ask students to think critically and understand the place of the target vocabulary in new contexts. Students can also retell the target vocabulary by using the information that they have in due lesson.

Stage 5- Incubation and Memory Encoding

This stage is for giving a break in students' minds. Rather than exposing the brain with a lot of unfamiliar information, it might be helpful for the brain to learn on a periodical schedule (Jensen, 1995). In Brain-Based Vocabulary Teaching, this break can be used during the change of activities. Students may give a break before they get into the next activity.

Stage 6- Verification and Confidence Check

In this stage, students are required to create something new related to the things they learnt. Making use of what they learnt, they present a new product in the classroom in

order to confirm that they learnt these things clearly and accurately. As Jensen (1995) states “Learning is best remembered when the student possesses a model or metaphor regarding the new concepts or materials” (p.313). This phase is almost identical with the Synthesis and Evaluation Level in Bloom’s Taxonomy as it requires learners to create something new by making use of the newly learnt information.

In Brain-Based Vocabulary Teaching, this phase is where students create sentences, paragraphs, stories, and dialogues with the target vocabulary that they learnt. They are able to use the words in contexts and understand the usage of the new words. After making associations between the unfamiliar words and previously known words, understanding the differences, getting various input, retelling the input in their own words, and then it is time to create something new by making use of this information that they got in the previous stages.

Stage 7- Celebration and Integration

This phase is where students look back and criticize their own learning. After completing the previous stages, students now contribute this process with their feelings and personalization (Jensen, 1995). It is aimed to inspire further learning and reinforce current learning in this stage. To be able to reinforce their learning, students should link it with their lives and personalize it. It also gives students to evaluate their own learning. With this aspect, it is remarkably similar to the Evaluation Level in Bloom’s Taxonomy. Therefore, it might be a good idea not to skip this stage.

In Brain-Based Vocabulary Teaching, students can complete this stage by exchanging information about the target vocabulary in groups, telling a real story including these target words from their lives and create social situations to do role-play.

1.1.5 The arbitrariness of linguistic sign

Words are regarded as signs and these signs are expressed with two terms as signified (the concept of the words) and signifier (the sound-image of the words) by Saussure (1959). Saussure (1959) describes a linguistic sign as a combination of a “concept” and a “sound pattern” in the brain. Words do not carry any clues that can be identified by their sounds except for onomatopoetic ones such as flush, plop, beep and so on. “Since I mean

by sign the whole that results from the associating of the signifier with the signified, I can simply say: the linguistic sign is arbitrary" (Saussure, 2011, p.67). Therefore, pronunciation of a word does not necessarily feature its meaning. This is called arbitrariness of the linguistic sign.

Since the words' meanings are arbitrary, they should be stored somewhere and before storing them, they should be learnt. Learning a word is a difficult process. It starts by separating sounds into phonemes and combining these phonemes to constitute a meaningful word. Phonemes make up the words (Saussure, 1959). However, as it is mentioned before, word meanings are arbitrary and to give meaning to the words, it is necessary to apply certain conditions. "Children must, therefore, be limited in the kinds of hypotheses they consider as possible word meanings" (Markman,1990, p.57). Linguists call these conditions as word learning assumptions. These are Whole Object Assumption, Type Assumption, Basic Level Assumption, and Mutual Exclusivity Assumption (Markman, 1990). In order to teach new words to students, these mechanisms that lie beneath students' first encounter with unfamiliar words should be comprehended by teachers very well. Thus, these assumptions are to be analyzed with special reference to how they can be used in Brain-Based Vocabulary Teaching.

1.1.6 Word learning assumptions

There are four word learning assumptions, put forward by different linguists, which may contribute to teachers understanding of what someone tends to do when encountering with an unfamiliar word. These assumptions and how they can contribute to Brain-Based Vocabulary Teaching are to be discussed below.

a) Whole Object Assumption refers to the situation in which when an unfamiliar object is pointed or shown, the person who does not know the word for that object, which is pointed, tends to name it as whole rather than parts of it (Markman, 1990). For example, in a kitchen, a mother points at a pan among other kitchen tools and ask her son to bring it. Her son does not know the word 'pan;' however, he takes the pan to his mother instead of taking the handle of it. This can be particularly useful when understanding the working principles of the brain. Because if it is known that such constraining is available in learners' minds, then words with pieces can be taught to learners by making use of an

activity in which they use this assumption such as giving the models of target vocabulary on a stall and asking students to match target words according to the videos they are to watch during the activity.

b) Type Assumption, which is also known as Taxonomic Assumption (Markman,1990), is the situation in which language users relate the same kind of words to a general category rather than choosing the relevant ones (Markman, 1990). To continue from the previous example about a pan, if the son is shown a pan and told that this is a "tuq," after that, if he is asked to show another "tuq" from the options of a bottle of oil and a plate, he will probably (65%) (Markman, 1990) choose a plate over a bottle of oil. Because language learners tend to think that objects of the same kind belong to the same category. In Vocabulary Teaching, this assumption can help teachers use categorization and classification activities in which learners relate an unfamiliar word to a more general category.

c) Clark (2003) describes Basic Level Assumption as "Members of a basic level category generally have more parts in common with each other than with members of a higher-level category" (p.135). It can be said that it is the generalization of words. It is similar to prototype theory of Atchison (1989). As long as words meet the requirements of basic features, they can be generalized in the other contexts as well. Regarding the previous example about pan, after the son comes to the understanding of what a pan looks like, he will be able to identify it in the other situations regardless of whether this pan is in the kitchen or not.

d) In Mutual Exclusivity Assumption, at the point when people first and foremost experience with a new word, they will generally name it by utilizing the data that they get from the environment. It is also stated in "Gavagai problem" (Quine, 1960). It is an experiment done by Quine in which, a person points at a rabbit and says that this is Gavagai. Next day, even if this person points at the rabbit again and says something different such as Havagai, the other person will understand that Havagai does not mean rabbit. Instead, its meaning can be a part of rabbit, its feature, or its color etc. Using the previous pan example, if the mother asks her son to bring the pot in the kitchen, he will understand that this time, his mother asks him to bring some other tool except for the pan.

In other words, he excludes the word pan from other words. In vocabulary teaching, this assumption can be used in an activity in which there are number of options only one of which includes the target word, and the rest are the already familiar words. Learners can use their previous knowledge, especially, already familiar words to find the unfamiliar one.

To sum up, all of these assumptions should be taken into consideration when designing activities as they are under the category of working principles of the brain. Moreover, they give clues about how a person learns a word and what he or she assumes when encountered with an unfamiliar word for the first time. In vocabulary teaching practices, in most situations, learners will encounter with unfamiliar vocabulary and teacher's aim is to teach this target vocabulary. If a teacher understands what processes a learner goes through while students learn an unfamiliar word, he or she can help them more by using practices which would facilitate these processes to be overcome by the learners.

1.1.7 Mental lexicon

In language, there is not a technical reason to name a dog as dog since it does not match the sound that is made by a dog. This issue can be valid for almost every word. The importance of meaning making process puts forward the fact that human beings match items with their meanings in their minds. Additionally, saying that human beings only store meanings of the words will not be enough as words are not the units that are composed of solely meaning but also sounds and forms (Aitchison, 1987). All these show the availability of a mental dictionary in which human beings store the semantic, phonological, and formative aspects of the words for items in their minds.

Scholars did experiments to understand the structure of the representations of words in the mind. Basically, these experiments are based on the mistakes that are made by language users or language aphasic patients due to the fact that these may give important clues about the process of comprehension and production of a word, which, in turn, will enable scholars to enlighten how words are represented in one's mind. In their experiments they used some techniques such as Preactivating, priming and so on. "Preactivating listener's attention is known as priming" (Aitchison, 1987, p.24). Scholars used this technique to understand whether showing some related words in advance help

target words to be remembered or identified more easily. For example, to facilitate the retrieval process of the word “pan,” showing the word “kitchen” in advance will help the target word “pan” to be retrieved more easily. Before these experiments, it is thought that every word has a place in the mind just as every book has in a library. They thought that human beings have an alphabetical or topic-based shelves on which they can put these words and take them out when necessary. However, even in a city library, there are thousands of books and occasionally it may be quite difficult to find the one that is being looked for (Aitchison, 1987). Then, assuming that mind has a system just like a library would be an unfair judgment as an average literate person may have more than ten thousand words in his mind but when he tries to find one, the finding process takes less than a second for the mind. Thus, mental representations of the words in the mind should be rather different than the library analogy so that every word can be used when necessary.

It was also ambiguous whether words were separated and stored as isolated units in the mind. For that reason, it has been tried to be understood how words are treated and what a word refers to in the mind. There appeared a question: what criteria do human beings apply while identifying a specific word? For instance, seeing a four-legged creature, a person thinks it is an animal, but there are also two legged animals, so it is significant to understand what process a person follows while identifying an object, an animal, or a human (Aitchison, 1987). To be able to understand these issues, scholars did experiments and found that words are not stored as isolated units in the mind and that human beings identify words as prototypes in which there are certain characteristics of objects, and which would help them know those words at the time of communicating.

As a result, it has been understood that words should be analyzed in groups which connect them semantically, phonologically, and form-based way. “In brief we should regard words as coins with meaning and word class together on one side and the sounds on the other” (Aitchison, 1987, p.100). A different and more encompassing analogy about representations of the words in the mind can be suggested. Words can be considered as more detailed taboo game cards, on one side of which there are meanings and forms of words and on the other, there are pronunciations and phonologically similar words. As it is known, on a taboo game card, there is a target word and under it are semantically related

words which prevent players from saying those words while describing the target word as they would help the target word to be retrieved easily. The situation is the same in mental lexicon. “Words from the same semantic field are closely linked” (Aitchison, 1987, p.84). This part of the analogy suggests the semantic connections among the words. Moreover, on this side of the cards, there are often words from same semantic fields or categories such as while the target word is snowy, one of the clue words can be winter or cold. Additionally, if the detailed cards are to be used in this taboo game, the clue words should be from the same word class as it would also support the finding that “when people pick one word in mistake for another, the errors almost always preserve the word class of the target, whether they are based on meaning, sound or both. Nouns change place with nouns, verbs with verbs and adjectives with adjectives” (Aitchison, 1987, p.99). It is also necessary to include words from the same word class in a vocabulary teaching activity as the same word class would help learners find the target words more easily.

To continue the analogy, it can be suggested that on the back side of these detailed taboo game cards, there should be pronunciations of the target words and under them should be phonologically similar words as this would also support the findings: “When people are searching around their mental lexicon among the word beginnings, conf and conv are closely linked and so are wind and wint” (Aitchison, 1987, p.125).

Words are stored in the mind in a systematic way. “Word association responses suggest that words are indeed organized in the mental lexicon” (Schmitt, 2000, p.42). This can be understood by thinking the contrary. There are so many words, and it is almost always easy to find them while communicating in language. If they are not stored in a systematic way, then how would it be possible to find them when needed? To answer this question, scholars tried to find ways to clarify the mental representations of the words in the mind. Once, they resembled the storage of the mind to a library (Aitchison, 1987). They thought that just like a library, the words were stored in the mind in categories and these categories helped language users to find specific words in related situations. Even if this statement was true, it seems unlikely to understand how fast the mind finds the words when needed as in a library, even in limited number of sources, it does not take as fast period as the other words require.

1.1.8 What is vocabulary testing?

To be able to understand the effectiveness of the practices that are used to teach vocabulary in classrooms, proper testing is fundamental for EFL teachers. “If vocabulary is considered to be an important component of language knowledge, then it naturally needs to be assessed in some way” (Schmitt, 2000, p.163). Since the purpose of the study is to understand the impacts of Brain-Based Vocabulary Teaching on young adult learners, it is vital for the study to cover how an effective vocabulary testing can be achieved.

Furthermore, in tests, learners give much importance on seeing the useful information that they can use afterwards. If they do not find any relation between what they have learnt and how useful it is for their further knowledge, they do not feel motivated. Most educators know that students to some extent judge the significance of the new material by regardless of whether it shows up on ensuing tests. This impact is called backwash (or washback) (Schmitt, 2000). Additionally, as it is mentioned in the previous parts of this study, vocabulary is a crucial component of language, which teachers should be aware of and give essential importance on. If he or she gives enough importance on vocabulary and wishes his/her learners to do the same, he/she should assess vocabulary knowledge of learners. Unless the teacher covers vocabulary in assessments sufficiently even though he or she emphasizes the importance of it in lessons, it will still be unclear in learners’ minds (Schmitt, 2000). What is more, vocabulary knowledge is seen equal to knowing a language by a lot of learners and it is important for them to know how many words they learnt to evaluate themselves in terms of knowing a language (Read, 2000).

According to the current trends, it can be seen that vocabulary testing is limited to some meaning-based activities such as multiple-choice tests, cloze tests, and quizzes that ask L1 equivalents of target words. However, Nation (2001) explains that “there is much more to vocabulary testing than simply testing if a learner can choose an appropriate meaning for a given word form” (p.22). Read. However, asking only the meanings of the words in a test can be criticized in a few ways. One of the criticizations can be about generalizing a learner’s vocabulary level might be wrong as a learner might know a word’s meaning, however he may not know how to use it in a sentence. The other

criticization can be about receptive vocabulary and productive vocabulary. A learner's capability of understanding a word does not necessarily mean that he can use it in a writing task. Additionally, in these types of tests, words are found as separate units, notwithstanding, in real life, they are included in contexts surrounding some other words. Finally, in daily life conversations or reading passages, although all the words included in the context may not be known by the learner. Learner can still understand the context.

Sample rate (Schmitt, 2000) can be a good solution to solve the problems of vocabulary tests. It is the rate between the number of words that are needed to be measured and questions to assess someone's vocabulary knowledge. "Sample rate has direct effects on the three major criteria in language testing: validity, reliability, and practicality" (Schmitt, 2000, p.166). In terms of validity, if a test measures what it intends to measure, it is regarded as a valid test. To put it correctly, a valid test must measure form, meaning and use. Regarding reliability, if a test designed by a researcher or a teacher gives the same results when it is used by other researchers or teachers, it can be called as a reliable test. Therefore, a reliable test should be severe about its rationale inside which assists the test with requesting the information and make it evident. As for practicality, if a test is applicable enough to be used in the classroom, it is practical (Schmitt, 2000). Therefore, tests including a question for every vocabulary item can lack of practicality. In other words, they are difficult to apply in classrooms.

In essence, vocabulary tests should cater for sample rate and different aspects of knowing a word such as form, meaning and use to measure learners' vocabulary knowledge. As this study is to apply pre-tests and post-tests to enlighten the impacts of Brain-Based Vocabulary Teaching on young adults, for pre-tests, it can make use of vocabulary testing model by Paribakht and Wesche (1993) which covers these aspects of vocabulary assessment. It is based on following options which learners will choose about a target word:

1- I have never seen this word.

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

3- I have seen this word before, and I think it means _____.(synonym or translation)

4- I know this word. It means _____. (synonym or translation)

5- I can use this word in a sentence. _____.(p.15)

Since this study is experimental, it can be useful to apply different types of tests to assess learners' vocabulary knowledge before and after the Brain-Based Vocabulary Teaching practices are applied. As Nation (2000) also supports this: "In experimental research, it is very useful to test the same word in several different ways" (p.581). That's why this study aims to use multiple choice tests, matching exercises and gap filling activities in which learners need to use their knowledge about different aspects of words such as meaning, form and usage.

1.1.9 Characteristics of young adult learners

Every person differs from one another individually in terms of personality, emotional states, and cognitive stages. Every brain is unique. However, there is a tendency to categorize learners according to their ages due to certain common characteristics that they set forth in educational settings. For instance, Piaget (1973) put forward cognitive stages of learners. Instead, scholars dealing with developmental psychology, asserted common characteristics of certain age groups in terms of their needs, behaviors, and anticipations. Physiological changes in human body cause cognitive differences and constitute certain common features that can be classified together. In this technological era, since the technology is used widely, it also has effects on behaviors of human beings and their characteristics. That's why young adult learners of 2022 should also be viewed under the title of Generation Z which refers to people who were born after 1995 (Schwieger & Ladwig, 2018).

Being aware of the learners' needs, behaviors, and anticipations, teachers can improve their teaching skills since awareness of these will enable teachers to understand and get acquainted with their learners better. Provided that a teacher knows which activities motivate their students, how they react to certain situations, and more important than all, how his/her learners learn best, he/she will design activities and lesson plans accordingly. As one of the aims of this study is to develop a Brain-Based Vocabulary Teaching practice

checklist for teachers, it needs to highlight the characteristics of the target group and design these activities and the check list accordingly.

In this study, young adult learners refer to the group of learners whose ages range from 14 to 17. Their cognitive development identifies itself from the other age groups in terms of abstract thinking, knowledge about environment, deductive reasoning, decision making and memory-related processes. All these have influence on their performance in educational setting. Because of the differences of cognitive developments related to their ages, the practices to be used in classroom should be designed accordingly. As this study aims to develop Brain-Based Vocabulary Teaching practices for young adult learners, it needs to cater for these strengths and weaknesses of them.

One of the most prominent characteristics featuring during these ages can be to start thinking abstractly as well as thinking about concrete things in life (Lerner et.al, 2003). This is a stage suggested by Piaget (1973). In this stage, people starting from the age of 12 begin to think of various dimensions of an issue including factual and hypothetical ways at once. As this period of life can be regarded as a bridge to adulthood, people at these ages recognize themselves more and can reflect on their personal development. They start discovering their desires from life and what they can achieve in the future. Additionally, shaping their own concepts about life, they build metacognitive knowledge about their abilities. Because they become aware of themselves, they tend to understand others better, caring about their individual differences as well. “Along with their implications for learning and problem solving, these kinds of cognitive changes affect individuals’ self-concepts, thoughts about their future, and understanding of others” (Lerner et.al, 2003, p.325). These show that high order cognitive processes start to be emerged during this period of life. They become better aware of themselves and others around them. Therefore, the vocabulary teaching practices that are planning to be used in classrooms of young adults can include activities in which learners locate target vocabulary in their lives. In other words, they can be given chances to personalize the words that they learnt through these practices. They can also be put in groups in which they can reflect on both their friends’ and their own performance, exchanging information about the target vocabulary such as telling a story of their experiences in which this target vocabulary involved.

Knowledge about the environment can help deductive reasoning skill develop in young adult learners as it enables young adult learners to become aware of what is happening around them. Deductive reasoning can be described as the ability to come to a conclusion by making use of the information given in a situation. For example, if, in a crime scene, it is said that the gardener was killed, there were only two people in the house at that time, landlord and the gardener's friend, but the gardener's friend could not have killed him as he was the best friend of the gardener, then someone might conclude that then the landlord must have killed him (Lerner et.al, 2003). The advantage of improved deductive reasoning skill in young adult learners may offer teachers, who teach target vocabulary, to use stories from which learners can infer the meanings of the given words. Thus, activities that require deductive reasoning skill can be used in the classroom of these learners.

Being aware of what surrounds him, thinking logically to reach conclusions, young adult learners can possess developed decision-making skills as well. Decision-making, as its name suggests, is the ability to choose the best option in one's advantage in a certain condition. Decision-making can contribute a young adult learner in educational setting while learning a new word. After linking the previous knowledge with the target vocabulary, a learner will need to master the meaning, form, and usage of the word. While deciding in which context the newly learnt word will be used, a learner will get help from his or her decision-making skill. So, activities which involve learners in situations in which they need to make decisions about the usages of words can be beneficial for them.

Young adult learners also differ in their memory skills especially in working memory. It is very similar to RAM in computers, which processes data for a short period of time to send it to the hard disk drive. In brain, as it is described in the previous chapters about memory of this study, there is a working memory which evaluates information in terms of its importance. On the condition that the information is important enough to be stored, it is sent to the long-term memory. It seems that working memory in young adults performs better when compared to adults and children (Freitas et.al, 2007). Bearing this finding in mind, it can be suggested that while teaching to young adults, teachers may benefit from their working memories, by giving them chances to process more information about a word than traditional vocabulary practices such as giving bilingual

word lists in which there are only the meanings of target vocabulary. This can be achieved through Frayer model in which a word's certain feature is determined with the learners. As another option, an activity which is based on this model can be developed.

Concisely, young adult learners in 2022 are also classified as Generation Z as the participants of this study are at the age of 15 and Generation Z refers to people who were born after 1996. They have certain characteristics that should be taken into consideration while designing vocabulary teaching practices for them. Because if teachers are aware of their learners' characteristics, they might have a better chance to teach them more effectively. Furthermore, Generation Z has some characteristics which identify them from the other generations in terms of their personal traits, cognitive stages and preferences. Due to their being born into a technologically developed world, they can easily have access to information and this makes them direct their attention on online sources whenever possible. The fact that they usually have online sources at their disposal makes them difficult learners to address as their attention span might be limited. They have critical thinking skills which enable them to criticize what is around them including the educational setting. Alongside their being skillful at multitasking, they also enjoy watching videos and stories which make them good observers. For teachers to meet the expectations and demands of learners of Generation Z, they must be aware of these and design their lessons accordingly.

To sum up, a vocabulary teaching activity for young adult learners should cater for these characteristics and they should not only include various input sources containing videos, visuals, listening recordings, stories and other authentic material which are related to real life but also involve the strengths of these learners such as multitasking, observation and technological knowledge.

1.2 Statement of the Problem

The problems about vocabulary teaching can be counted as underestimation of the importance of vocabulary in language, usage of practices that are not designed according to the learning principles of the brain and ignoring the emotional status of learners in the classroom. For the first problematic area which is about the underestimation of the importance of vocabulary in language, the solution can be put forward by explaining what

processes vocabulary teaching has been through. For the second one which is about usage of practices, teachers' preferences about vocabulary teaching practices can be detected and according to the results, the strengths and weaknesses of the practices that they preferred can be identified. Instead, brain-based teaching practices can be offered. For the last one which is about ignoring the emotional status of learners in the classroom, learners can be observed during certain practices and the ones which have positive emotional impacts on learners can be reinforced in the classrooms.

This study, by dealing with the teachers' most preferred activities in vocabulary teaching and by taking the Brain-Based Teaching, Bloom's Taxonomy, Mental Lexicon and Word Learning Assumptions into consideration as well as characteristics of young adult learners, designs applicable activities for young adults, presents a checklist which will help and inspire teachers to design their own practices with working and learning principles of the brain. Additionally, it enables them to recognize vocabulary with special respect to form, meaning and use.

1.3 Purpose of the Study

The objective of this study is to provide new insights into vocabulary teaching practice from the perspective of Brain-Based Teaching. To do this, it aims to understand the usage of vocabulary teaching practice of 100 English Language Teachers in Turkey. Using the results, it presents new practices which EFL teachers can use in the classrooms of young adult learners. The impacts of these practices on young adults are to be enlightened academically. As well as evaluating their academic performance on Brain-Based Vocabulary Teaching, highlighting the young adult learners' characteristics, the research tries to understand these learners' emotional and motivational outcomes from the brain-based practices by videoing the first and the last week's lessons in the classroom of brain-based teaching practices are applied.

1.4 Significance of the Study

This study is significant as it not only tries to enlighten the language teachers' most common practices in vocabulary teaching in Turkey, but also identifies brain-based

practices that can be used in classes of young adult learners by highlighting the characteristics of them.

Moreover, the study presents a Brain-Based Vocabulary Teaching practice check list for teachers, taking Brain-Based Teaching, Bloom's Taxonomy, Mental Lexicon and Word Learning Assumptions into consideration, so that they can understand the differences of Brain-Based Vocabulary Teaching practices and get inspiration for further studies.

Finally, it uses these practices, designed by the researcher, in an actual classroom setting to see the impacts of brain-based vocabulary teaching on young adults. These impacts are to be evaluated in two ways: the rate of learning by assessing the pre-test and post-test results applied every week, and the emotional and motivational outcomes of learners by scrutinizing 2 lesson videos, which were taken from the experimental group in the first and the last week of the teaching process, through descriptive analysis. The study is significant in that it reveals the emotional outcomes of the learners. The emotional outcomes of the learners are obtained through the analyses of the researcher, a psychologist and a psychological counselor.

1.5 Assumptions

This study assumes that young adult language learners, taught through Brain-Based Vocabulary teaching, will learn new vocabulary more effectively than the ones, taught through traditional practices such as giving bilingual word lists and memorizing.

Moreover, young adult learners will show higher motivation and positive emotional reactions to participate in the classroom activities if they are taught through Brain-Based Vocabulary Teaching practices.

Finally, it is presumed that there are certain criteria which can be set forth by taking Brain-Based Teaching, Bloom's Taxonomy, Mental Lexicon and Word Learning Assumptions into consideration. These criteria distinguish Brain-Based Vocabulary Teaching from the traditional types of vocabulary teaching practices.

1.6 Limitations

To be able to generalize the results of this study, the practices should be applied in the classrooms of all types of learners in terms of age, grade, gender, and language level. However, this study is conducted in one school.

In this study, the 30 participants are all Turkish male students who are at the age of 15, for further studies, the participants may be chosen from different scales in terms of gender, population**,** and nationality.

The duration of this study is 10 weeks. For further studies, duration can be expanded to an academic term.

Finally, the study is limited in that it observes the emotional outcomes of only the experimental group as it tries to reveal the emotional outcomes of the Brain-Based Vocabulary Teaching practices. For that reason, there are two videos taken during the first and the last lesson of the experimental group.

1.7 Research Questions

To fulfill the requirements to reach the goals of the study, three research questions were posed:

Research Question 1-What practices do EFL teachers use to teach vocabulary?

Research Question 2-What are the impacts of Brain-Based Vocabulary Teaching on young adults in terms of their levels of learning the target vocabulary?

Research Question 3- What are the emotional outcomes of young adults taught through brain-based vocabulary teaching?

1.8 Definition of Terms

EFL: It is a shortened form of English as a Foreign Language alluding to English as educated to individuals whose fundamental language isn't English and who live in a nation where English isn't the authority or primary language (Heacock, 2009).

Brain-Based Vocabulary Teaching: It is a vocabulary teaching method which aims to teach vocabulary by using the principles of how brain learns and stores a word (Jensen, 2000).

Mental Lexicon: It is the presumption of availability of a mental dictionary in human mind (Aitchison, 2012).

Bloom's Taxonomy: It is a pyramid for categorizing educational goals, it includes six phases, these are: remember, understand, apply, analyze, evaluate, and create (Bloom, 1956).

Word Learning Assumptions: Assumptions in which linguists claim that human beings tend to apply certain procedures when encountered with an unfamiliar word or object (Markman, 1990).

Web Tool: Web sites and software which operate on the internet and which can help teachers develop materials for their lessons (Elmas & Geban, 2012).

Retention test: It is a test which is used to measure learners' levels of remembering the target vocabulary (Webster, 2022).

2. LITERATURE REVIEW

In this part, the studies which are carried out in vocabulary teaching centering around Brain-Based Teaching are presented. The studies from Turkey and different countries are explained under different titles.

2.1 Relevant Domestic Studies

In Turkey, there are plenty of studies in vocabulary teaching centering around Brain-Based Teaching. Some of these studies are quantitative, whereas the others are qualitative. These studies are helpful for the research to compare and contrast its results in both ways.

Cengiz (2004) used music in vocabulary teaching and evaluated this within the framework of Brain-Based Teaching. Within the framework, she used Teele Multiple Intelligence Inventory so that she could detect the learners whose musical intelligence were dominant. Furthermore, she carried out an experimental study and applied pretests and posttests to the participants of the study. When she compared the pretest results, she found out that the average point of control group was 7,30 out of 60, whereas the average point of experimental group was 10,10 out of 60. The groups were similar in terms of their proficiency before the study started. After 6 weeks of vocabulary teaching process, she applied posttests. The posttests were the same as the pretests. According to the results of the post tests, the average point of the control group was 33,62 out of 60, whereas it is 51,32 in the experimental group. When these average points are compared, it can be concluded that the vocabulary teaching which includes practices centering around music is more successful than the vocabulary teaching which does not include any practices centering around music.

Yaman (2006) used communicative vocabulary teaching activities and techniques in the experimental group, whereas she used traditional vocabulary teaching activities and techniques in the control group. She stated that the results of statistics in two schools have revealed that the students who have been taught words through communicative activities and techniques have been more successful in learning the word, storing the word in their long-term memories and using the word in communication. Additionally, significant

differences have been found in their overall success. Based on these findings, communicative teaching and activities through language teaching approaches can be said be more effective in teaching vocabulary than traditional vocabulary teaching ways.

Şimşek (2008) put forward the results of the study named An Effective Way of Teaching Vocabulary: Collocations. The result of the multiple-choice post tests showed no significant difference among the groups. The means and the standard deviations of the treatment groups were higher than the control group in both immediate post-tests. In the immediate multiple-choice posttest, the scores of the definition group, in other words, the control group were higher, whereas the scores of the collocation group, in other words, the experimental group were higher in the immediate definition sentence post-tests. Although the groups showed differences in the test results, Anova, which was conducted to find out whether these differences were significant, showed that the differences were not statistically significant. This result was unexpected since the collocation group was expected to score higher than the other group. Because the researcher assumed that collocations would help learners learn vocabulary items better than the other group. This result indicates that using collocations may not help learners very much with vocabulary learning.

The study conducted by Samur (2009) in order to examine the effects of the English course taught through brain-based e-learning and the traditional language teaching method (Grammar Translation Method) on the academic achievement and attitudes of the students towards the English course, with a pre-test and post-test trial model. was carried out. In this study, the research group consisted of 102 7th grade students. In the research, the unit topics were taught with the students in the experimental group through brain-based e-learning, and in the control group using the traditional language teaching method. As a result of the research, the academic success of the students in the experimental group in the unit was found to be higher than the academic success of the students in the control group in the unit.

In the study directed by Duman (2010) to look at the impacts of brain-based learning with respect to the academic achievement of students with various learning styles, 68 college understudies learning at the Faculty of Education, Department of Social Studies Teaching

partook and the review was done as a pretest posttest trial model. In the study, it was seen that the experimental group learners who were applied the Brain Based Learning approach were in a superior circumstance in working on their academic achievement than the control group learners who were applied the traditional methodology.

Yavuz and Yagli (2013) led a study to look at the impact of brain-based learning approach with respect to accomplishment and demeanor in English lessons in high school learners. A sum of 78 learners partook in the study, which was done utilizing the Solomon research model, and 2 experimental and 2 control groups were utilized. As per the discoveries toward the finish of the study, they expressed that the attitudes of the learners in the experimental groups in light of the brain-based learning approach worked on more than the learners in the control groups, and there was no statistically significant difference between the experimental group and the control group learners in their academic performance.

31 studies conducted between 1999 and 2011 were included in the study, which was conducted according to the meta-analysis method in order to examine the effect of brain-based learning on academic achievement by Gözüyeşil and Dikici (2014). As a result of the research, they determined that brain-based learning had a positive effect on students' academic achievement, but this effect was at a moderate level (d=0.640). In addition, they determined that the effect sizes did not differ according to the level of education, course area and the number of samples, and when the studies conducted in Turkey and the United States were compared, there was a significant difference in favor of Turkey.

Topkaraoglu and Dilman (2014) used vocabulary enhancement activities integrated into regular curriculum on 43 2nd-grade male learners. On the other hand, they used traditional vocabulary teaching activities on 45 2nd-grade male learners. Regarding the pre-test scores of both experimental and control group, the vocabulary production levels of learners were the same. However, according to the post test results, learners in the experimental group were more successful than their peers in the control group. The insights showed that focusing on the target words in English by using vocabulary enhancement activities results in a massive distinction for the experimental group and has

a constructive outcome as far as the quantity of exact word use and by and large vocabulary production level in vocabulary learning.

Çelik (2015) used Brain-Based Strategies in one of the classrooms of young learners and traditional vocabulary teaching strategies such as translating the word into L1 in the other. According to the posttest results, the learners in the experimental group are more successful in remembering and using the target vocabulary than the ones in the control group. The total score of the experimental group was 94,4 whereas it was 56,5 in the control group. She also set forth a descriptive analysis of the average of the remembered words. In the experimental group, the least number of remembered words was 15, whereas in the control group, the greatest number of remembered words was 14. This comparison shows the success of the experimental group which were taught through brain-based activities in remembering the words. Additionally, to evaluate the students' motivational and emotional outcomes, she gave them a questionnaire in which they could describe their feelings about the activities used in the classroom. Most of the students stated that they felt themselves happier and more comfortable with the brain-based teaching activities.

Acar (2017) used a research model with pretest posttest control group in his study to look at the impact of Brain Based Learning method on learners' outcome in foreign language lessons. 16 learners in the experimental group were taught with a brain-based learning approach, and 16 learners in the control group were instructed with traditional teaching methods for a very long time, utilizing four distinct fairy tales. While there was a significant difference between the pre-test and post-test mean scores of the learners who got taught with the BBL method, no significant difference was found between the pre-test and post-test mean scores of the learners who got instruction with the traditional method. What's more, subsequently, toward the end of the applied training programs, a significant difference was found between the reading and comprehension skill levels of the learners in the experimental and control groups.

Yegen (2020) carried out a study in which activities planned within the framework of Brain-Based Learning are used in the classroom of 5^{th}, 6^{th}, 7^{th} and 8^{th} grades. He used pretests, retention tests and posttests to understand the effects of the activities in different

age groups. He found that word teaching planned according to Brain-Based Learning framework has critical effects in the development of vocabulary of these groups. The pretest score of 5th grades was X=14.22, whereas the post test score was X= 24.25. The pretest score of 6th grade was X=14.10, while the post test score of the same group was X=22.84. In the 7th grade, the pretest score was X=15.12, while the post test score in the same group was X=22.91. Finally, The pretest score of 8th grade was X=13.23, whereas the post test score was 25.41 in the same group. To sum up, it can be said that Yegen (2020) found that the vocabulary teaching activities planned within the framework of Brain-Based Learning have positive impacts on 5th, 6th, 7th and 8th grade students academically.

Göral (2021) found out through the study named Brain-Based Learning she carried out using experimental and control groups that there are meaningful differences between the pretest and post test scores of the experimental group. In her study, she used practices planned under the framework of Brain-Based Learning in Preparatory Classes of Muğla Sıtkı Koçman University. The pretest score of the experimental group was 35.65±8.31, whereas the pretest score of the control group was 36.11±13.31. There were not any meaningful differences between the pretest scores of both groups. Therefore, the groups were similar in terms of their proficiency. However, when the post tests were applied, it was seen that there were meaningful differences between the pretest and post test scores of both group. The post test score of the experimental group was 67.04±15.58, whereas it was 57.13±19.94 in the control group. She also explained the students' opinions about the vocabulary teaching practices planned under the framework of Brain-Based Learning. %83.3 of the students stated that the Brain-Based practices used in the classroom were quite effective. %37,04 of the students suggested that group work and sharing activities in the lesson were beneficial for them. %29,63 explained that they learnt the words while doing brainstorming.

Finally, it can be stated that in this study named The Impacts of Brain-Based Vocabulary Teaching on Young Adults, designing vocabulary teaching practices that can be used in classrooms of young adult learners by taking the correspondence between Brain-Based Teaching and Bloom's Taxonomy of Cognitive Domain on the theoretical basis of Mental Lexicon and Word Learning Assumptions distinguishes itself from the other studies

carried out in Turkey. Moreover, for the qualitative data, none of the mentioned above videoed any of the lessons during the vocabulary teaching practice. The study is identical in collecting data from a real source which helps the researcher observe the learners' behaviors.

2.2 Relevant International Studies

There are number of international studies which center around the Brain-Based Vocabulary Teaching in different countries except for Turkey. These studies will be explained below.

Lawson and Hogben (1996), in their experimental work, tested whether the words taught by the word method are easier to remember than the words taught by the classical method. In this study, the keyword method was carried out in two stages: The first is to determine the keyword in the mother tongue and the second is to find an image that resembles the target language word in terms of sound or structure, while at the same time containing the keyword and the definition of the new word in the target language. Experimental results revealed that students remember the words they learned with the keyword method more easily.

Hoge (2002) wanted to determine the effects of brain-based learning strategies on students' literacy development, achievement and attitudes in literature classes. In the research, interview form, observation, questionnaires with students and teachers were used as data collection tools. As a result of the research, it was determined that brain-based learning strategies did not contribute much to the development of students' literacy skills but helped them develop positive attitudes towards the lesson.

In the study of Getz (2003) in which he examined the effects of practices carried out in accordance with the brain-based learning approach on English lessons with a research design with pre-test and post-test applied experiment and control groups, activities designed in accordance with the brain-based learning approach were applied to the individuals in the experimental group. According to the findings that emerged at the end of the experimental process of the research, it was observed that the level of achievement of the students in the experimental group increased.

In the study carried out in a longitudinal design in order to evaluate the brain-based writing program by comparing the performances of the students to whom the writing programs developed in line with traditional and brain-based approaches were applied by Griffee (2007), the application process was started with 37 students, and the ten-week process was completed with 23 students. With the measurement tool consisting of open-ended and closed-ended questions, the students' enjoyment of the program was determined, and the effects of the programs on this skill were investigated by looking at their writing scores. When the answers given by the students to the open-ended questions in the dimension of enjoying the program were examined, it was determined that the students in the group in which the brain-based writing program was applied made more positive comments than the students in the group in which the traditional program was applied. Although it was determined that the scores obtained from the Likert-type scale, which included closed-ended questions, were higher in the group in which the brain-based program was applied, a comparison could not be made between the groups due to the low number of students participating in the study. In the study, it was also revealed that the students in the group in which the brain-based program was applied had higher writing scores and differed significantly from the other group.

Weimer (2007), on the other hand, aimed to determine the effect of brain-based learning on increasing students' interest in the lesson and long-term memory. He conducted his research on 181 secondary school students and 8 teachers. In his research, he first took the opinions of the teachers and tested the lessons in four aspects. These; increasing long-term memory, keeping student interest high, affective bonds and transferring knowledge. The results obtained from the research showed that the brain-based learning approach meets the social and sensory needs of the students, the interest and attention of the students improves long-term memory, the focus of the student on the lesson and the permanence of the knowledge in the students.

According to the study conducted by Pennington (2010) to examine the effect of kinesthetic movements used as a tool while teaching grammar to high school students, brain-based learning theorists suggest that the anatomical parts of the brain cooperate with basic physical movements, as well as physical elements in intellectual movements. In other words, he argues that movements are necessary for appropriate learning to occur.

227 secondary school students from the 9th and 11th grades, who were created by computer-processed random selection, participated in the study. Traditional grammar exercises were applied to the control group, and kinesthetic learning exercises were applied to the experimental group. When the t test results were examined, it was seen that there was no significant difference.

In a study by Zuhriyah and Augistina (2020), researchers investigated the effect of the brain-based learning (BBL) model on students' higher-order thinking skills (HOTS) in writing, teaching, and learning. Two classes of the fourth semester of the English Language Department formed the universe and sample of this study. Students in both classes are divided according to their high- and low-level thinking skills. Then, writing was taught using the brain-based learning model in the experimental class, and writing was written with a guide in the control class. Then, the data obtained from the writing test were calculated using two-way analysis of variance. According to the results of the analysis of the data, a relationship was observed between teaching models and students' higher-order thinking skills, and it was concluded that this relationship influenced students' writing skills.

Vivar (2022) conducted a study named “Effects of exposure to L1 translation in vocabulary acquisition in English as a Foreign Language with college students”. 166 participants involved in her study. There were two groups as control group and experimental group. She used pretests and posttests to be able to compare the results of the groups. Participants’ vocabulary knowledge was assessed before and after interventions with an adapted version of the Vocabulary Knowledge Scale (Paribakht & Wesche, 1993). This research consisted of two phases. First, explicit vocabulary instruction through visual exposure to target vocabulary with Spanish translation and aural input was assessed in a pilot study. This stage focused on the first step for vocabulary learning mentioned by Nation (2013): Noticing. Results obtained from the pilot study presented no significant difference between the control and the experimental group. Therefore, it was decided to include an additional activity to enhance vocabulary learning. In the second phase, which included 166 students, employed a web-based vocabulary activity as well as the visual exposure. This was introduced to evoke the second step of vocabulary learning: Retrieval. This methodology provided opportunities

for participants to explore vocabulary with a new learning tool; allowing students to not only notice target vocabulary, but also to retrieve it. The results from the main study were encouraging, the experimental group outperformed the control group in the posttest ($p<0.001$) showing significant improvement in most words in the experimental group. We may assume that the additional methodology included in the main study could be responsible for the vocabulary enhancement. After the intervention, a semi-structured interview with participants from the experimental group elicited information about their ideas toward their own learning and the methodology used. Participants gave a positive opinion of web-based activities and acknowledged the importance of vocabulary development in their language learning process. This study highlights the positive influence of explicit vocabulary instruction in English Learning classroom settings.

For the relevant international studies, the fact that they are less interested in Brain-Based Teaching can be set forth. Instead, they tried to use various approaches to teach vocabulary. However, the impacts of these approaches are changing depending on the learners, countries and words. In this study named The Impacts of Brain-Based Vocabulary Teaching on Young Adults, what makes the difference is its applicability to every classroom of young adult learners and every group of words.

3. METHODOLOGY

3.1 Introduction

This part gives a detailed description of the methodology of the study by giving information about research design, research questions, setting, the participants, data collection instruments, data collection procedure and data analysis procedure.

Quantitative research is a method for finding out about a specific gathering, known as an example population. Utilizing logical request, quantitative examination depends on data that are noticed or estimated to analyze inquiries regarding the example population. On the other hand, qualitative research includes gathering and breaking down non-mathematical data to grasp ideas, sentiments or encounters (Neuman, 2014).

This study is mixed type. It collects both quantitative and qualitative data. Mixed type research consolidates components of quantitative examination and subjective exploration to address the research questions (George, 2022). In this study, in order to reveal the learners' vocabulary learning levels, quantitative data are analyzed, whereas, to enlighten the learners' emotional outcomes, qualitative data are analyzed. In research design, the types of the study including quantitative and qualitative are presented. In research questions, the questions which lead this study to be initiated are given with the reasons why they are asked. In setting, the places where the study is conducted are mentioned. In the participants part, people who the study involves are brought forward. In data collection instruments, the materials which help this study collect data such as questionnaires, videos and tests are explained. In data collection procedure, how data is collected with the help of data collection instruments is put forward. In the last part, data analysis procedure, it is shown how the collected data is analyzed.

3.2 Research Design

The study aims to understand what practices EFL teachers use in their classrooms to teach vocabulary so that it cannot only offer brain-based vocabulary teaching practices but also distinguish brain-based vocabulary teaching practices from the traditional ones. At the first stage, to address this aim, an online questionnaire which asks the preferences of EFL teachers' vocabulary teaching practices is designed in google forms and sent to 100 EFL

teachers in Turkey. In order to enlighten the preference ratio of the vocabulary teaching practices, a question which requires teachers to put the practices into an order from most common used to the least was included in the questionnaire as well. As one of the objectives is to create a brain-based vocabulary teaching practice checklist for EFL teachers, viewing Jensen's Brain-Based Teaching Model and its correspondence with Bloom's Taxonomy on the theoretical basis of Mental Lexicon and Word Learning Assumptions, ten Brain-Based Vocabulary Teaching practices are designed by the researcher. In addition to the theoretical background of Jensen's Model, it is also benefitted from Caine and Caine's (1991) Brain-Based Teaching Model which requires practices to indicate complexity, social interactions, group discovery, individual search and reflection, role playing, and an integrated subject matter. They also observed that these practice elements or elements of orchestration (source of information, classroom organization, classroom management, and outcomes), must be present in order for BBL (Brain-Based Learning) to be different from traditional teaching (Caine & Caine, 1991).

Furthermore, since the study purposes to reveal the impacts of Brain-Based Vocabulary teaching on young adults, two groups whose proficiency levels are similar on account of the classification by the school administration according to the Liselere Giris Sinavi (LGS), High School Entrance exam results, are selected. Each group includes 15 learners. One of the groups is the experimental group. In the classroom of the experimental group, ten brain-based practices designed by the researcher are applied for ten weeks in one lesson hour, whereas in the control group, traditional vocabulary teaching practices such as giving bilingual word lists (English-Turkish), having students write target words for multiple times are used. The reason why these practices such as giving bilingual word lists and having students write target words for multiple times are called as traditional vocabulary teaching is that they are both most preferred ones by the teachers according to the questionnaire results that the study encompasses and have been widely used in the past by Grammar Translation Method. Leka and Klodiana (2012) imply that "new words are learned through direct translation from the native language if Grammar Translation Method is used" (p.14).

In order to see the impacts of Brain-Based Vocabulary Teaching practices, every week, pre-tests are applied in both groups to see whether there are already familiar words known

by learners and to know their readiness levels to the target vocabulary. Moreover, every week, post-tests are also applied to see the impacts of the practices in both groups. Finally, retention tests are applied in every three weeks to reveal the longer-term impacts of the Brain-Based Vocabulary Teaching practices on learners' levels of remembering the target vocabulary.

As one of the objectives of the study is to reveal the emotional outcomes of the learners taught through Brain-Based Vocabulary Teaching practices, the first and the last weeks of the lessons in the experimental group are videoed to be able to see the learners' levels of eagerness to join activities and classroom atmosphere. The videos are scrutinized through descriptive analysis learner by learner during the activity. Every reaction given and each behavior performed by the learners are observed accompanying by a psychologist and psychological counselor.

3.3 Setting

This study is conducted in Sancaktepe Teknoloji Anatolian İmam Hatip High School. The two preparatory classes whose proficiency levels are similar are selected. There are 15 students in each classroom. One of these classrooms, Preparatory Class C, includes the students of experimental group and the other classroom, Preparatory Class A, is the control group.

3.4 Participants

Participants of this study are 30 students who study at Sancaktepe Technology Anatolian İmam Hatip High School. They are at the age of 15 and all of them are male students. Their proficiency in English is similar as they were classified by the school administration according to the LGS exam conducted by National Ministry of Education in Turkey.

There are also 100 EFL teachers who answered the questionnaire to provide data for the study to understand EFL teachers' vocabulary teaching practice preferences. These teachers' ages differ from 25 to 45. They work in different cities of Turkey. Their majors are English Language Teaching, Translation and Interpreting, English Literature and American Literature.

3.5 Data Collection Instruments

In this study, three data collection instruments are used: questionnaire, tests, and videos.

3.5.1 Questionnaire

A questionnaire which was designed by the researcher, and which included 5 open ended questions to understand the EFL teachers' vocabulary teaching practices. This questionnaire was sent to 10 EFL teachers as a pilot project. It was aimed to see whether the questionnaire served the study. At the end of the pilot project, it was seen that the questionnaire was useful to be applied in larger groups. The questions are:

1- What is your major?

2- What age groups do you teach?

3- How many years of experience do you have on teaching?

4- Which of the following practices do you use to teach vocabulary? (More than one option is possible)

5- Could you please put 10 vocabulary teaching practices that you use in your classes into an order from the most frequent to the rarest?

3.5.2 Tests

There are 10 pretests, 3 retention tests and 10 post tests that are used in this study. All these tests are developed by the researcher. Tests include several types of questions about the target vocabulary. It is aimed to determine learners' readiness about the target vocabulary with the pre-tests. These tests are applied before the lessons start. In this study, pre-tests are used to reveal whether there are differences between the experimental and control group in terms of proficiency with the target vocabulary as it would be in vain to try to understand the impacts of Brain-Based Vocabulary Teaching if one of the groups already knew the target words. Furthermore, the pre-tests are also used to see whether there are learners who already know the target vocabulary and who may cause study to disprove what it tries to enlighten. For these reasons, in pre-tests, vocabulary testing

model by Paribakht and Wesche (1993, as cited in Read, 2000) is used. Every target word is included in these questions to see whether learners are already familiar with those target words and if there are any statistically meaningful differences between the groups. In the options, there are:

1- I have never seen this word.

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

3- I have seen this word before, I think it means _____. (synonym or translation)

4- I know this word. It means _____. (synonym or translation)

5- I can use this word in a sentence: _____.(p.15)

The objective of the posttests is to reveal the difference between learning levels of both the experimental and control group. They are applied at the end of every lesson for ten weeks. The questions included in the post tests are completely different than the ones in the pre-tests and retention tests.

First retention test includes the target vocabulary of the first four weeks, second retention test contains the 5th, 6th and 7th week's target vocabulary and the third retention test encapsulates 8th, 9th, and 10th week's target vocabulary.

The retention tests were applied two days after that week's posttest was distributed. In other words, the first retention test was completed two days after the 4th posttest, the second retention test was solved two days after the 7th posttest, whereas the 3rd retention test was given two days after the 10th posttest.

The reason why retention tests were not distributed on the same day as the posttests were given is that the objective of the retention tests is to measure the learners' levels of remembering the target words. Furthermore, Learners are not involved in a retention test if they miss one of the lessons during the study. For instance, learner 10 was not in the classroom in the first week of the study, so he did not participate the retention test 1 as the test included first week's vocabulary and he missed it. None of the tests were applied

other than the specified dates. However, 28 participants involved in the study has at least one pre-test, posttest and retention score which helps the study evaluate the results.

3.5.3 Videos

In the experimental group, the first and last week's lessons are videoed. The videos are shot in order to see learners' eagerness to join the activities and general classroom atmosphere.

3.6 Data Collection Procedure

The study can be divided into three main phases in terms of collecting data. In the first phase, in order to understand the vocabulary teaching practices of EFL teachers in Turkey, an online questionnaire which was designed by the researcher is sent to 100 EFL teachers and their vocabulary teaching preferences are investigated by using open ended questions. They are asked to choose the practices that they use in classes and put them into an order from the most common to the rarest. In this way, teachers most common practices to teach vocabulary have been found.

In the second phase, 130 words from 10 units of the Oxford Directions A2 Book, which had been decided to be the main course source by the English Teachers in the school, have been selected. These words are not selected intentionally, rather, they are taken from the vocabulary parts of the units. It has been planned to teach 13 words in a lesson so that all the vocabulary parts can be covered in ten weeks. After that, Jensen's Brain-Based Teaching model and its correspondence with Bloom's Taxonomy have been underpinned. They are viewed under the theoretical basis of Mental Lexicon and Word Learning Assumptions to establish A Brain-Based Vocabulary Teaching Activity Check List. As a result, ten brain-based vocabulary teaching practices are designed by the researcher to apply in the experimental group for ten weeks. Before the application of the activities, pre-tests are conducted. At the end of every lesson, post tests are applied to be able to understand the impacts of brain-based vocabulary teaching. In control group, traditional vocabulary teaching practices such as giving bilingual word lists and having students write target vocabulary for multiple times are used. The pre-tests and post tests are also applied in the control group to be able to compare the results. Moreover, in the 4^{th}, 7^{th} and

10th weeks, retention tests are applied to see the learners' level of remembering the target words.

In the last phase of the study, the first and last lessons of the experimental group are videoed to see how brain-based vocabulary teaching practices affect learners emotionally in the classroom. Therefore, the videos are scrutinized through descriptive analysis and students' eagerness to join the activities and general classroom atmosphere have been discussed.

3.6.1 Brain-based vocabulary teaching practices

The practices are designed to see whether there are any meaningful and positive impacts of Brain-Based Vocabulary Teaching on young adults. They are used in an actual classroom setting containing 15 young adult learners whose ages are 15. All the practices are planned according to the correspondence between Jensen's Brain-Based Teaching and Bloom's Taxonomy. They are viewed on the theoretical basis of Mental Lexicon and Word Learning Assumptions as well. Additionally, the practices are divided into steps which refer to a stage and a level in both Bloom's Taxonomy and Jensen's Brain-Based Teaching. Every practice has a name which gives clues about the activities that are done in that lesson.

The first practice is "Find me". This practice is named as "Find me" since it requires learners to find connections between the target words and their previously learnt words. Additionally, it also asks learners to find the appropriate words for different contexts.

The second practice "Wordsvelope" is used in the classroom. The target words and their semantically related ones are presented in the envelopes entwined together. Learners open these and have a level of familiarity with the target vocabulary. For these reasons, this practice is called "Wordsvelope".

The third practice is "Vocards Pair". Learners are distributed cards. On the front side of these cards, semantically related words are written and on the other side of the cards, the phonologically similar words. They try to match these cards with the target words by finding a meaningful pair.

The fourth practice is “Stairs to success”. In this practice, target words and their semantically related ones are presented on the steps of the stairs. Learners link those words to each other to find the target words.

The fifth practice “Weather presenters” is used in the classroom. Learners are expected to present a weather forecast report taking the advantage of the target vocabulary they learnt.

The sixth practice is “Riddle solvers.” In this practice, target words are presented as the answers of the riddles. Learners try to solve these riddles to reach the target words.

The seventh practice is “Vocapuzzle”. The target words are presented in a puzzle which asks learners to find the appropriate word for the definitions. Learners need to solve the puzzle to reach the target words.

The eighth practice “Chained words” is used in the classroom. The target words and semantically related ones are presented in chains. Learners need to associate the chains so that they can find the target words.

The ninth practice is “Wordea”. Learners need to state their ideas about the target words so that they can link the new words with the previously known ones. They categorize and find more examples about the target words.

The tenth practice is “Word baskets”. Semantically related words to the target vocabulary are included in a shopping basket which helps learners find the target words. Learners use the baskets to reach the target words.

Jensen’s Brain-Based Teaching Model includes seven stages, whereas Bloom’s Taxonomy includes six levels. Among these stages, Pre-exposure in Brain-Based Teaching corresponds with the Remembering level in Bloom’s Taxonomy as both require teachers to have learners associate their previous knowledge with the new knowledge. For that reason, the practices that are planned to be done in this step are designed accordingly. The other corresponding steps are shown in the Figure 2. as follows:

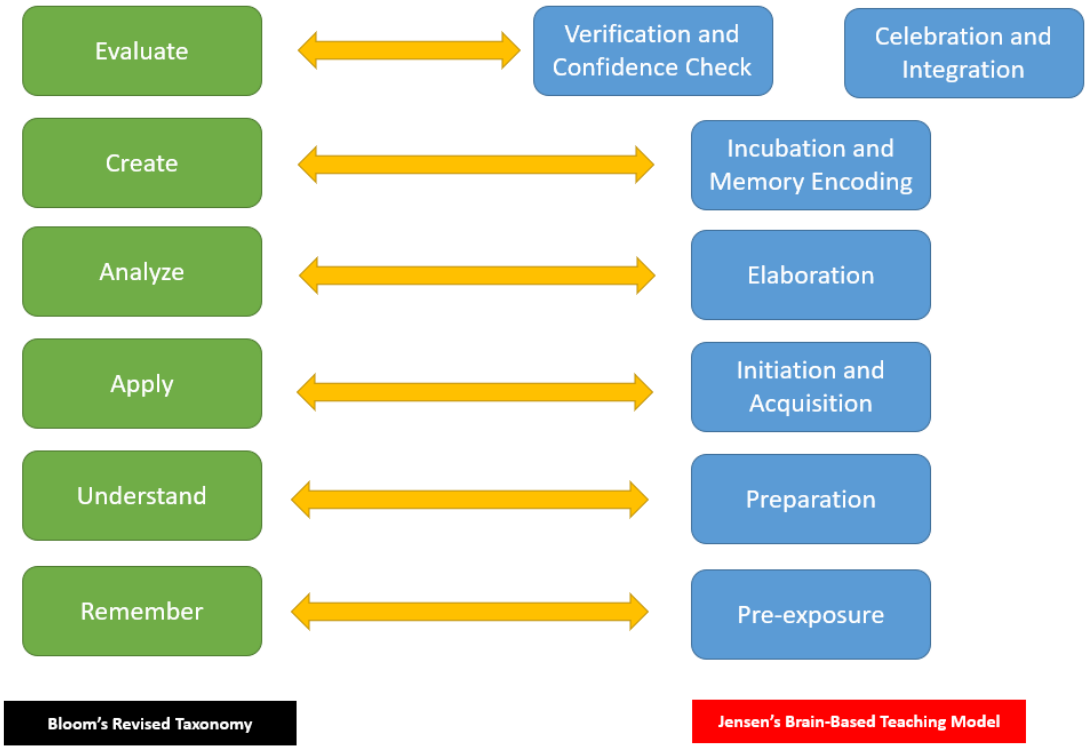


Figure 2. Correspondence between Bloom's Revised Taxonomy and Jensen's Brain-Based Teaching Model

Understanding Level in Bloom's Taxonomy is similar to Preparation Stage in Jensen's Brain-Based Teaching. Because both require learners to come into realization of newly presented items in a lesson. The activity steps related to these are designed accordingly. In this step, learners make obvious that they start understanding the newly presented items. For instance, by drawing a simple picture for the sentences including target words, they show that they understand the unfamiliar words. Hence, they begin to be curious about further information.

Both Applying Level in Bloom's Taxonomy and Initiation and Acquisition Stage in Jensen's Brain-Based Teaching require learners to use newly taught information in a simple context in which they can deepen their knowledge about the newly taught items. They understand that the items are not separate units only learnt in a lesson. Instead, they are associated with real usage. In the activity steps, these are presented by giving learners tasks in which they apply the newly learnt items in contexts where one of the items are required such as filling in the blanks in stories with the target vocabulary.

In Analyze Level of Bloom's Taxonomy, learners distinguish and identify new information, in other words, they increase their understanding on the newly taught items. The situation is the same in Elaboration Stage in Jensen's Brain-Based Teaching Model as it demands information processing. In activities, these are achieved through asking learners to make resemblance or differentiations between newly learnt items. This is achieved through getting them to put the target vocabulary into categories or finding new contexts where they can use the target words.

In Create Level of Bloom's Taxonomy, learners are expected to put forward a new product benefitting from the information that they learnt in the lesson. Similarly, in Incubation and Memory Encoding Stage in Jensen's Brain-Based Teaching, learners are given a break in their minds by asking them to create something with the information they learnt. Learners recall the information they learnt and do something accordingly. Learners are asked to create stories, slogans, advertisements and scenarios in the steps of the activities addressing these levels and stages.

Evaluate Level in Bloom's Taxonomy asks learners to make judgments about their learning. The same is true for Verification and Confidence Check and Celebration and Integration Stages of Jensen's Brain-Based Teaching Model as both require learners to make comments on the things that they created in the previous steps. In activities, sometimes teacher is asked to give feedbacks to learners on what they learn or learners are asked to exchange information about the newly learnt items through pair work, group work, giving medals on which positive feedback is written.

Taking these correspondences and similarities between the levels of Bloom's Taxonomy and Jensen's Brain-Based Teaching Model into consideration, the practices are presented in the tables which show steps of the activities, their referents to stages and levels in Jensen's Brain-Based Teaching and Bloom's Taxonomy, language skills that they address, vocabulary aspects that they cover and theoretical basis upon which they are built. These tables are as follows:

Table 1. First week's practice: find me					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Target words are presented in circles which include semantically related words connected to each other.	*Pre-exposure*	*Remembering*	Reading	Receptive	"A word facilitates processing of another" (Aitchison, 1987)(p.24).	*Mutual Exclusivity Assumption*
Learners find the appropriate target word for different sentences. Then, they draw a simple picture for every sentence to show that they understand the target words.	*Preparation*	*Understanding*	Reading	Receptive		
Learners try to find the appropriate word for listening exercises where one of the target word is necessary.	*Initiation and Acquisition*	*Applying*	Listening	Receptive		
Learners explain the connections between the target word and semantically related words by coming to the board voluntarily.	*Elaboration*	*Analyzing*	Speaking	Productive	"Words from the same semantic field are closely linked" (Aitchison, 1987)(p.84).	
Learners write or make up two-sentence memory involving one of the target words.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Learners share the memories that they wrote or made up in the previous step with their friends.	*Verification and Confidence Check*	*Evaluating*	Reading	Receptive and Productive		
Learners exchange opinions about how they felt about the memories they were involved.	*Celebration and Integration*		Speaking	Productive		

Table 2. Second week's practice: wordsvelope					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Target words are presented in two envelopes entwined together, on different tables in the classroom, in these envelopes, there are semantically related words and the target word is written on the largest envelope.	*Pre-exposure*	*Remembering*	Reading	Receptive	"Clusters of words relating to the same topic are stored together" (Aitchison, 1987, p.73).	*Basic Level Assumption*
Learners open the envelopes and put these on their desks. They try to guess the relation between these words by using one or two sentence utterances.	*Preparation*	*Understanding*	Speaking	Productive		
Learners see examples of stories about the target words on the smartboard. In these descriptions, learners identify the target vocabulary by reading them one by one. They match envelopes with the descriptions.	*Initiation and Acquisition*	*Applying*	Reading	Receptive	"Words from the same semantic field are closely linked" (Aitchison, 1987)(p.84).	
Learners try to understand the good and bad sides of sceneries. They give explanations and reasons to express their opinions.	*Elaboration*	*Analyzing*	Speaking	Receptive and Productive		
In pairs, learners write a travel agency advertisement in which they are to include these target words and their semantically related words.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Learners give their advertisements to the other pairs and they come together to make group of four members. In groups, they exchange opinions about the advertisements they wrote.	*Verification and Confidence Check*	*Evaluating*	Listening and Speaking	Receptive and Productive		
Learners choose one of the advertisements created by the classroom members and tell how they would feel if they read such an advertisement.	*Celebration and Integration*		Listening and Speaking	Productive		

Table 3. Third week's practice: vocards pair					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
There are two cards for every target word in this activity. One card includes the target word alone, the other card, in other words information card, has two sides: on the front side is written semantically related words, on the back side, phonologically similar words to the target word are written.	*Pre-exposure*	*Remembering*	Reading	Receptive	"Words with the same or similar beginnings and endings are closely linked" (Aitchison, 1987, p.124).	*Basic Level Assumption* *Mutual Exclusivity Assumption*
Every learner is given one information card and they introduce these cards to their friends coming to the board.	*Preparation*	*Understanding*	Speaking	Productive		
Classroom is divided into two groups. One group is given the information cards and the other group takes target word cards. Learners try to find matches walking around the classroom by using the information on the cards.	*Initiation and Acquisition*	*Applying*	Listening and Speaking	Receptive and Productive		
After each match is found, learners come to the board and explain the correctness of the matches they found by using the clues on information cards.	*Elaboration*	*Analyzing*	Speaking	Productive	"Clusters of words relating to the same topic are stored together" (Aitchison, 1987) (p.73).	
Each pair of learners create a sentence including the target word. These sentences can be related to their personal lives. They express their sentences to the other pairs.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Learners express their opinions and feelings about the sentences that their friends uttered.	*Verification and Confidence Check*	*Evaluating*	Speaking	Productive		
Learners will give feedbacks to their friends about the sentences.	*Celebration and Integration*		Speaking	Productive		

Table 4. Fourth week's practice: stairs to success					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Target words are presented in graphics in the shape of stairs, on the steps of which semantically related words are written. On the top, target word is written.	*Pre-exposure*	*Remembering*	Reading	Receptive	"Word association responses suggest that words are indeed organized in the mental lexicon" (Schmitt, 2000) (p.42).	*Mutual Exclusivity Assumption*
Learners see a story behind stairs on the whiteboard. The story includes each semantically related word, and every story has one word missing. Learners read and wonder about the word.	*Preparation*	*Understanding*	Reading	Receptive		
Learners try to find which of the target words are suitable for the blanks in stories.	*Initiation and Acquisition*	*Applying*	Reading	Receptive		
Learners hear conversations including the target vocabulary. They put one mark on their notebooks every time they hear one of the words from target vocabulary.	*Elaboration*	*Analyzing*	Listening	Receptive	"Clusters of words relating to the same topic are stored together" (Aitchison, 1987) (p.73).	
Learners are put in groups of three and try to write a drama scenario including target vocabulary.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
The groups of learners exchange their scenarios. They study the scenarios and act it out in the classroom.	*Verification and Confidence Check*	*Evaluating*	Reading and Speaking	Receptive and Productive		
Every scenario is rated and given feedbacks by the teacher.	*Celebration and Integration*		Listening	Receptive		

Table 5. Fifth week's practice: weather presenters					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Learners watch a video about the target words. In these video, semantically related words to the target vocabulary are given. Teacher pauses the video from time to time and get learners to repeat sentences.	*Pre-exposure*	*Remembering*	Reading	Receptive	"Preactivating listener's attention is known as priming" (Aitchison, 1987, p.24).	Whole Object Assumption
Learners take notes of sentences in the video. They group these sentences under the categories of bad weather conditions and good weather conditions.	*Preparation*	*Understanding*	Writing	Productive		
Learners listen to the video without seeing it this time. They use the sentences they wrote in the previous step and the target words to tell a story by coming to the board.	*Initiation and Acquisition*	*Applying*	Listening and Speaking	Productive		
After each story, learners try to guess the meaning of the target word. They raise their hands to say each word's Turkish meaning.	*Elaboration*	*Analyzing*	Speaking	Receptive	"Clusters of words relating to the same topic are stored together" (Aitchison, 1987) (p.73).	
Learners prepare a weather forecast report including one of the target words. They made their speech in front of the class voluntarily.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Learners express their opinions about their friends' speeches. They speak to each other to learn whether they agree or disagree with the speech givers.	*Verification and Confidence Check*	*Evaluating*	Reading and Speaking	Productive		
Each learner is given a paper medal including the sentence: "Congratulations, you have learnt these words."	*Celebration and Integration*		Speaking	Productive		

Table 6. Sixth week's practice: riddle solvers					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Learners are taken to the computer lab in this lesson. In every computer, there are folders, each of them is named as the target words. In the folders, there are pictures which are related to the target word.	*Pre-exposure*	*Remembering*	Reading	Receptive	"A word facilitates processing of another" (Aitchison, 1987) (p.24).	Basic Level Assumption
Learners try to find more pictures of the semantically related words on the internet. They put those pictures they find on the internet into the folders.	*Preparation*	*Understanding*	Reading	Receptive		
Learners see the "riddles" folder on the desktop. They open that folder and read each riddle. The answers of these riddles are the target words one by one. They try to solve these riddles.	*Initiation and Acquisition*	*Applying*	Reading	Receptive		
Each target word is listed by learners. They find these words' English equivalents on an online dictionary. They read and take notes about the definitions of the target words.	*Elaboration*	*Analyzing*	Reading	Receptive	"The fact that a prototype often calls up a whole scene, in which numerous other words are involved, indicated one important fact: words cannot be dealt with isolation" (Aitchison, 1987) (p.62).	
Learners are put in groups of four and prepare a puzzle including target words and their English equivalents by using puzzlemaker webtool.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Puzzles are solved in the classroom altogether. They exchange ideas about the puzzles.	*Verification and Confidence Check*	*Evaluating*	Reading and Speaking	Productive		
ch puzzle is presented in the classroom and given feedback by the teacher.	*Celebration and Integration*		Speaking	Productive		

Table 7. Seventh week's practice: vocapuzzle					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Learners see a puzzle including English definitions of the target words.	*Pre-exposure*	*Remembering*	Reading	Receptive	"In some cases, it is difficult to understand a word without knowing the words around it" (Aitchison,1987) (p.63).	Basic Level Assumption
Learners use the definitions as clues to understand each target word.	*Preparation*	*Understanding*	Reading	Receptive		
Learners solve the puzzle by using the definitions as clues.	*Initiation and Acquisition*	*Applying*	Listening	Receptive		
Each word is seen in a sentence by the learners. They take notes whether the words in the sentences are used according to their definitions in the puzzle.	*Elaboration*	*Analyzing*	Reading	Receptive	"Words from the same semantic field are closely linked" (Aitchison, 1987) (p.84).	
In pairs, learners tell the sentences in the previous step to each other. They dramatize the scene and try to give answers to the sentences as if they heard in the real life.	*Incubation and Memory Encoding*	*Creating*	Speaking	Productive		
The dialogues are resumed by the learners to see how the conversation goes.	*Verification and Confidence Check*	*Evaluating*	Speaking	Productive		
Each dialogue is acted out in front of the class and given feedbacks.	*Celebration and Integration*		Speaking	Productive		

Table 8. Eighth week's practice chained words					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Chains including target words are presented on the smartboard. Every chain includes semantically related words to the target word.	*Pre-exposure*	*Remembering*	Reading	Receptive	"A word facilitates processing of another" (Aitchison, 1987)(p.24).	Whole Object Assumption
Classroom is divided into two groups. These groups form speech circles. Every member of the speech circle says a sentence about the word in chain in turns.	*Preparation*	*Understanding*	Speaking	Productive		
By learners, target words are placed in the blanks of the chains which have semantically related words.	*Initiation and Acquisition*	*Applying*	Reading	Receptive		
Learners listen to different people describing their jobs. They try to know which job these people have.	*Elaboration*	*Analyzing*	Listening and Speaking	Receptive and Productive	"Words from the same semantic field are closely linked" (Aitchison, 1987)(p.84).	
In groups of five, learners prepare wallpapers introducing target words. Every group chooses a different job. They use semantically related words in their wallpapers.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
At the end of the activity, groups present their wallpapers in front of the class. Their peers evaluate them with special respect to positive sides.	*Verification and Confidence Check*	*Evaluating*	Speaking	Productive		
Every wallpaper is hung on the wall and learners are given feedbacks by the teacher.	*Celebration and Integration*		Speaking	Productive		

Table 9. Ninth week's practice: wordea					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Learners express their opinions about the words travel, tourism, culture, history, religion, holiday, and tourist attractions. They tell a word that might be related to these. These words are written on the board without paying attention to any relevancy.	Pre-exposure	Remembering	Speaking	Productive	"Preactivating listener's attention is known as priming" (Aitchison, 1987, p.24).	Whole Object Assumption
Teacher draws links between the target words and learners' own words on the board.	Preparation	Understanding	Reading	Receptive		
Learners are given situations in which tourists state their preferences about tourist attractions. Learners try to find suitable places for these tourists.	Initiation and Acquisition	Applying	Listening	Receptive and Productive		
Learners put the target words into categories of winter tourism, summer tourism, historical tourism, and cultural tourism.	Elaboration	Analyzing	Reading	Receptive	"Clusters of words relating to the same topic are stored together" (Aitchison, 1987, p.73).	
Pictures of target words are hung on the walls of the classroom. Learners are put in groups of three and they wander around the classroom. One of the group members is tourist guide. They introduce these places to their friends. With every different place, a different learner becomes the tourist guide.	Incubation and Memory Encoding	Creating	Speaking	Productive		
At the end of the activity, groups are asked to evaluate themselves. They express their reasons and what points they emphasize while introducing the places.	Verification and Confidence Check	Evaluating	Speaking	Productive		
Learners are asked which places they would prefer to go and how they would feel if they went those places.	Celebration and Integration		Speaking	Productive		

Table 10. Tenth week's practice: word baskets					**Theoretical Basis**	
Activity Steps	**The stage(s) it corresponds in Brain-Based Teaching**	**The level it addresses in Bloom's Taxonomy**	**Language Skill**	**Vocabulary Aspect**	**Its relation to Mental Lexicon**	**Word Learning Assumption**
Learners are shown shopping lists in which there are words for the items that someone can buy from the shops.	*Pre-exposure*	*Remembering*	Reading	Receptive	"We need to consider how they are stored in relation to one another" (Atchison, 1987, p.62)	Whole Object Assumption Mutual Exclusivity Assumption
Learners prepare the Turkish equivalents of the items in the shopping lists.	*Preparation*	*Understanding*	Writing	Receptive		
Learners are shown pictures of target words and asked to find the appropriate places to buy the items on the list. They write the names of the places on the shopping lists.	*Initiation and Acquisition*	*Applying*	Reading	Receptive		
Learners are put in groups of three. The names of the places are written on a piece of paper and put on three different desks. Every group sits on a desk and tries to find other items that may be bought from these shops.	*Elaboration*	*Analyzing*	Speaking	Productive		
In groups, they assume that they own a shop from the target words. They try to create a slogan for these shops.	*Incubation and Memory Encoding*	*Creating*	Writing	Productive		
Every slogan is read aloud by the students at the end of the activity. The other groups express their preferences about shops and how they are affected by the slogans.	*Verification and Confidence Check*	*Evaluating*	Reading and Speaking	Receptive and Productive		
The slogans created by learners are hung on the walls.	*Celebration and Integration*		Reading	Receptive		

3.7 Data Analysis Procedure

The data obtained from the questionnaire which was answered by 100 EFL teachers is analyzed in two ways. One of them is the direct results that are taken from google forms. These data include demographical questions and the answers of the 4th and 5th questions. The fourth question was about what practices do you use to teach vocabulary? (More than one option is possible). In the second way, the data of the last question of the questionnaire was analyzed by the researcher manually. The question was about putting the practices into an order from the most common to the rarest. So, the researcher read every answer and gave 10 points to the first item and 1 to the last item in the sequence that the teachers made. Hence, the preference ratio of the activities has been calculated.

The test results of the students have been analyzed by the research by grading the correct answers. The total point is determined as 100 hundred points and it has been divided into question numbers to find a point for every question. After that students' percentage of knowing or learning the words have been put forward.

The videos that are taken in the first and last lessons of the experimental group have been watched and scrutinized through descriptive analysis. Every student in the study was given a number to represent him. The behaviors and reactions of learners were analyzed with the assistance of a psychologist and a psychological counselor. According to the videos, the learners' eagerness to join the activities and general classroom atmosphere were observed and described.

4. FINDINGS AND DISCUSSION

4.1 Organization of the Findings

In this study, three data collection instruments are used. These are respectively the questionnaire sent to 100 EFL teachers to identify the most commonly and frequently used practices to teach vocabulary in classrooms, tests to reveal the impacts of Brain-Based Vocabulary Teaching Activities in the classroom of young adult learners and two lesson videos to show the learners' eagerness to join the activities and general classroom atmosphere. The data obtained by these instruments are analyzed and given in this chapter.

In the first part titled as The Most Common Practices Used by Teachers to Teach Vocabulary, the findings of the questionnaire containing five questions are presented with special respect to the answer given to each question.

In the next part named as Pre-Test Results, the test points of both experimental and control group are shown on different tables. The same is true for the next part, named as Retention Test Results and Post-Test Results.

In the last part, named as Observations about Videos, learners' eagerness to join the activities and general classroom atmosphere in the experimental group are explained.

4.2 The Most Common Practices Used by Teachers to Teach Vocabulary

This questionnaire was designed and distributed to 10 EFL teachers in a pilot project. After it was understood that the answers given by the teachers were consistent with the objective of the study, the same questionnaire was sent to 100 EFL teachers who teach at different schools in Turkey. The questionnaire aims to understand what practices EFL teachers use to teach vocabulary as one of the purposes of the study is to put forward that Brain-Based Vocabulary Teaching should be used in the classrooms. For this purpose, the practices used by the teachers in the actual classroom setting have been enlightened. The questionnaire included 5 questions. The detailed results of the questionnaire, "The Most Common Practices Used in Vocabulary Teaching" are as follows:

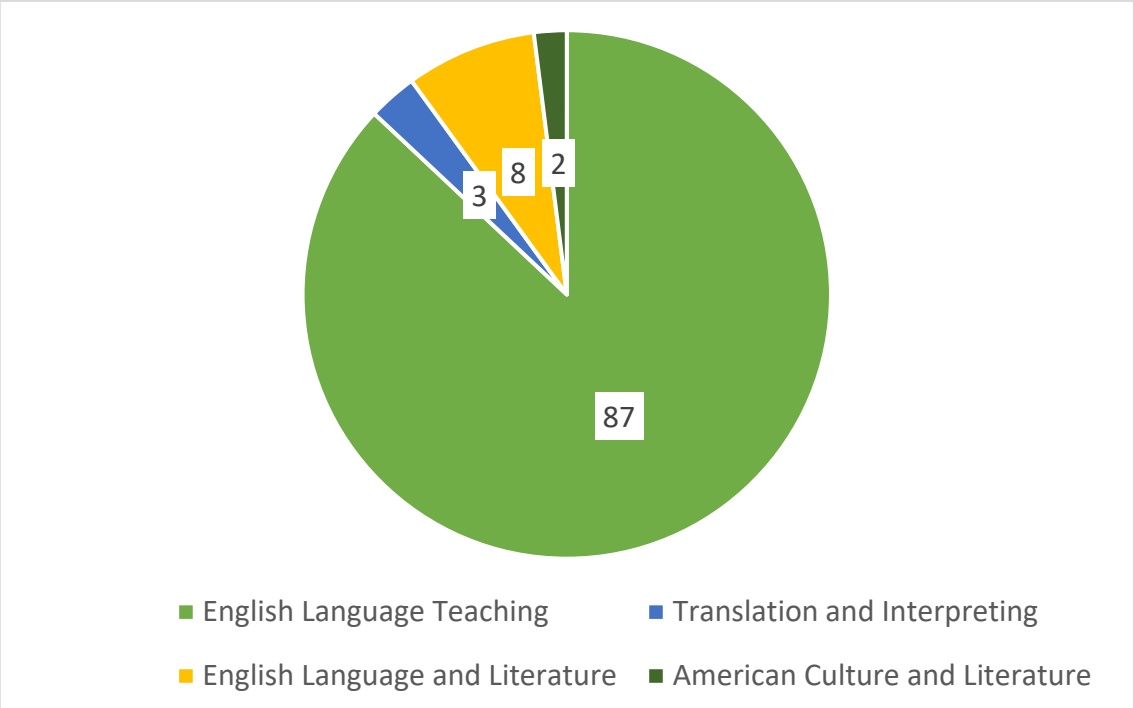


Figure 3. The majors of the teachers

100 participants are involved in this research. The first question of the questionnaire is about the majors of EFL Teachers. Participants differed in their majors as English Language teaching, Translation and Interpreting, English Language and Literature, American Culture and Literature.

The percentage of Participants whose major is English Language Teaching is 87. English Language and Literature is 8%, Translation and Interpreting is 3% and American Culture and Literature is 2%. It has been seen that majority of the participants answering the questionnaire is English Language Teaching graduates whereas the minority is American Culture and Literature graduates. The fact that majority of the participants are English Language Teaching graduates is important as there may be differences between practice preferences of different majors. Moreover, the percentage of English Language Teaching graduates is 87 which makes the participants of the study a homogenous group. Most of English Language Teaching graduates prefer translation-based practices and memory games, whereas English Language and Literature graduates prefer presenting target vocabulary in literary texts such as stories, paragraphs and poems. This shows that even though English Language Teaching graduates do not have certain practice preferences to

teach vocabulary, English Language and Literature graduates tend to choose text-based vocabulary teaching. They usually depend on the texts to present target vocabulary. When it comes to Translation and Interpreting graduates' practice preferences, they primarily depend on translation-based preferences in which learners need to translate a text including target vocabulary into their L1. The situation is the same in the practice preferences of American Culture and Literature graduates. They select practices which require learners to translate a text, poem, story or a paragraph.

The second question of the questionnaire is about the age groups that EFL teachers have currently been teaching. This question has been asked to identify which age groups the participants have currently been teaching. The number of participants who teach English to the young adult learners whose ages differ from 14-18 is 83. 17 participants teach English to either primary or secondary school learners. This is also significant as this study aims to enlighten the impacts of Brain-Based Vocabulary Teaching on young adult learners whose ages differ from 15-18. The questionnaire presents the practice preferences of 83 teachers who teach young adult learners.

The third question of the questionnaire is about the years of experience that EFL Teachers have on teaching. 90 participants have at least 5 years of experience, whereas 10 participants have less than 5 years of experience in teaching English. This finding is valuable as different practice preferences are offered by teachers who have different amount of experience. The teachers who have more than 5 years of experience tend to prefer easy and quick to use practices such as giving bilingual word lists and having students write target vocabulary for multiple times as they have experienced the classrooms more than the others and been aware of the classroom dynamics more. However, the ones who have less than 5 years of experience do not abstain from practices which require a lot of effort such as giving students matching games. This practice requires a lot of effort as it may be difficult to prepare a matching game for every target vocabulary unit. Therefore, it can be said that the practice preferences of these two groups differ in terms of their applicability in the classroom.

In the fourth question, the participants are asked to choose which practices they use to teach vocabulary in the classroom. 32 practices and an additional option were added in

case participants would like to add their own practices. Participants are also allowed to choose more than one option. The practices' names and their percentage of being chosen are written by their sides.

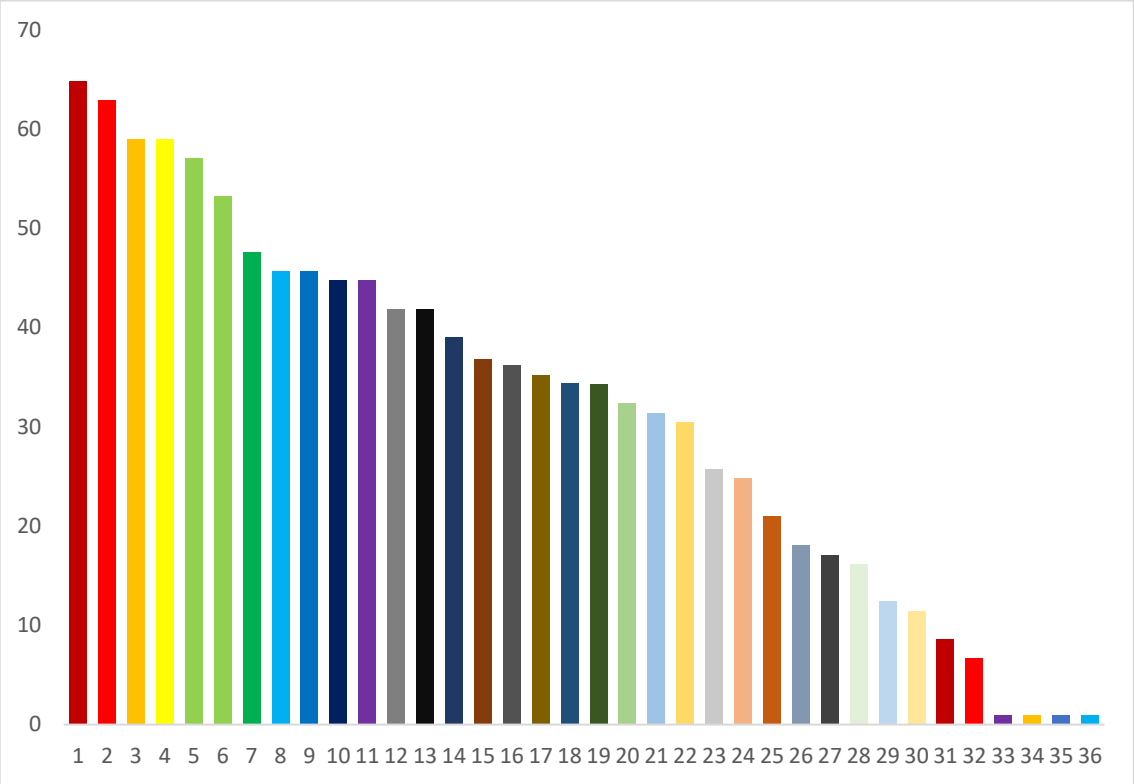


Figure 4. The most common practices chosen by EFL Teachers

% = how common or rare an activity is

1- Presenting target vocabulary with videos %64,8

2- Having students listen to songs about target vocabulary %62,9

3- Giving bilingual word lists %59,

4- Presenting target vocabulary in a text %59,

5-Miming target vocabulary %57,1,

6-Having students read a dialogue about target vocabulary %53,3,

7- Having students make a sentence about target vocabulary %47,6,

8- Having students read a text including target vocabulary and translate it into L1 %45,7,

9- Giving students matching games in which there are L1 equivalents of target vocabulary %45,7,

10- Playing memorization games about target vocabulary %44,8,

11- Using pictionaries about target vocabulary %44,8,

12- Drawing or having students draw pictures of target vocabulary %41,9,

13- Putting target vocabulary into categories %41,9,

14-Playing jeopardy games about target vocabulary with students %30,5,

15-Having students memorize target vocabulary by repeating multiple times %36,8,

16-Using dramatization %36,2,

17-Playing hangman about target vocabulary with students %35,2,

18-Having students play kahoot games about target vocabulary % 34,3,

19-Giving students cloze tests about target vocabulary %34,3,

20-Playing movement and command-based games with students about target vocabulary %32,4,

21-Having students write a dialogue about target vocabulary %31,4,

22-Using picture stories about target vocabulary %30,5,

23-Having students write a story about target vocabulary %25,7,

24- Giving monolingual word lists %24,8,

25- Having students write target vocabulary with their Turkish equivalents for multiple times %21,

26- Bringing models or maquettes of target vocabulary %18,1,

27-Playing taboo with students about target vocabulary %17,1,

28-Playing bingo games about target vocabulary with students %16,2,

29-Playing scrabble with students about target vocabulary %12,4,

30-Using poetry %11,4,

31-Using Flipgrid platform %8,6,

32-Using Lyrics training platform with students %6,7,

33-Mind mapping %1,

34-Word search %1,

35-Memorable %1,

36-Using Memory aid learning loops % 1.

When the fourth question's answers were analyzed, it was seen that teachers mostly know vocabulary teaching practices which are easy to use in classroom, in vocabulary teaching, however, all the practices should correspond with the working principles of the brain as it is the center where all learning occurs. The practices that are stated to be used by the teachers participated in the questionnaire help learners to some extent, but a brain-based approach is needed to meet the needs of the learners and enable them to acquire the words they aim to learn. Because, for instance, giving bilingual word lists to students to teach vocabulary can be seen as an inefficient way as it may load a burden to the students'

shoulders with a lot of things to remember by making them memorize target words instead of facilitating their learning and remembering. As Oscar Wilde put it: “If you want to forget something, put it in a list”.

The other most popular practices that are chosen by the teachers can also be very challenging for some learners. For instance, presenting target vocabulary with videos can be elusive for audial learners. The situation is the same for presenting target vocabulary with songs with visual learners. There are also some other practices that neither correspond with the working principles of the brain, nor have a possibility of encouraging learners and increasing their motivation to learn a new language. By having learners to write target vocabulary for multiple times and giving cloze test including target words may exhaust learners and lower their self-confidence by making them feel unsuccessful. Nonetheless, it would be unfair to judge teachers only by the practices that they expressed they knew. Instead, the practices most frequently used by them should be detected as well. For this reason, the frequency of practices used by teachers in the classrooms are asked in the fifth question.

In the last question, to be able to detect the most frequently used ones in classroom, teachers were asked to put ten of the practices, which they chose in the previous question, in an order from the most frequently used to the rarest. According to the sequence that every teacher made, the preference ratio of each practice was determined. The practice in the first rank was given ten points and the one in the tenth rank was given one point. This grading process was applied to every answer of the fifth question in the questionnaire. As a result, the preference ratios of the practices were determined. According to the results, in vocabulary teaching, the most frequently used practice by the EFL teachers in Turkey is “presenting vocabulary with videos”, whereas the most rarely used one is “using Lyrics training Web Tool with students”. Their preference ratios, calculated by the sequence made by the teachers, are given in brackets.

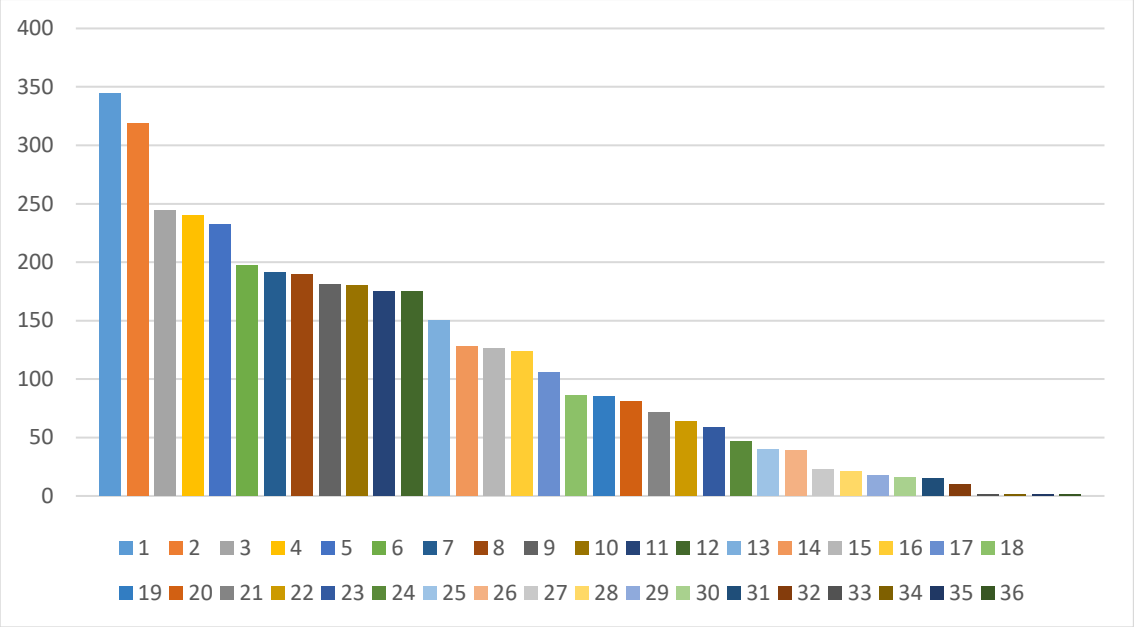


Figure 5. Preference ratios of the practices

1- Presenting target vocabulary with videos (344)

2- Giving bilingual word lists (319)

3- Having students read a text including target vocabulary and translate it into L1 (244)

4- Having students listen to songs about target vocabulary (240)

5- Presenting target vocabulary in a text (232)

6- Giving students matching games including L1 equivalents of target vocabulary (197)

7- Having students memorize target vocabulary by repeating multiple times has been chosen (191)

8- Using pictionaries about target vocabulary (190)

9- Having students read a dialogue about target vocabulary (181)

10- Having students make a sentence about target vocabulary (180)

11- Miming target vocabulary (175)

12- Playing movement and command-based games with students about target vocabulary (175)

13- Playing memorization games about target vocabulary (150)

14- Putting target vocabulary into categories (128)

15- Having students play kahoot games about target vocabulary (126)

16- Having students write target vocabulary with their Turkish equivalents for multiple times (124)

17- Giving students cloze tests about target vocabulary (106)

18- Using picture stories about target vocabulary (86)

19- Using dramatization (85)

20- Having students write a story about target vocabulary (81)

21- Playing hangman about target vocabulary with students (71)

22- Having students write a dialogue about target vocabulary (64)

23- Drawing or having students draw pictures of target vocabulary (59)

24- Bringing models or maquettes of target vocabulary (47)

25- Giving monolingual word lists (40)

26- Playing jeopardy games about target vocabulary with students (39)

27- Playing scrabble with students about target vocabulary (23)

28- Using Flipgrid platform (21)

29- Playing bingo games about target vocabulary with students (18)

30- Using Lyrics training platform with students (16)

31- Playing taboo with students about target vocabulary (15)

32- Using poetry (10)

33- Mind mapping (1)

34- Word search (1)

35- Memorable (1)

36- Using Memory aid learning loops (1)

Additionally, the most frequently used ten practices are respectively as follows:

a) Presenting vocabulary with videos,

b) Giving bilingual word lists,

c) Having students read a text including target vocabulary and translate it into L1,

d) Having students listen to songs about target vocabulary,

e) Presenting target vocabulary in a text,

f) Giving students matching games in which there are L1 equivalents of target vocabulary,

g) Having students memorize target vocabulary by repeating multiple times has been chosen,

h) Using pictionaries about target vocabulary,

i) Having students read a dialogue about target vocabulary,

j) Having students make a sentence about target vocabulary.

The least frequently used practices are as follows:

i. mind mapping,

ii. word search,

iii. memory aid learning loops,

iv. memorable,

v. using poetry,

vi. playing taboo with students about target vocabulary,

vii. using Lyricstraining platform with students,

viii. playing bingo games about target vocabulary with students,

ix. using Flipgrid platform,

x. playing scrabble with students about target vocabulary.

In the light of this information, when the three most preferred practices are regarded, it is obvious that EFL teachers in Turkey mostly rely on giving L1 equivalents of target vocabulary. It can also be suggested that EFL teachers tend to use different practices in classrooms, however, when it comes to using one of them commonly to teach vocabulary, they chose giving bilingual word lists to the students. In other words, most of the EFL teachers know various practices such as presenting target vocabulary with videos, songs, and texts but they use giving bilingual word lists in a more common way. They cannot keep their classrooms away from traditional vocabulary teaching practices such as translation and giving bilingual word lists. Furthermore, these results show that it is not always possible to use different practices such as using songs, videos, and texts to teach vocabulary in classrooms, as it may be difficult to find an appropriate song, a video and a text which cover the target vocabulary, whereas it is mostly possible to give bilingual word lists to the students as it can cover target vocabulary in an easier way.

All these practices that are preferred by EFL teachers should be modified according to the brain's working principles and some new practice types should be introduced with the teachers in order for vocabulary teaching to be effective as all of the practices used by EFL teachers lack points that may be crucial for a learner in a learning environment. Teachers should also be informed about the working principles of brain so that they can also adapt these into their classrooms in their other teaching experiences. Thus, this study aims to bring new insights into vocabulary teaching in the framework of brain-based approach, to provide practices for classroom usage and to clarify a brain-based vocabulary practice checklist for future usage for EFL teachers. The practices which are designed by taking the correspondence between Jensen's Brain-Based Teaching Model and Bloom's Taxonomy on the theoretical basis of Mental Lexicon and Word Learning Assumptions into consideration by the researcher is to be applied in actual classroom and the results are to be discussed in this research. The results are provided through the pre-tests, retention tests and posttests applied in experimental group in which ten Brain-Based Vocabulary Teaching Practices are used. In control group, traditional vocabulary teaching practices such as giving bilingual word lists and having students translate a text into L1 are used to teach vocabulary. Finally, to be able to understand the emotional outcomes of Brain-Based Vocabulary Teaching Practices on young adult learners, the first and the last week's lessons are videoed in the experimental group and these videos are analyzed through descriptive analysis under the criteria of eagerness to join the activities and general classroom atmosphere.

4.3 Pre-Test Results

In this part, the results of the pre-tests are presented.

Groups' Statistics of Pre-test

	group_name	N	Mean	Std. Deviation	Std. Error Mean
pretest	Control Group	15	29,7913	1,67098	,43144
	Experimental Group	15	28,4553	2,46360	,63610

Figure 6. Pre-test results of the groups

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
pretest	Equal variances assumed	2,410	,132	1,738	28	,093	1,33600	,76861	-,23843	2,91043
	Equal variances not assumed			1,738	24,631	,095	1,33600	,76861	-,24819	2,92019

Figure 7. Pre-test results of the groups according to the Independent Samples Test

Taking the pre-test results of both groups into account, it can be stated that there are not any statistically meaningful differences between the groups according to the Independent Samples Test (p>0,05). From this point of view, it was seen that the students in the experimental and control group formed equivalent groups.

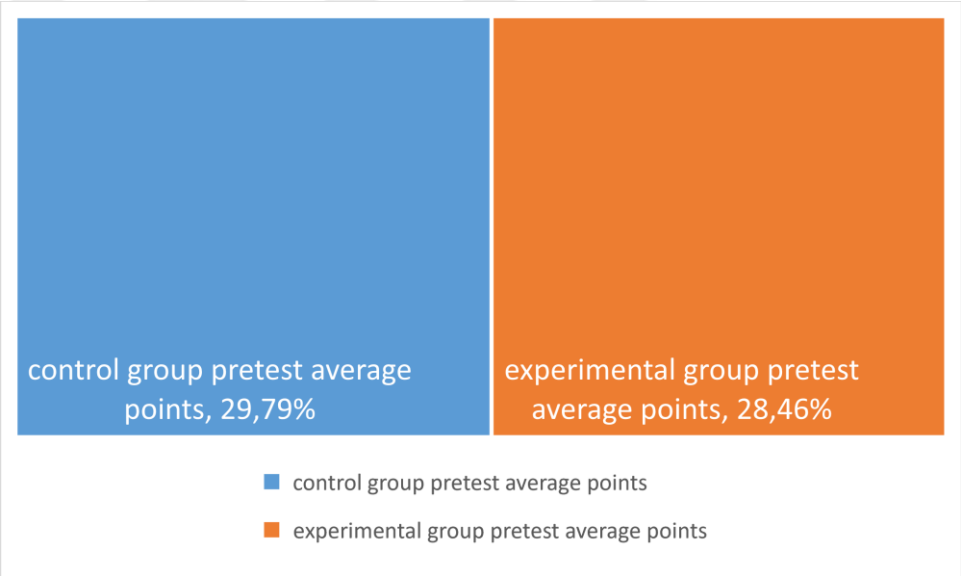


Figure 8. Pre-Test Average Points of the Groups

4.4 Post Test Results

In this part, the post test results of both groups and their differences are scrutinized.

Group Statistics

	group_name	N	Mean	Std. Deviation	Std. Error Mean
Difference_post_pre_test	Control Group	15	37,5953	6,76607	1,74699
	Experimental Group	15	63,1611	3,83678	,99065

Figure 9. Difference between the post test and pre-test results of the groups

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Difference_post_pre_test	Equal variances assumed	2,911	,099	-12,730	28	,000	-25,56581	2,00832	-29,67968	-21,45195
	Equal variances not assumed			-12,730	22,160	,000	-25,56581	2,00832	-29,72908	-21,40255

Figure 10. Post test results of the groups according to the Independent Samples Test

According to the results of the Independent Samples Test, there are statistically meaningful differences between the results of post tests both groups ($p<0,05$). As it can be understood from these results that learners in the experimental group showed more improvement than the ones in the control group in terms of learning the target vocabulary. Although the learners in the control group managed to learn the target vocabulary taught through traditional vocabulary teaching practices, they showed less improvement when compared to the experimental group taught through Brain-Based Vocabulary Teaching Practices. Their average points of the post tests are as follows:

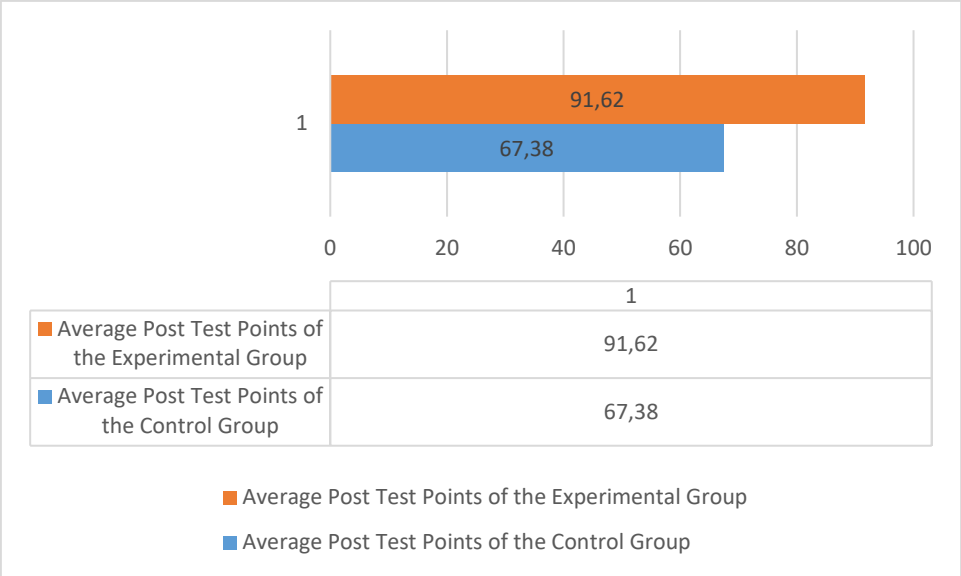


Figure 11. Average Post Test Points of the Groups

It has been indicated that the groups showed differences in terms of levels of learning the target vocabulary. When the differences between their post test and pre-test results are compared, as their pre-test results were almost the same, learners in the experimental group showed more success than the ones in the control group in terms of learning the target vocabulary. The differences between the groups are as follows:

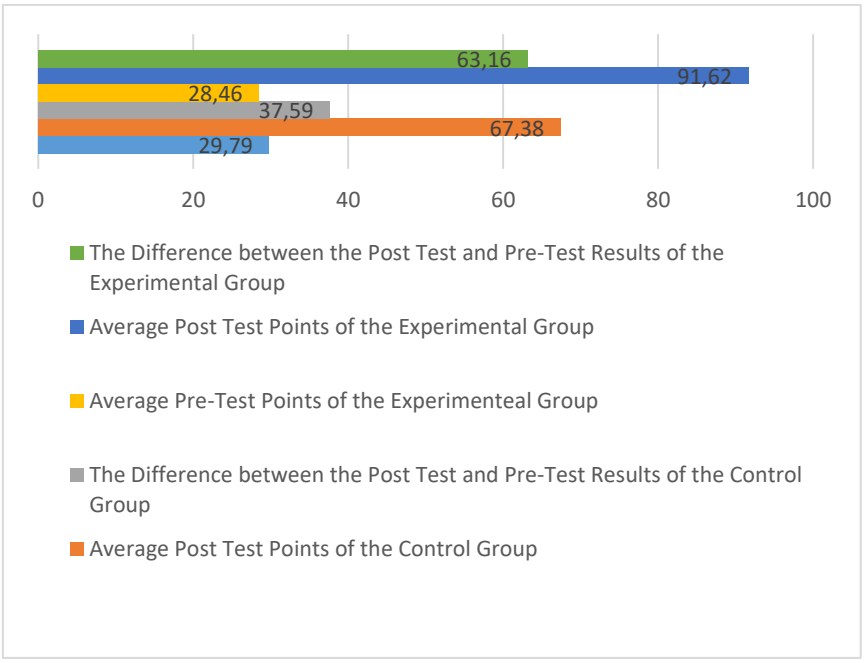


Figure 12. The Differences Between the Groups

In essence, when the post test results of these two equivalent groups are taken into account, it is clear that Brain-Based Vocabulary Teaching and traditional vocabulary teaching practices contributed to learning target words to the learners. However, Brain-Based Vocabulary Teaching practices provided the learners in the experimental group with more success in vocabulary learning.

4.5 Retention Test Results

In this part, the average Retention Test Points of the groups and their statistical differences from post test results are presented.

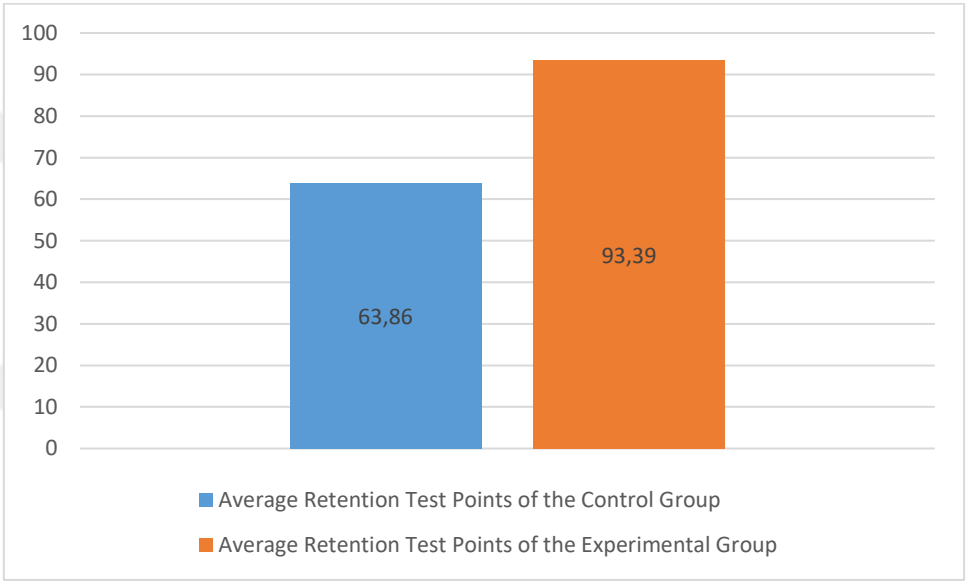


Figure 13. Average Retention Test Points of the Groups

According to the average points of the retention tests of both groups, it can be stated that learners in both groups managed to preserve their scores although certain period of time passed after the post tests were applied. In this study, retention tests help the researcher understand whether learners can remember the target words or their successes are special to the post tests of a specific week. For that reason, their retention test and post test results are compared to see if there are any statistically meaningful differences. The differences between the groups are analyzed through Independent Samples Test:

Group Statistics

	group_name	N	Mean	Std. Deviation	Std. Error Mean
Difference_retention_post_test	Control Group	15	-3,5200	9,62661	2,48558
	Experimental Group	15	1,7835	3,52861	,91108

Figure 14. Difference between the retention and post test results of the groups

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Difference_retention_post_test	Equal variances assumed	13,808	,001	-2,003	28	,055	-5,30352	2,64730	-10,72626	,11923
	Equal variances not assumed			-2,003	17,695	,061	-5,30352	2,64730	-10,87216	,26512

Figure 15. Difference between the retention and post test results of the groups according to the Independent Samples Test

There are statistically meaningful differences between the retention test and post test results of the groups (p>0,05). According to the results, learners in the experimental group are more successful in remembering the target words than the ones in the control group. Although learners in the control group do not forget the target words, their remembering levels are less than those of the experimental group. The reason why the learners in the control group do not forget the target words may be because of their individual performances or eagerness to show their success to their teachers. Therefore, it can be concluded that Brain-Based Vocabulary Teaching practices enable learners to not only learn the target words more effectively, but also remember the target words better and keep their learning permanent in their minds.

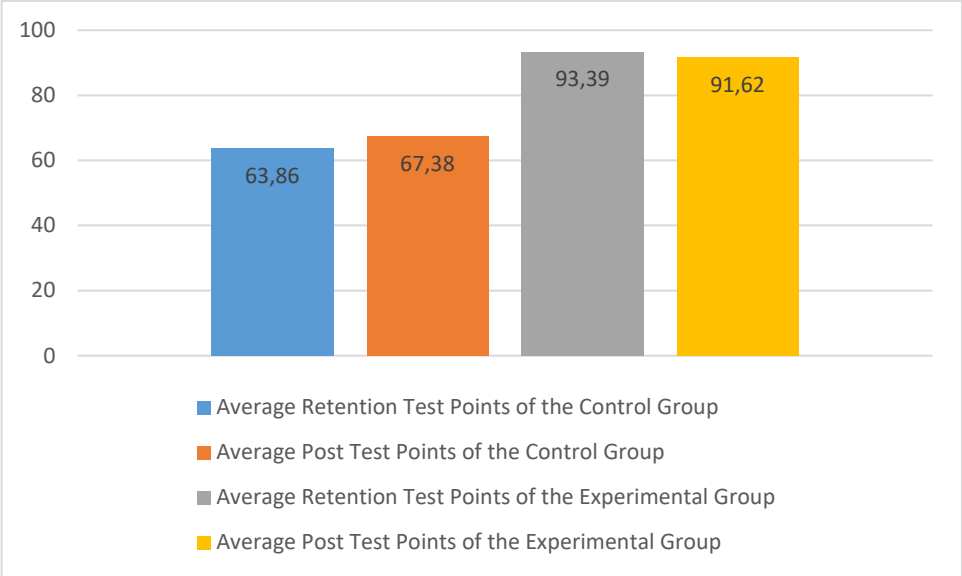


Figure 16. Retention and Post Test Results of the Groups

Finally, as it is shown in the Figure 16, the learners in the experimental group showed even more success than their post test results, whereas the learners in the control group showed less success than their post test results. To put it in another way, Brain-Based Vocabulary Teaching practices are more impactful than the traditional ones in helping learners remember the target words.

4.6 Observations About Videos

In this study, the first and the last week's lessons are videoed in the experimental group to see the emotional outcomes of the Brain-Based Vocabulary Teaching practices. The videos are taken during the parts of the lessons instead of the whole lessons so that learners can feel themselves comfortable. In total, there are two videos, shot in the first and the last lessons of the experimental group. Each video lasts 15 minutes. The videos are scrutinized through descriptive analysis. The analyses were obtained with the professional assistance of a psychologist and a psychological counselor. In the next part, the learners' eagerness to join the activities and general classroom atmosphere in the experimental group are explained judging by the reactions or behaviors that the learners performed during the lesson.

4.6.1 First lesson

In the study, learners are videoed during the first lesson to see their eagerness to join the activities and general classroom atmosphere. The videos are scrutinized through descriptive analysis. All the analyses were noted accompanying with a psychologist and a psychological counselor. The behaviors performed by every learner in the parts of the video are explained with special respect to two criteria mentioned above, eagerness to join the activities and general classroom atmosphere. The second criterion, general classroom atmosphere, is explained by scrutinizing common behaviors of the classroom members which create a classroom atmosphere.

4.6.1.1 Eagerness to join the activities

Learner 2 sits confidently at the beginning of the lesson even though he has not got any idea about what words he will see. When the teacher says one of the target words, “anxious”, and asks whether they know what it means, he smiles and confesses that he does not know the word. He also looks down to show that he is ashamed because he does not know the word. However, he still waits impatiently for the words related to the target word so that he can have an idea about what the target word means. After the teacher shows semantically related words such as worried, nervous, uncomfortable and troubled in the pre-exposure stage and remembering level, he smiles again. This might reveal that he not only has an idea about the meaning of the word but also has established a connection in his brain by making use of his previous knowledge. After the first word and its semantically related ones are given to the learners, he is more focused to see the next target words. While the next target words are shown he does not hold himself back from raising his hand to express what the target words might mean by making using of the semantically related words. When he is not given a chance to speak, he does not get hurt or feel unmotivated. This can be understood from his behavior to raise his hand again for the next questions. In the preparation stage and understanding level, learners are asked to draw a picture according to what they have understood from the sentence on the board. In this step, learner 2 is eager to read, draw and show his picture. This is because both he is already a self-confident learner and he thinks he understands the target word exactly. In the initiation and acquisition stage and applying level, learners are asked to listen to a

recording and answer the questions on the board accordingly. After he carefully listens to the recording, he raises his hand to answer the question on the board immediately. This shows that in general he is very motivated and eager to join the Brain-Based practices designed by the researcher.

Learner 4 listens to the teacher carefully from the first step of the practices to the last, however he does not easily join the activities. It can be suggested that he would like to be completely sure of what he has understood. For that reason, he does not raise his hands in the first and the second step of the activities. In the applying level and initiation and acquisition stage, learners are asked to listen to the recording and answer the questions, he hesitates to raise his hand. This shows that he is still not sure of whether he has understood the target word and the recording. He can be called as a cautious person judging by the behaviors he has performed until the third step of the practice. However, he does not feel himself unmotivated and unhappy as he can smile from time to time. Generally, although he may be evaluated as uneager to join the activities, it is obvious from his reactions such as being focused until the last minute of the lesson that he does not feel himself overwhelmed and bored of the activities.

Learner 6 concentrates on what the teacher says from the beginning of the lesson and repeats the target word and its semantically related ones. As soon as the teacher asks the meaning of the target word after he explains the semantically related ones, he raises his hand to answer the question. The teacher gives the chance to speak to another learner, learner 6 is still not disappointed with this situation judging by the look on his face. Additionally, he keeps on raising his hand for the next opportunities to speak. In the next step of the lesson where the teacher asks the classroom members to draw the pictures of the sentences, after he finishes drawing the picture, he expects his teacher to come and see it. From this expectation, it can be concluded that he is confident about his picture which shows that he has understood the target word. Next, when the teacher asks “which one of the target words come to your minds? “, he would like to participate in the activity to express his opinion about the target word. The teacher sees and gives him the chance to speak and learner 6 answers the question correctly. After the positive feedback he takes from his teacher, he is pleased about the situation and shows eagerness to see the other sentences. In general, his behaviors show that he is calm, focused and eager to join the

activities during the lesson as the activities in the lesson attract learners' attentions enabling them to take responsibility on their own learning and where they can establish neural connections in their brains.

Learner 8 is very careful about the teacher's instructions from the beginning of the lesson. Although there is a cliché about the students in the back row of the classroom which suggests that only learners who do not want to participate in the activities prefer sitting there, he behaves quite the opposite. He sometimes checks his friends' reactions to the target words and their semantically related ones. This might be an indicator of his tendency to learn cooperatively. In the pre-exposure and remembering part of the lesson, when the teacher asks, "Is there anyone who wants to read the words around the target word?", he would like to participate in the activity. However, he does not feel disappointed judging by the look on his face when the teacher gives the chance to another learner. He continues to raise his hand for the next question about the meaning of the target word and shows eagerness to read the words around the target word. The teacher gives him the right to speak and learner 8 reads and says the meaning of the word correctly. In the next part, he combines his hands in front of himself, which might show that he is in the middle of understanding a new item and bringing both his brain and emotions to the learning process as combining hands may mean bringing all the power together. As well as the eagerness to join the individual activities, he is also enthusiastic about joining the cooperative activities such as reading the sentence on the board aloud altogether. Learner 8 is a very patient person, he does not hurry up about having a right to speak, he does not demotivate himself when he could not get one. He sustains his eagerness through the whole lesson. From these mentioned above, it can be suggested that learner 8 is an eager learner to join the activities.

Learner 10 was not in the classroom when the lesson was videoed as he was ill. For that reason, there is not any observation about him for the first lesson.

Learner 12 smiles at the beginning of the video because of embarrassment about the lesson's being videoed. When the target words and their semantically related ones start to be explained and repeated, he focuses on them and listens to his teacher's instructions carefully. He repeats the words after the teacher without skipping even a word. When the

first question is posed by the teacher, he remains neutral to answer it. After that, he continues to listen to the lesson. He places one of his hands under his chin and shows the signs of understanding. Just after this hand movement, when the teacher asks the meaning of the word “embarrassed”, he raises his hand and answers the question correctly. He takes his hand back to where it was before he raised his hand and continues to listen to his teacher. He changes his hands’ position and tries to understand his teacher more. He thinks about the example that his teacher gave and keeps on listening. Although he seems eager in the pre-exposure stage and remembering level which are the first step in the Brain-Based Vocabulary Teaching, he does not show any eagerness when it comes to show that he has understood the words in the second step of the practice. While everybody raises their hands, learner 12 remains silent and observes what is around him. He performs cautious behaviors when the activities firstly start just as in the first step of the practice. He is one of the first learners to finish drawing his picture about the sentence reflected on the board. His teacher confirms his picture and he continues to observe his friends around him. Before the listening activity starts in the third step, he shows signs of boredom or anxiety of challenge in case he may not understand the listening part. He does not want to lose his confidence in the activities, for that reason he remains neutral about joining activities in the first place. In total, when his behaviors from the beginning to the end of the lesson are observed and evaluated, it can be concluded that he is cautious to join the activities in the first place, however, if he becomes more familiar with the activity, he does not hesitate to raise his hand to answer questions.

Learner 14 is a reserved person and wants to hide himself behind his friend although he and his parents have permission to be videoed during the lesson. Because of having a reserved personality and unfamiliarity of being videoed during the lesson, he performs shy behaviors about not only joining the activities but also being seen in the video. Despite all of these, he listens to the lesson carefully and repeats the target words and their semantically related ones. Furthermore, he draws his picture properly in the understanding level and initiation and acquisition stage. Nonetheless, in general, he can be evaluated as an uneager learner to join the activities.

Learner 16 moves his legs and plays with his hair at the beginning of the video. This may point out that either he has a prejudice about the activities and thinks that it will be a

boring lesson, or he acts cautiously before seeing the target words in front of the camera. For a while after the teacher starts to explain the target words, he does not stop doing the same things. However, when the teacher gives somebody else a chance to say the meaning of the first target word, he stops his movements just after he has heard the correct answer. He does not raise his hand for the first question because of his nervousness. For the next target words, his behaviors remain the same. Nevertheless, he does not abstain from joining the practices which are done altogether with the other classroom members such as repeating the target words and semantically related ones. Until the second step of the lesson, he does not show any eagerness to join the individual activities. Other than these, he is not distracted, rather, he focuses on the lesson and listens to his teacher carefully. After one of his friends reads the target words and the other words around it aloud, the teacher asks the meaning of the target word. Learner 16 raises his hand to answer at this point. The teacher gives him the chance and learner 16 answers this question correctly. After this minute, he stops performing nervous behaviors and joins the activities more. To sum up, just like learner 12, he does not show any eagerness to join the activities when they are firstly introduced, however, when he becomes involved in the activities more as the examples are given, he seems eager to raise his hands to answer the questions.

Although Learner 18 is a student who moves a lot during class, he listens carefully to the teacher's instructions. He can easily answer the questions asked. This may be due to his high interest in the lesson and activities. After the answers he gave, he continued the lesson in a more motivated way through the positive feedback he received from his teacher. He participated in almost all the activities in the 18 lessons, focused, and listened attentively to the teacher.

Learner 20 gave a very positive response to his teacher's request to involve him in the lesson and focused more on the activities in the lesson. During the lesson, it is observed that learner 20 follows the lesson in a comfortable position. It is seen that he carefully listens to the feedback given not only by his teacher but also by his friends during the lesson. It was also noted that he voluntarily answered the question asked by the teacher, additionally he was very comfortable while answering, and continued the lesson confidently. Although he finished his drawing long before the time allotted for that

activity, he reviewed his activity and made additions where he needed to. This shows that the interest in the lesson increases with the activities.

Learner 22 attentively listens to his teacher throughout the lesson. He does not raise his hand to answer the first question asked by the teacher. However, he confirms his friend's answer by nodding his head. He seems focused on the activities even though he moves his legs slightly from time to time. He thinks for a while before answering the question about the target word "confused". Then he raises his hand and answers correctly. In the next parts of the lesson, he volunteers to read the semantically related words. It is also observed that he gets impatient to see the next activity in the certain period of the lesson. He does not feel himself comfortable when it is time for drawing activity. He moves his feet while drawing. This movement might be an indicator of trying to finish the task quickly. After that, in the listening activity, he holds on a moment to understand clearly. While listening to the recording, he yawns. This shows that he finds the conversation in the listening recording boring. Nonetheless, he is surprised at the situation in the second conversation of the second listening recording. He shows this surprise by popping his eyes.

Learner 24 rubs one of his shoulders when listening to the teacher. This might be an indicator of thinking while listening. He carefully watches his teacher while he gives examples about the target words. Then, he scratches his head while thinking about the answer to the question the teacher asked. In the first parts of the lesson, he cannot decide whether to join the activities. After he watches his friends around the classroom, he decides to join the activities in the next steps. From this minute, he almost always raises his hand to speak. He seems eager to join the activities. Finally, he does not hesitate to state his opinion about the listening activity's answers.

Learner 26 listens carefully to the teacher's instructions. Although he changes his sitting position from time to time, he is not distracted. Sometimes he hesitates to pronounce the words spoken by the teacher. As the minutes progressed in the lesson, Learner 26's interest grew. In the middle of the lesson, he began to raise his hand to answer all the questions asked. He did what was asked of him in the activities properly and as a result

of the positive feedback he received from his teacher, his willingness to participate in the activities increased.

Learner 28 is aware of the need to listen carefully to the lesson. Therefore, he follows his teacher's instructions in a focused way. Student 28 cares about showing that he/she understands and shows this situation by using non-verbal communication items. He shakes his head, leans forward in body position, and carefully repeats the repetitions he is asked to do. He follows his teacher almost without taking his eyes off. Although it was seen that he answered the questions without being confident in the beginning of the lesson, he was more encouraged to participate in the activities in the lesson through the positive feedback given by the teacher regardless of the answer. He was able to maintain this participation until the end of the lesson and confidently did what was requested in the activities. He became the pioneer of his other friends in attending the lecture in the speaking activity. His excitement during the speech showed itself in the sentence he made.

Learner 30 was not in the classroom during the first week of the study. For that reason, he could not be described.

4.6.1.2 General classroom atmosphere in the first lesson

Learners showed eagerness to join the activities although they felt themselves uncomfortable because of being videoed during the lesson. The reason of this feeling might stem from the unfamiliarity of such a video shooting application in the classroom. Additionally, the types of practices are new to the learners. For these reasons, learners hesitated to join the activities at the beginning of the lesson. However, they performed a fully concentrated attitude towards the lesson when they realized that they did not need to feel under pressure. The teacher gave the learners the freedom to take active roles in their own learning and reinforced them whenever it is possible. Judging by the reactions that the learners gave, it can be said that general classroom atmosphere included focused, relaxed and confident learners.

To sum up, learners taught through Brain-Based Vocabulary Teaching practices can focus on the activities and sustain their attention levels during the lesson. They show eagerness

to join the activities. Additionally, they do not get distracted as the Brain-Based Vocabulary Teaching practices keep their minds engaged during the lesson.

4.6.2 Last lesson

There are 8 lessons which were not videoed after the first lesson. As it is stated previously, learners felt themselves uncomfortable in the first lesson both because they were unfamiliar with lesson's being videoed and the types of practices were new to them. However, these problems did not occur during the weeks that were not videoed. In addition, learners started to become familiar with the practice types. Hence, their eagerness increased, in contrast to their anxiety.

Summing up given the afore stated information, it can be put forward that learners became familiar with the practice types as the weeks progressed. Their attention levels increased. They did not feel themselves uncomfortable.

4.6.2.1 Eagerness to join the activities

It is thought that, sitting in the front desk is an important point and it helps learner 2 to keep his attention at a high level. It is inferred that it prevents him from losing his interest during the lesson. It is also observed that he has an active role at every stage of the lesson and has an efficient course process. It is seen that, his interest is directed to the activities, by focusing on the sharing of his friends.

It is seen that if learner 4 is able to attend the lesson and express his opinion easily, he is more interested. Contrary to this, he has a more passive role before teamwork. It is seen that the learner sometimes seems disconnected from the activities. By stating his thoughts, he undertakes an active role in teamwork and concentrates on the lesson more.

The fact that, learner 6 frequently shakes his legs and plays with his hands shows that he may be anxious. As he attends the activities and answers questions, his anxiety level approaches stable. He often raises his hand to state his opinion and participates the lesson in this way. Moreover, he has an interested attitude towards the participation of his friends. In teamwork, he writes the opinions of his friends and he is an active learner. In total, he showed eagerness to the activities.

It can be observed that the learner 8 has an appropriate sitting style for the lesson. It can be said within the context of behavioral communication, he uses his arms and hands effectively to listen the lesson. His raising hands even before the teacher ends the questions may be considered as evidence of his capability of responding. As expected, he continues to show the same behavior such as arguing and responding as soon as the teacher gives the instructions. According to the video record, it can be said that he keeps his attention at a high level during the whole lesson.

At the beginning, learner 10 tries to concentrate on the lesson, by repositioning his sitting style. He follows the instructions from time to time and studies his notes, which shows his interest in the lesson. He actively attends the teamwork. He does not feel himself bored as the lesson progresses. This is the indicator of his high level concentration.

In general, learner 12 is willing and active throughout the lesson. In addition, it is seen that he has a quick grasping skill as he raises his hand to state his opinion before the instructions are completed. From time to time, it is seen that the interest of him decreases but when he notices this situation, he immediately raises his hand to gain his interest again. With this behavior, it can be deduced that his self-control skills are really good.

Learner 14 seems as if he did not pay attention to the instructions in the lesson. However, it can be observed in the record that he has a high level of capability of clearly understanding and responding as expected. He attends in teamwork actively despite his behavioral manner may be interpreted as bored attitude such as holding his head even in the teamwork. Learner 14 may be considered as an observer type of learner in the class. After all, he shows and shares with his friends what he learnt and thinks about the instructions.

Learner 16 was not in the classroom.

Learner 18 is one of the most active students. He seems such an eager student that he raises his hand for almost all questions to express his opinion. He often changes his sitting position but it does not negatively affect his activeness. When it comes to the teamwork, the student is in a pioneer position. His attempt to put the desks in order before starting

the teamwork, suggests that he cares about being organized and untidiness can lead to a possible distraction. He often helps his friends in teamwork.

During the lesson, it is noticeable that learner 20 is in a comfortable position judging by his sitting style, and his sleepy condition, often yawning, reduces his interest in the lesson. However, after the first half of the lesson, it is seen that, he is more enthusiastic. In teamwork, he prefers to get support from his group friends. In the second half of the lesson, it is seen that he plays a more active role in joining the activities.

Learner 22 was not in the classroom.

It is striking that learner 24 played with his hands and shook his legs throughout the lesson. It shows that he is willing to participate in the lesson, but the level of his anxiety is above normal. When he cannot answer the question, he makes the observer feel that he is thinking about the matter by taking his hand to his forehead. It is observed that he shakes his legs severely when he sincerely wants to attend to the lesson. It is seen that he looks at his book from a closer distance to comprehend the instructions better. Moreover, it is considered that his interest is high in the lesson. When it comes to the teamwork, it is seen that he is just a listener rather than an active participant.

In general, learner 26 seems shy while the class is asked to respond the instructions all together by the teacher. He responds to all the instructions even after the rest of the class. His posture proves that he may be a shy type of learner. However, he responds the posed questions correctly. His behavioral manner can be described as holding his head, responding not loudly, sitting in a withdrawn way. Despite that, his communication attitude and posture turn into more self-confident manner in the teamwork. It can be proved through the record that even if his expressing style shows difference in comparison to the rest of the class, learner 26 has a high level of learning.

Learner 28 participates in the lesson in a calm and relaxed manner and the fact that he is sitting in the front desk, suggests that he keeps his interest high in the lesson in this way. It is observed that he follows the instructions in a focused manner but he seems more eager to study individually. It is seen that he demands a right to speak even though he is sometimes late in answering some questions.

4.6.2.2 General classroom atmosphere in the last lesson

Learners found themselves in the middle of a lesson which was videoed again. After 8 weeks of break, they felt the pressure of being videoed in the last lesson. However, this time they got over that pressure quicker than the first lesson. They showed their eagerness and high attention levels by joining the activities. They were not interested in anything but the activities in the lesson. All the classroom members were fully focused on the instructions and tasks given by the teacher. Their eagerness was reinforced by the teacher with positive feedbacks. Learners discovered the freedom of stating their opinions about the exercises in the lesson. The general classroom atmosphere involved learners who have high levels of attention, motivation, self-esteem and encouragement.

Finally, it can be claimed that Brain-Based Vocabulary Teaching practices affect learners positively in terms of their emotional states. Observants of the videos, a psychologist and a psychological counselor agreed upon the positive emotional outcomes of the learners taught through Brain-Based Vocabulary Teaching practices.

4.7 Discussion

In Turkey, the studies centering around Brain-Based Vocabulary Teaching used different practices to teach vocabulary. In 2009, Samur found that Brain-Based e-learning contributed to learners more than the traditional vocabulary teaching. In this study, it can be concluded that learners taught through Brain-Based Vocabulary Teaching practices performed better in post tests and retention tests than the ones taught through traditional vocabulary teaching practices such as giving bilingual word lists and translating the target vocabulary into L1.

In 2013, Yavuz and Yagli did not find any statistically meaningful difference between the academic achievement of the experimental and control group. The experimental group was taught through Brain-Based Learning, whereas the control group was taught through traditional methods. However, Duman (2010) found positive impacts on the learners taught through Brain-Based Learning. The learners in the experimental group scored more than the ones in the control group taught through traditional practices. The situation is the same in this current study.

In 2014, Toprakoglu and Dilman found that learners taught through vocabulary enhancement activities in the experimental group were better at vocabulary production than the ones taught through traditional vocabulary teaching activities in the control group. The inadequacy of traditional vocabulary teaching activities are the same as in the current study. The results of the study conducted by Toprakoglu and Dilman were parallel to the current study in terms of focusing on the vocabulary teaching with the help of activities involving learners in the learning process actively.

In 2015, besides the academic achievement of young learners, Celik also found positive emotional outcomes on the learners taught through Brain-Based Learning strategies. In the study, questionnaires were distributed to the students to understand their feelings about the Brain-Based Learning strategies. Most of the students stated that they felt themselves happier and more comfortable with the Brain-Based Teaching activities. In the current study, learners are observed in the lessons through videos. These videos are scrutinized through descriptive analysis with the help of a psychologist and a psychological counselor. As a result, it is seen that learners taught through Brain-Based Vocabulary Teaching practices were more motivated, focused and eager during the lessons.

In the studies from international sources, Hoge (2002) determined that the literacy developments of learners taught through Brain-Based Learning were increased more than the ones taught through traditional methods. Griffee (2007) carried out a study and evaluated the performances of students taught through Brain-Based Learning and traditional methods. As a results, it was found that learners involved in Brain-Based Learning scored higher than the ones involved in the traditional learning. In the current study, it was also found that learners taught through Brain-Based Vocabulary Teaching were better at learning and remembering the target vocabulary than the ones taught through traditional vocabulary teaching practices.

In a study by Zuhriyah and Augistina (2020), researchers investigated the effect of the brain-based learning (BBL) model on students' higher-order thinking skills (HOTS) in writing, teaching, and learning. Two classes of the fourth semester of the English Language Department formed the universe and sample of this study. Students in both

classes are divided according to their high- and low-level thinking skills. Then, writing was taught using the brain-based learning model in the experimental class, and writing was written with a guide in the control class. Then, the data obtained from the writing test were calculated using two-way analysis of variance. According to the results of the analysis of the data, a relationship was observed between teaching models and students' higher-order thinking skills, and it was concluded that this relationship influenced students' writing skills. In this study, as the Brain-Based Vocabulary Teaching practices were designed based on the correspondence between Jensen's Brain-Based Teaching Model and Bloom's Revised Taxonomy, learners' high order thinking skills were taken into account. These skills contributed them to learn the target words better than the ones taught through traditional vocabulary teaching practices.

For the first research question of the study, which asks the vocabulary teaching practice preferences of EFL teachers, the questionnaire that this study encompasses showed that teachers mostly rely on learners' L1 when teaching vocabulary. They use practices such as giving bilingual lists, translating a text including the target words into L1 and having students write the target vocabulary with their L1 meanings for multiple times.

For the second research question of the study, which tries to detect the impacts of Brain-Based Vocabulary Teaching on young adults in terms of their levels of learning the target vocabulary, these conclusions can be drawn with the help of pre-tests, post tests and retention tests:

Firstly, according to the Independent Samples Test, there is not any statistically meaningful difference between two groups when all of their pretest results are compared ($p>0,05$). According to these results, it can be concluded that before the study starts, the groups selected to be involved in the study are similar in terms of their language proficiency and vocabulary knowledge. The average pre-test score of the control group is 29,79%, whereas the average pre-test score of the experimental group is 28,46%. Additionally, both groups learned unfamiliar words rather than already familiar ones during the study.

Secondly, according to the Independent Samples Test, there are statistically meaningful differences between the experimental group taught through Brain-Based Vocabulary

Teaching practices and the control group taught through traditional vocabulary teaching practices ($p<0,05$).

Thirdly, the experimental group showed more improvement than the control group when their pretest and posttest results are compared. The difference between the pre-test and post test scores of the experimental group is 67,38%, whereas the difference between the scores of these two tests of the control group is 37,59%.

Fourthly, the experimental group scored higher than the control group in posttests. The average post test score of the experimental group is 91,62%, whereas the average post test score of the control group is 67,38%.

Fifthly, although the groups had similar levels before the study started, the practices applied in the classrooms of these groups made the difference in posttests. In other words, Brain-Based Vocabulary Teaching practices contributed the learners in the experimental group to learn the target vocabulary better and to score higher in posttests.

Sixthly, according to the Independent Samples Test, there is not any statistically meaningful difference between the results of posttests and retention tests of the experimental group taught through Brain-Based Vocabulary Teaching ($p>0,05$). These results show that Brain-Based Vocabulary Teaching enables learners not only to learn, understand and use the target words, but also to remember and retrieve them when they are needed.

Seventhly, it can also be concluded from the results that the success of learners in the experimental group in posttests were not only special to that week, instead, they could sustain their performances in learning the target words. The average retention test score of the experimental group is 93,39%.

Eighthly, there are statistically meaningful differences between the retention tests and the posttests of the control group ($p<0,05$). Learners in the control group scored less in the retention tests than the posttests. The average retention test score of the control group is 63,86%. According to the results, it can be stated that traditional vocabulary teaching practices contribute learners neither to learn the target words completely, nor to remember them when they are needed. In other words, learners start to forget or mix the forms,

meanings and uses of the target words when certain time passes since they are taught through traditional vocabulary teaching practices such as giving bilingual lists or having learners write the target words with their meanings for multiple times.

As for the last research question of the study, which asks the emotional outcomes of young adults taught through Brain-Based Vocabulary Teaching, it can be inferred that according to the observations from the videos, in terms of the criterion, learners' eagerness to join the activities, almost every learner in the experimental group raised their hands to join the activities at least once in the first lesson. Yet, two learners who did not raise their hands in the first lesson did not seem uneager to the activities. Rather, they seemed nervous to be videoed during the lesson since being videoed during a lesson is an unfamiliar application to them. They did not deal with any other items or focus on any other topic except for the lesson. However, the nervousness of the learners about being videoed during the lesson decreased in the last lesson as it can be observed from the video recording. They seemed more eager to join the activities in the last lesson. There may be two reasons for this increase in the eagerness of the learners. One of them is the decrease in the nervousness about being videoed and the other one is learners' being familiar with the types of activities involved in the practices.

In terms of the second criterion, general classroom atmosphere, it can be put forward that in both lessons, the experimental group showed a peaceful, favorable, concentrated and curious classroom atmosphere. All the learners focused on their teachers' instructions and their tasks during the lessons. They did not interrupt any of their friends or their teacher. Every learner in the classroom has been reinforced with positive feedback regardless of the answers they gave to the questions in the lessons and they have felt precious and respected.

In essence, it can be suggested that Brain-Based Vocabulary Teaching practices affect not only learners positively in terms of their eagerness to join the activities, but also overall classroom atmosphere.

5. CONCLUSION

In this study, three research questions were posed. These questions were answered in three phases which led to another and from which different conclusions can be drawn. The first question purposed to enlighten the vocabulary teaching practices of EFL teachers. The second question aimed to understand the impacts of Brain-Based Vocabulary Teaching on young adult learns in terms of their levels of learning the target vocabulary. The third question intended to reveal the emotional outcomes of the young adult learners taught through Brain-Based Vocabulary Teaching.

The study, initially, tried to understand the practice preferences of EFL teachers to teach vocabulary in classroom. 100 EFL teachers participated in the questionnaire. In the questionnaire, their majors, years of experience, age group that they teach, practices that they choose to teach vocabulary and frequency of using these practices in the classrooms are asked. One of the most remarkable questions in the questionnaire is the fourth one as it tries to reveal the common practices that teachers use to teach vocabulary. There were 32 options taken from various students' books and one additional option in case teachers would like to add their own practices. According to the results, the most 5 popular practices chosen by teachers are Presenting target vocabulary in videos, %64,8, having students listen to songs about target vocabulary, %62,9, giving bilingual word lists, %59 and presenting target vocabulary in a text, %59. However, when it comes to the usage of these practices in classrooms, in the fifth question, the questionnaire asks teachers to choose ten practices and put these into an order from the most frequently used to the least. According the to sequences every teacher made, the most frequently used practice to teach vocabulary in classrooms is presenting target vocabulary in videos (it has 344 preference ratio), giving bilingual word lists (319), having students read a text including target vocabulary and translate it into L1 (244), having students listen to songs about target vocabulary (240) and presenting target vocabulary in a text (232). It can be concluded that when the answers to the most remarkable questions of the questionnaire, question 4 and question 5, which are especially designed to reveal the practice preferences of EFL teachers, are compared, teachers intend to use different practices such as presenting the target vocabulary in videos, text and songs. However, they count primarily on L1 equivalents of the words when it comes to using these practices in the classroom.

Additionally, without paying attention to the learners' characteristics and brain's working principles, they prefer practices which are easy to use in classrooms.

The second question asked the impacts of Brain-Based Vocabulary Teaching on young adult learners. After the need for Brain-Based Vocabulary Teaching practices was discovered from the results of the questionnaire, the second phase of the study was initiated. Ten Brain-Based Vocabulary Teaching practices were designed by taking the correspondence between Brain-Based Teaching and Bloom's Taxonomy of Cognitive Domain on the theoretical basis of Mental Lexicon and Word Learning Assumptions. Rather than offering practices in theory, the study used Brain-Based Vocabulary Teaching practices in an actual classroom setting to reveal whether they positively affect vocabulary learning levels of learners. To be able to do that, it benefitted from experimental study in which two groups, experimental and control group, were involved. These two groups were male young adult learners whose ages are 15 and who study at Teknoloji Anadolu İmam Hatip High School in Sancaktepe. According to the results of pretests, analyzed by SPSS Statistics 25 program, there were not meaningful differences between the groups ($p>0,05$). Both the experimental and control group were similar in terms of level of proficiency in English.

After it was seen that learners' levels were similar, in the experimental group, Brain-Based Vocabulary Teaching practices were used, whereas in the control group, traditional vocabulary teaching practices such as giving bilingual word lists and having learners write target vocabulary with their L1 meanings for multiple times were used for ten weeks. Different pretests and posttests were used before and after the lessons in during the study. Although there was not meaningful difference between the groups in any of 10 pretests, the results of all ten posttests had meaningful differences between the groups according to the Independent Samples Test ($p<0,05$). The average pre-test scores of the experimental and the control group are respectively 28,46% and 29,79%. On the other hand, the average post test scores of the experimental and the control group are respectively 91,62% and 67,38%. This shows that learners have higher scores in posttests when they are taught through Brain-Based Vocabulary Teaching. In other words, the learners taught through Brain-Based Vocabulary Teaching practices are more successful

in understanding and using the target words than the learners taught through traditional vocabulary teaching practices.

Moreover, learners were applied retention tests in the fourth, seventh and tenth week of the study in order to see whether their success that they obtained according to the results of the post tests was only special to that week. In other words, it was enlightened whether learners forget the words after a short period of time they learnt the target vocabulary. The average retention test score of the control group is 63,86%, whereas it is 93,39% in the experimental group. The results show that there are meaningful differences between the scores of post tests and retention tests of the control group according to the Independent Samples Test. However, the scores of the post tests and retention tests of the experimental group did not have any statistically meaningful difference. In essence, it can be concluded that learners taught through Brain-Based Vocabulary Teaching succeeded more in learning, understanding, using and remembering the target vocabulary than the learners taught through traditional vocabulary teaching practices did. Taking these results into account, it can be concluded that Brain-Based Vocabulary teaching not only contributes learners to understand and use the target words, but also enables them to remember when the words are needed. However, it cannot be stated that practices are entirely beneficial for the learners if they improve their levels of learning the target vocabulary. The classroom practices should also have positive impacts on the emotional and motivational status of the learners. For that reason, in the third phase of the study, the classroom practices in the first and last week were videoed in the experimental group and the videos were scrutinized through descriptive analysis.

The third question, differing from the other studies, carried out in the field, aimed to show motivational and emotional outcomes of Brain-Based Vocabulary Teaching practices by observing them in the first and the last lesson through videos. The observations from videos were scrutinized through descriptive analysis by giving each learner a number to represent them. The analyzes were obtained through the assistance of a psychologist and a psychological counselor.

In the last phase of the study, to be able to reveal the emotional and motivational outcomes of learners, the first and last week's lesson were videoed and learners' behaviors were

scrutinized through descriptive analysis under the criteria of eagerness to join activities and general classroom atmosphere. Every learner has been given a number to represent himself and from the first minute to the last minute of the lesson, the behaviors and body language signs that every learner performed were observed. The criterion about the eagerness to join the activities is explained considering the individual activities during the lesson, whereas the criterion, general classroom atmosphere is described considering the group activities.

According to the results, for the criterion of eagerness to join activities, almost every learner in the experimental group showed eagerness to the steps of Brain-Based Vocabulary Teaching practices in the first and last lessons. In the first lesson, 13 of the learners raised their hands at least once, whereas one of them was absent on that day and the other one did not get distracted despite the absence of motivation to join the activities. On the other hand, learners did not seem to be having fun during the first lesson. This might be an indicator of feeling under pressure during the lesson as videoing a lesson is an unfamiliar application in a classroom setting. This can also be supported by the amount of fun that the learners have in the lessons that are not videoed. It must definitely be stated that sounds of laughing and speaking were much louder in the lessons that are not videoed.

In the last lesson, there were two absent learners. The ones who were present in the last lesson showed great eagerness to join the activities as they were relatively more comfortable about the lesson's being videoed. They were focused and not easily distracted. Every learner tried to do his best to join the activities and sustain their motivation and attention during the lesson. They were positively reinforced by their teachers regardless of the answers they gave to the questions in the activities. To sum up, it can be inferred that Brain-Based Vocabulary Teaching practices enable learners to improve their vocabulary learning levels and they simultaneously affect learners positively in terms of their emotional and motivational status as almost all learners showed eagerness to join the activities.

In both videos of the lessons, there was a peaceful, favorable, concentrated and curious classroom atmosphere. All the learners focused on both the instructions of their teachers

and the activities. In the first lesson, from the first minute to the last, there were not any interruptions to the other learners or to the teacher by any learner. Every learner felt themselves precious and they respected all the members of the classroom. In conclusion, the overall classroom atmosphere was so good that any learner would want to be in that classroom and any teacher would want to teach there. In other words, Brain-Based Teaching practices brought joy in both learning and teaching.

5.1 Implications

In the study, the impacts of Brain-Based Vocabulary Teaching on young adult learners have been examined in terms of their learning levels of vocabulary and emotional outcomes. In this context, the following implications can be made based on the teaching practices and the data obtained.

5.1.1 Implications for educational practice

Vocabulary is one of the most significant areas in language teaching. Sounds produced by human beings are combined to form words so that they can convey meaning. Therefore, in order to teach a language, vocabulary teaching must be paid great attention. While teaching vocabulary, one of the most important factors is how to teach it. As learning occurs in the brain, teaching practices must be designed within the framework of working principles of the brain. To facilitate the vocabulary learning process for students, Brain-Based Vocabulary Teaching practices must be put forward. However, there are basic criteria which identify Brain-Based Vocabulary Teaching practices from the other vocabulary teaching practices. These criteria are formed through making use of the correspondence between Brain-Based Teaching and Bloom's Taxonomy of Cognitive Domain on the theoretical basis of Mental Lexicon and Word Learning Assumptions. They are presented in a checklist so that teachers can benefit from it while designing Brain-Based Vocabulary Teaching practices.

1- Students can associate target words with already familiar ones.

2- Students can reveal their understanding of the target words.

3- Students can participate in the learning process by applying what they have learned.

4- Students can establish closer relationship with the target words.

5- Students can put forward a new item by making use of the target words.

6- Students can evaluate and celebrate their and their peers learning.

5.1.2 Implications for further research

This study designed ten Brain-Based Vocabulary Teaching practices, however, there are more practices needed to use in an academic term. Additionally, the study lasted ten weeks which can be regarded as a short period of time for an academic term. For further studies, this period can be extended.

In this study, 15 male Turkish young adult learners are involved. Nevertheless, more participants can be selected from different age groups, nationalities or genders in the further studies.

It can also be expressed that this study designed vocabulary teaching practices for the target words in A2 Level Oxford Directions Book's vocabulary parts. The target words can be selected from different sources in the further studies.

Finally, the videos which purposed to observe the learners' behaviors during the lessons in which Brain-Based Vocabulary Teaching practices are used only contain the first and the last lesson of ten weeks. However, in the next study, for a more detailed analysis and to see learner progress week by week, more lessons can be videoed.

REFERENCES

Acar, N. (2017). Die anwendung des gehirngerechten lernens anhand von märchen im fremdsprachenunterricht und ihre auswirkung auf den schülererfolg (Tez No. 471985) [Doktora Tezi, Ondokuz Mayıs Üniversitesi]. YÖK Ulusal Tez Merkezi.

Aitchison, J. (2012). Words in the mind an introduction to the mental lexicon. Wiley.

Bloom, B. S. (1956). Taxonomy of educational objectives: The classification of educational goals. Longman Group.

Boyd Zimmerman, C. (1997b) Historical Trends in Second Language Vocabulary Instruction. In J. Coady & T. Huckin (Eds.), Second Language Vocabulary Acquisition. Cambridge: Cambridge University Press. 5-19.

Caine, R. N., & Caine, G. (1990, October). Understanding a Brain-Based Approach to Learning and Teaching. Educational Leadership, pp. 66–70.

Caine, R. N., & Caine, G. (1994). Making Connections. Addison-Wesley.

Carter, R. (2009). The Human Brain Book: An Illustrated Guide to its structure, function, and disorders. Dorling Kindersley.

Cengiz, Y. (2004) Yabancı dilde sözcük öğretimine müzik kullanımının etkilerinin beyin temelli öğrenme kuramı ışığında araştırılması / Research on the effects of music on teaching vocabulary in EFL in relation to brain based learning (Tez No.140963) [Yüksek Lisans Tezi, Ankara Üniversitesi]. YÖK Ulusal Tez Merkezi.

Chambers, R. J. (1999) The poverty of accounting discourse, Abacus, 35(3), pp. 241–251.

Clark, E. V. (2003). First Language Acquisition. Cambridge University Press.

Çelik, S. (2015). Beyin temelli öğretim stratejileriyle çocuklara kelime öğretimi / Teaching vocabulary to young learners through brain-based teaching strategies (Tez No.419438) [Yüksek Lisans Tezi, Gazi Üniversitesi]. YÖK Ulusal Tez Merkezi.

Duman, B. (2010). Beyin temelli öğrenmenin farklı öğrenme stillerindeki öğrencilerin akademik başarılarına etkisi. Kuram ve Uygulamada Eğitim Bilimleri, 10(4), 2077-2103. https://files.eric.ed.gov/fulltext/EJ919873.pdf

Drachsler, Hendrik & Kirschner, Paul. (2011). Learner Characteristics. 10.1007/978-1-4419-1428-6_347.

Folse, Keith. (2004). The Underestimated Importance of Vocabulary in the Foreign Language Classroom.

Freitas, M., Ribeiro, A. F., Radanovic, M., & Mansur, L. L. (2007). Working memory: Differences between young adults and the aged in listening tasks. Dementia & neuropsychologia,1(2),147–153.https://doi.org/10.1590/s1980-57642008dn10200006

George, T. (2022, July 21). Mixed methods research: Definition, guide & examples. Scribbr. Retrieved August 18, 2022, from https://www.scribbr.com/methodology/mixed-methods-research/

Getz, M. (2003). Application of brain based learning theory for community college developmental english students: A case study. [Doctoral dissertation]. Colorado State University.

Göral, G. N. (2021) Beyin Temelli Öğrenme Modelinin Öğrencilerin Yabancı Dilde Kelime Öğrenme Düzeylerine Etkisi (Tez No. 690016) [Doktora Tezi, Muğla Üniversitesi]. YÖK Ulusal Tez Merkezi.

Gözüyeşil, Eda & Dikici, Ayhan. (2014). The Effect of Brain Based Learning on Academic Achievement: A Meta-analytical Study. Educational Sciences: Theory & Practice. 14. 10.12738/estp.2014.2.2103.

Griffee, D.T. (2007). Connecting Theory to Practice: Evaluating a Brain-Based Writing Curriculum. TLAR (The Learning Assistance Review), 12(1), 17-27.

Hoge, P. T. (2002). The integration of brain-based learning and literacy acquisition. Unpublished Doctorate's Theses. Georgia State University, Atlanta, Georgia. Retrieved January 5, 2005. From Dissertations and Theses Database.

Heacock, P. (2009). efl. Cambridge Academic Content Dictionary. Cambridge University Press.

Jensen, E. (1995). Brain Based Learning. The Brain Store.

Jensen, E. (2009). Brain-based learning: The new paradigm of teaching (2nd ed.). Corwin Press.

Kemmerer, D. L. (2011). Cognitive neuroscience of language. Routledge.

Lawson, M. J., & Hogben, D. (1996). The vocabulary learning strategies of foreign language students. Language Learning, 46, 105-135.

Leka, Klodiana. (2012). Teacher Evaluation Policies in Albania. Academic Journal of Interdisciplinary Studies.

Loewenstein, George & Lerner, Jennifer. (2003). The role of affect in decision making. Handb Affect Sci. 619.

Lynch M. A. (2004). Long-term potentiation and memory. Physiological reviews, 84(1), 87–136. https://doi.org/10.1152/physrev.00014.2003

Markman, E. (1990). Constraints Children Place on Word Meanings. Cognitive Science, 14, 57–77.

McCarthy, M. (1990). Vocabulary. OUP Oxford.

Nation. (1990). Learning vocabulary in another language. Cambridge University Press.

Neuman, W.. (2000). Social Research Methods: Qualitative and Quantitative Approaches. 10.2307/3211488.

Oxford, Rebecca & Crookall, David. (1990). Vocabulary Learning: A Critical Analysis of Techniques. TESL Canada Journal. 7. 10.18806/tesl.v7i2.566.

Park, I., & Hannafin, M. J. (1993). Empirically-based guidelines for the design of interactive multimedia. Educational Technology Research and Development, 41(3), 63–85. https://doi.org/10.1007/BF02297358

Pennington, E. (2010). Brain based learning theory; the incorporation of movement to increase the learning of grammar by high school students [Doctoral dissertation]. Liberty University.

Piaget, J. (1973). The child and Reality. Penguin Books.

Quine, W.V.O. (1960). Word and Object. Cambridge, MA: MIT Press.

Paribakht, T. S., & Wesche, M. B. (1993). Reading Comprehension and Second Language Development in a Comprehension-Based ESL Program. TESL Canada Journal, 11(1), 09–29. https://doi.org/10.18806/tesl.v11i1.623

Ramachandran, V. S. (2002). In Encyclopedia of the human brain. Academic Press.

Ratey, J. (2007). A user's guide to the brain. Abacus.

Read, J. (2000). Assessing Vocabulary. Cambridge University Press.

Read, J., & Chapelle, C. A. (2001). A framework for Second language vocabulary assessment. Language Testing, 18(1), 1–32. https://doi.org/10.1177/026553220101800101

Read, J. (2012). Second language vocabulary assessment. Language Teaching, 46(1), 41–52. https://doi.org/10.1017/s0261444812000377

Richards, J. C. (1976). The role of vocabulary teaching. TESOL Quarterly 10(1), 77-89.

Samur, Y. (2009). Beyin temelli e-öğrenmenin (e-learning) ilköğretim İngilizce dersi 7.sınıf öğrencilerinin akademik başarıları ve derse yönelik tutumları üzerine etkisi (Tez No. 235314) [Yüksek Lisans Tezi, Muğla Üniversitesi]. YÖK Ulusal Tez Merkezi.

Saussure, F. de, Bally, C., Riedlinger, A., & Sechehaye, A. (1959). Course in general linguistics. The Philosophical Library, Inc.

Schmitt, N. (2000). Vocabulary in language teaching. Cambridge University Press.

Schumann, J. H., Crowell, S. E., Jones, N. E., Lee, N., Schuchert, S. A., & Wood, L. A. (2004). The Neurobiology of Learning. Lawrence Erlbaum Associates, Publishers.

Schwieger, D., & Ladwig, C. (2018). Reaching and Retaining the Next Generation: Adapting to the Expectations of Gen Z in the Classroom. Information Systems Education Journal (ISEDJ), 45–54.

Somyurek, S., Guyer, T., & Atasoy, B. (2008). The effects of individual differences on learner's navigation in a courseware. Distributed by ERIC Clearinghouse.

Şimşek, G. (2008). An effective way of teaching vocabulary:Collocations / Kelime öğretiminde etkili bir yol:Eşdizim (Tez No. 218652) [Yüksek Lisans Tezi, Selçuk Üniversitesi]. YÖK Ulusal Tez Merkezi.

Topkaraoğlu, Mert & Dilman, Hakan. (2014). Effects of Studying Vocabulary Enhancement Activities on Students' Vocabulary Production Levels. Procedia - Social and Behavioral Sciences. 152. 10.1016/j.sbspro.2014.09.345.

Weimer C. Engaged Learning Through the Use of Brain-Based Teaching: A Case Study of Eight Middle School Classroom. PhD Thesis, Northern Illinois University, 2007.

Willis, J. (2008). Teaching the brain to read strategies for improving fluency, vocabulary, and comprehension. Association for Supervision and Curriculum Development.

Vermeer, Anne. (1992). Exploring the second language learner lexicon. 10.1075/z.62.16ver.

Vivar, C. P. (2022). Effects of exposure to L1 translation in vocabulary acquisition in English as a Foreign Language with college students (thesis). Valencia.

Yagcioglu, O. (2014). The advantages of brain based learning in ELT classes. Procedia - Social and Behavioral Sciences, 152, 258–262. https://doi.org/10.1016/j.sbspro.2014.09.190

Yaman, B. (2006) Teaching vocabulary through the communicative activities of language teaching approaches / Dil öğretim yaklaşımlarının iletişimci aktiviteleri doğrultusunda kelime

öğretimi (Tez No. 187348) [Yüksek Lisans Tezi, Ondokuz Mayıs Üniversitesi]. YÖK Ulusal Tez Merkezi.

Yavuz, S. ve Yağlı, Ü. (2013). Beyin temelli öğrenme yaklaşımının ingilizce dersinde akademik başarı ve tutuma etkisi. Karaelmas Journal of Educational Sciences, 1(2013), 94-111. https://dergipark.org.tr/tr/pub/kebd

Yegen, Ü. (2020). Beyin Temelli Bellek Destekleyicilerinin Ortaokul Öğrencilerinde Kelime Öğretimine, Kalıcılığa ve Okuduğunu Anlamaya Etkisi (Tez No.639458) [Doktora Tezi, Sakarya Üniversitesi]. YÖK Ulusal Tez Merkezi.

Zuhriyah, M., & Agustina, R. K. (2020). Brain-based learning and high order thinking skills effect on students' writing ability. JEES (Journal of English Educators Society), 5(2), 193-198. https://journal.umsida.ac.id/index.php/jees/article/view/778/1092

APPENDICES

Appendix I: Ethics Committee Approval

Bu belge, Yükseköğretim Kurulu tarafından 19.01.2021 tarihli "Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge" ile bildirilen 6689 Sayılı Kişisel Verilerin Korunması Kanunu kapsamında gizlenmiştir.

Appendix II: Ministry of Education Approval

Bu belge, Yükseköğretim Kurulu tarafından 19.01.2021 tarihli “Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge” ile bildirilen 6689 Sayılı Kişisel Verilerin Korunması Kanunu kapsamında gizlenmiştir.

Appendix III: Sample Of The Pre-Test

THE IMPACTS OF BRAIN-BASED VOCABULARY TEACHING ON YOUNG ADULTS

PRE-TEST 4 LEARNER ___

Question 1: Dark
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 2: Deep
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 3: Icy
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 4: Narrow
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 5: Shallow
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 6: Steep
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 7: Wide
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Question 8: Low
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence:
_____.

Appendix IV: Sample Of The Post Test

TOTAL POINTS:

CORRECT ANSWERS:

Question 9: High
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence: _____.

Question 10: Curved
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence: _____.

Question 11: Bright
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence: _____.

Question 12: Dim
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence: _____.

Question 13: Flattened
1- I have never seen this word.
2- I have seen this word before, but I don't know what it means.
3- I have seen this word before, and I think it means _____. (synonym or translation)
4- I know this word. It means _____. (synonym or translation)
5- I can use this word in a sentence: _____.

Appendix V: Sample Of The Retention Test

THE IMPACTS OF BRAIN-BASED VOCABULARY TEACHING ON YOUNG ADULTS

POST TEST 5 **LEARNER ___**

PART A – Match the definitions with the words. (13 x 3 = 39 points)

1- Frosty	**a) cold but not freezing**
2- Hailing	**b) bright because of light from the sun**
3- Misty	**c) slightly wet in a way that is not pleasant or comfortable**
4- Showery	**d) raining a lot**
5- Thundery	**e) with strong wind, heavy rain, and often thunder and lightning**
6- Chilly	**f) weather condition making difficult to see around**
7- Freezing	**g) small, hard balls of ice that fall from the sky like rain**
8- Sunny	**h) extremely cold**
9- Windy	**i) very cold, with a thin layer of white ice covering everything**
10- Stormy	**j) weather or a storm in which there is thunder**
11- Humid	**k) with light rain that is often not continuous**
12- Rainy	**l) with a lot of wind**
13- Dampy	**m) extremely small drops of water in the air**

PART B- Circle the best answers. (11 x 2 = 22 points)

1- The temperature was minus twenty degrees. It was a _____ weather.

A) misty B) thundery C) frosty D) stormy

2- It was hailing and snowy. Temperature was minus 5 degrees. In other words, it was _____.

A) rainy B) showery C) misty D) chilly

3- The weather was sunny and _____, so it was not freezing.

A) hot B) misty C) windy D) chilly

4- Look at those clouds, I think it is going to be ____ and rainy.

A) freezing B) hailing C) sunny D) windy

5- It was a _____ weather. We couldn't see anything.

A) thundery B) stormy C) misty D) showery

6- It is not going to rain a lot. It is _____.

A) stormy B) misty C) showery D) chilly

7- The weather is _____. There is lightning.

A) misty B) thundery C) windy D) hot

8- It was like a stronger wind. The weather was _____.

A) stormy B) hailing C) snowy D) lightning

9- Nelson wanted to do windsurfing but the weather was _____.

A) windy B) warm C) freezing D) hot

10- It was a beautiful day; birds were chirping, and the weather was _____.

A) stormy B) hailing C) warm D) misty

11- The weather is _____. There is lightning.

A) misty B) thundery C) windy D) hot

PART C- Write a different meaningful sentence with each word below. (13 x 3 = 39 points)

Frosty-hailing-misty-showery-thundery-chilly-freezing--sunny-windy-stormy-humid-rainy-dampy

1-_____.

2-_____.

3-_____.

4-_____.

5-_____.

6-_____.

7-_____.

8-_____.

9-_____.

10-_____.

11-_____.

12-_____.

13-_____.

TOTAL POINTS:

THE IMPACTS OF BRAIN-BASED VOCABULARY TEACHING ON YOUNG ADULTS

RETENTION TEST 3 LEARNER ____ TOTAL POINTS:

PART A – CHOOSE THE BEST OPTIONS FOR THE BLANKS. (5 x 5 = 25 pts)

1- We saw many great places during our holiday. There was a big church, it was a/an _____.

A) castle B) tower C) harbour D) cathedral

2- There is an ancient _____. People used to worship in it.

A) fountain B) temple C) tower D) castle

3- Atatürk passed away in Dolmabahçe _____ in 1938.

A) harbour B) monument C) square D) palace

4- The _____ of Liberty is in New York.

A) castle B) square C) tower D) statue

5- In a place, if there is a lot of water underground, it is most likely to see _____ everywhere.

A) temples B) towers C) fountains D) cathedrals

PART B – ANSWER THE QUESTIONS ACCORDING TO THE GIVEN SITUATIONS. (5 x 5 = 25 pts)

1- You want to buy some daisies and roses for your friend. You go to:

A) bakery B) charity shop C) florist shop D) jewellery shop

2- You feel yourself hungry, however you don't want to cook at home, you need ready meals, you go to:

A) DIY store B) delicatessen C) launderette D) butcher

3- You need to buy some painkillers for your headache, you go to:

A) take away B) bakery C) pharmacy D) grocery store

4- As you do not have a washing machine at home, you take your clothes to:

A) DIY store B) delicatessen C) launderette D) butcher

5- There are some furnitures to be fixed at home, but you do not have any tools, so you go to:

A) DIY store B) delicatessen C) launderette D) butcher

PART C – FILL IN THE BLANKS WITH THE APPROPRIATE WORDS. (5 x 5 = 25 pts)

I am a/an **1.** _____. I can pull out people's teeth. My friend, Sandra is a/an **2.**_____. She plans holidays of her customers. My father is a/an **3.** _____. He makes the final decision at the court whereas my mother is a/an **4.** _____. She helps pregnant women give birth. My brother is a student but he works at a cinema during the summer holidays and shows people their seats. He works as a/an **5.** _____.

1- A) engineer	**B) architect**	**C) clerk**	**D) dentist**
2- A) estate agent	**B) travel agent**	**C) paramedic**	**D) solicitor**
3- A) judge	**B) steward**	**C) tradesman**	**D) paramedic**
4- A) solicitor	**B) midwife**	**C) paramedic**	**D) tradesman**
5- A) usher	**B) steward**	**C) clerk**	**D) dentist**

PART D – PARAPHRASE THE SENTENCES WITH THE GIVEN WORDS BELOW, ONE WORD IS EXTRA. (5 X 5 = 25 PTS)

Mosque-palace-castle-fountain-church-statue

1- My Christian friends go to a place to do their religious routines.

_____.

2- My Muslim friends go to a place to their religious routines.

_____.

3- I love the giant liberty symbol in New York, it is splendid.

_____.

4- In İstanbul, there are a lot of historic sites, one of them is named Topkapı where sultans lived.

_____.

5- You should drink any water running through a tap outside.

_____.

ÖZGEÇMİŞ

Musa Duhan KÜÇÜKMEMİŞ

Eğitim

Derece	Yıl	Üniversite, Enstitü, Anabilim/Anasanat Dalı
Yüksek Lisans	2022	Maltepe Üniversitesi, Lisansüstü Eğitim Enstitüsü Yabancı Diller Eğitimi Ana Bilim Dalı, İngiliz Dili Eğitimi
Lisans	2015	Dokuz Eylül Üniversitesi, Eğitim Fakültesi, Yabancı Diller Anabilim Dalı, İngiliz Dili Eğitimi
Lisans	2022	Anadolu Üniversitesi, Açık Öğretim Fakültesi, Uluslararası İlişkiler

İş/İstihdam (Varsa)

2016-	Türkiye Cumhuriyeti Milli Eğitim Bakanlığı – İngilizce Öğretmeni