

**BRAIN-BASED LEARNING: NEURAL-NETWORKING'S
IMPACTS ON LANGUAGE PERFORMANCE SKILLS**

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MASTER OF ARTS THESIS

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English Language Teaching Program with Thesis

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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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Mustafa YOLUM

September, 2023

ÖZET

BEYİN TEMELLİ ÖĞRENME: SINIR AĞLARIN DİL PERFORMANS BECERİLERİNE ETKİSİ

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Maltepe Üniversitesi Lisansüstü Eğitim Enstitüsü, 2023

Bu çalışmada, Beyin Temelli Öğrenme tekniklerinin üniversite hazırlık öğrencilerinin dil performans becerilerine etkisi araştırılmıştır. Bu etkiyi incelemek için karma bir araştırma yöntemi kullanılmıştır.

Çalışmanın nicel kısmı; üniversite hazırlık öğrencilerinden (N=12) oluşan iki sınıftaki öğrencilerin konuşma ve yazma becerilerine yönelik dört sınav sonucunun istatistiksel analizini içerir. Deneysel gruptaki öğrencilere Beyin Temelli Öğrenme prensiplerine dayalı olarak tasarlanmış bir müfredatla eğitim verilmiş ve söz konusu müfredat, sınır ağlarını geliştirmelerine yardımcı olacak etkinlikler içermiştir.

Araştırmanın nitel kısmı, her iki gruptan rastgele seçilen üçer öğrenci (N=6) ile yarı yapılandırılmış birebir görüşmeleri ve bu görüşmelerin yanı sıra konuşma ve yazma sınavlarında tüm öğrenciler (N=12) tarafından yapılan hataların ve sözdizimi analizlerinin incelenmesini içerir.

Bu çalışma, Beyin Temelli Öğrenme teknikleri uygulanan grup ile uygulanmayan gruplar arasında anlamlı farklılıklar ortaya koymuştur. SPSS üzerinde yapılan analizlere göre, Beyin Temelli Öğrenme teknikleri uygulanan grup, geleneksel eğitime kıyasla küçük bir etki büyüklüğü göstererek son sınavda daha iyi performans sergilemiştir. Ayrıca, sözcüksel çeşitlilik açısından incelendiğinde, bu eğitim modeli ile eğitim alan grubun daha tutarlı bir artış gösterdiği belirlenmiştir. Hata ve sözdizimi analizlerinde, deney grubundaki öğrencilerde daha iyi bir gelişim olduğu görülmüştür. Ayrıca, deney

grubundaki öğrenciler görüşmeler sırasında dil öğrenmeye daha fazla motive olduklarını ifade etmişlerdir.

Anahtar Sözcükler: 1. Yabancı Dil Öğretimi, 2. İngilizce Öğretimi, 3. Dil Performans Becerileri, 4. Beyin Temelli Öğrenme, 5. Beyin Temelli Öğretim, 6. Sinir Ağları



ABSTRACT

BRAIN-BASED LEARNING: NEURAL-NETWORK'S IMPACT ON LANGUAGE PERFORMANCE SKILLS

Mustafa Yolum

Master's Thesis

Department of Foreign Language Education

English Language Teaching Master's Program with Thesis

Thesis Advisor: Assist. Prof. Dr. Hakan Dilman

Maltepe University Graduate School, 2023

In this study, the impact of Brain-Based Learning (BBL) techniques on the language performance skills of university preparatory students has been investigated. To examine this effect, a mixed research method was employed.

The quantitative part of the study consists of the analysis of the results of four exams in speaking and writing skills through independent samples t-tests and ANOVA analyses on SPSS, which were taken by students (N=12) in two classes, both consisting of university preparatory students. The students in the experimental group were taught using a curriculum that was designed based on the principles of Brain-Based Learning and included activities to help them build and enhance their neural networks. The qualitative part of the research involves semi-structured one-on-one interviews with three randomly selected students (N=6) from each group, along with the error and syntactic analyses of all students (N=12) in speaking and writing exams.

This study revealed significant differences between the group that received education in which Brain-Based Learning techniques were applied and the group that did not. The group that was taught using Brain-Based Learning techniques demonstrated better performance in the final test according to the analyses conducted in SPSS, indicating a small effect size compared to traditional education. Furthermore, when examined in terms of the number of lexical varieties, it was documented that the group taught with BBL type of educational model showed a more consistent increase. In error and syntactic analyses, the students in the experimental group showed more improvement. In addition, the

students in the experimental group expressed that they were more motivated about language learning during the interviews.

Keywords: 1. Foreign Language Teaching, 2. English Language Teaching, 3. Language Performance Skills, 4. Brain-Based Learning, 5. Brain-Based Teaching, 6. Neural Networks.



GENİŞLETİLMİŞ ÖZET

BEYİN TEMELLİ ÖĞRENME: SINIR AĞLARININ DİL PERFORMANS BECERİLERİNE ETKİSİ

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Bu çalışmada, Beyin-Temelli Öğrenme teknikleri kullanımının üniversite hazırlık öğrencilerinin dil performans becerileri üzerindeki etkisi araştırılmıştır. Bu etkinin incelenmesi adına karma araştırma yöntemi kullanılmıştır.

Araştırma İstanbul, Türkiye’de yer alan bir özel üniversitenin hazırlık sınıfı öğrencileri gözlemlenerek gerçekleştirilmiştir. Kurumun sınıf içi ve online olanakları göz önünde bulundurulduğunda, Beyin-Temelli Öğretim tekniklerini kullanmak için ideal bir ortam olduğu kanaatine varılmıştır. Deneyde yer alacak öğrenciler bu kurumun hazırlık okulundaki iki ayrı sınıf öğrencilerinin araştırmaya katılmaya gönüllü olanları arasından rastgele seçilmiş ve her iki grupta da eşit sayıda öğrenci bulunmasına dikkat edilmiştir. Araştırmada toplamda on iki olmak üzere her iki sınıftan yaşları 18 ila 22 arasında değişen altışar öğrencinin katılımı bulunmaktadır. Araştırmayı yürütecek olan araştırmacı İngiliz Dili ve Edebiyatı lisans bölümü mezunu olup, deneyin başlama süresine kadar 7 sene farklı kuruluşlardaki yabancı dil öğrencilerine farklı müfredatlarla (hazırlık okulu, ortak dersler gibi) ders vermiştir. Ayrıca dil öğretimi ve öğrenimi üzerine kurslar ve dersler olarak yabancı dil öğretiminde, gerekli olan bilgi birikimini sağlamaya çalışmıştır.

İkisi de üniversite hazırlık öğrencilerinden oluşan (N=12) iki sınıftan birine, Beyin-Temelli Öğrenme temel ilkeleri göz önünde bulundurularak ve öğrencilerin sinir-ağları oluşturmada ve bu ağları geliştirmede yardımcı olacak aktiviteler barındıran bir

müfredat oluşturulmuştur. Bu eğitim sürecinde, geleneksel yabancı dil eğitimi almakta olan kontrol grubu ile birlikte konuşma ve yazma becerilerinden yapılan 4'er sınavın sonuçları IBM SPSS 26 istatistik programı aracılığıyla analiz edilmiştir. Bu analizler araştırmanın nicel kısmını oluşturmaktadır.

Araştırmanın nitel kısmını ise, toplamda altı olmak üzere her deney ve kontrol grubundan rastgele seçilen üç öğrenci (N=6) ile yarı-yapılandırılmış bire bir görüşmelerin tematik analizi, konuşma ve yazma becerileri üzerinde gerçekleştirilen, ilk ve son sınavlar arasında yapılan hata ve sözdizimi analizleri oluşturmaktadır.

Araştırmada ilk olarak öğrencilerin sözcüksel çeşitlilik (diğer bir deyişle tekrarlanmayan sözcükler) kullanımına odaklanılmış ve yapılan sınavlarda, kullandıkları kelimeler öncelikle ilk test ve son test başarı düzeyleri bağımsız örneklem ve tanımlayıcı istatistiksel testleri ile IBM SPSS 26 istatistik programı yardımıyla ölçülmüştür. Daha sonrasında ise kullandıkları sözcüksel çeşitlilik sayısındaki artışın düzenli olup olmadığı da yine IBM SPSS 26 istatistik programı yardımıyla yapılan ANOVA testleriyle incelenmiştir.

Bu araştırma sonucunda Beyin-Temelli Öğrenme teknikleri uygulanarak yabancı dil eğitimi alan deney grubu ile geleneksel yabancı dil eğitimi alan kontrol grubu arasında, yapılan bağımsız örneklem ve tanımlayıcı istatistiksel testler sonucunda olumlu yönde, önemli bir fark olduğu sonucuna ulaşılmıştır. Beyin-Temelli Öğrenme, yani deney grubunda olan öğrenciler ile, kontrol grubunda olan öğrencilerin sözcüksel çeşitlilikleri arasında önemli bir fark gözlemlense de Beyin-Temelli Öğrenme tekniklerinin dil performans becerilerine etkisinin küçük oranda olduğu da yapılan ANOVA testi aracılığıyla istatistiksel olarak gösterilmiştir.

Sonrasında yapılan hata ve sözdizimi analizlerinde ise Beyin-Temelli Öğrenme teknikleri uygulanan ve uygulanmayan gruplar arasında farklılıklar ortaya çıkmıştır. Beyin-Temelli Öğrenme teknikleri uygulanarak yabancı dil eğitimi gören öğrencilerin son testte daha başarılı olduğu hem konuşma hem de yazma testlerine uygulanan analizler sonucunda belgelenmiştir. Geleneksel yabancı dil eğitimi alan kontrol grubu öğrencilerinin hata ve sözdizimi analizlerinde genel olarak bir değişim gözlenmemiştir. Beyin-Temelli Öğrenme teknikleri uygulanarak yabancı dil eğitimi almış olan öğrencilerin konuşma ve

yazma testlerindeki hata ve sözdizimi analizlerinde ise öğrencilerin genel olarak ilerleme kaydettiği gözlemlenmiştir.

Sonrasında her iki gruptan rastgele üçer öğrenci olmak üzere, toplamda altı öğrenci ile gerçekleştirilen yarı-yapılandırılmış yüz yüze mülakatların tematik incelemesinde 4 başlık ön plana çıkmıştır. Bunlar “Dil Öğrenim Süreci Hakkındaki Karmaşık Düşünceler”, “Olumlu Tecrübeler ve Yardımsever Öğretmen”, “Konuşma ve Yazmada Güçlük Çekme” ve son olarak “Dil Performans Becerilerindeki Gelişime Arzu” olmak üzere gruplandırılmıştır. Bu temalar dil olarak İngilizce üzerinden gruplandırılmıştır. Yapılan mülakatların tematik analizi sonucunda, araştırma sürecinde geleneksel eğitim almış öğrenciler, genel olarak durumlarını yeterli gördüklerini fakat belirli konularda zorluk çektiklerini dile getirmişlerdir. Derslerin sıkıcı geçtiğini ve daha fazla pratik yapmaları gerektiğini, yeni öğrendiği dilbilgisi kurallarını çabuk unuttuklarını, öğretmenin yardımsever olması ve yol göstermesinin kendilerini ders esnasında ve sonrasında motive ettiğini ve konuşma ve yazmada yeri geldiğinde kelimeleri unuttuklarını dile getirmişlerdir. Deney grubundaki öğrenciler de kontrol grubu öğrencileri gibi öğretmenin yardımsever ve yol gösterici olmasının kendilerini motive ettiğini iletmış ve dil seviyelerindeki gelişimi yeterli bulmuşlardır. Bunlara ek olarak deney grubu öğrencileri kendilerini yazma ve özellikle konuşma alanında daha iyi ifade edebildiklerini, öğrendikleri kelimeleri hatırlamada ve günlük hayatta kullanmada zorluk çekmediklerini belirtmişlerdir.

Tüm analizler bir çatı altında toplandığında, Beyin-Temelli Öğrenim uygulanarak yabancı dil eğitimi öğrencilerin, geleneksel yabancı dil eğitimi alan öğrencilere kıyasla daha başarılı oldukları sonucuna varılmıştır. Beyin-Temelli Öğretim tekniklerinin öğrencilerin beyinlerindeki sinir-ağları oluşturma ve güçlendirmekteki katkısı nicel ve nitel analizler sonucunda gösterilmiştir.

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ABBREVIATIONS

EFL : English as Foreign Language

BBL : Brain-Based Learning

L1 : Mother tongue

L2 : An additional Language

TL : Target Language

LL : Language Learning

EG : Experimental Group

CG : Control Group

1. INTRODUCTION

The need to communicate in any language easily has always been there. As students gain the ability to speak and write in the target language easily and gain a decent proficiency in them, they become more motivated. This motivation empowers them to communicate and express themselves in a more efficient way. For the purpose of achieving this motivation, students must learn the language and be assessed in a realistic environment, wrapped with authentic materials, in which they could relate.

Schmitt & Zimmerman (2002) claim that second language teachers should be informed with effective vocabulary teaching practices in order to offer learners meaningful opportunities to learn and remember new vocabulary for future productive usage (p. 287). This account puts forward the importance of how language teachers should be well informed about language teaching and learning. In order to understand how a learner learns a language, one must first have brief understanding of how brain works during language learning.

Within whichever area is dominant in brain (left or right side), there are two main sub areas associated with language; Broca's area which helps humans to speak, and Wernicke's area which allows them to understand language. This information is proved by neurologists' observation on patients who got hit on Broca's and Wernicke's areas. Both Broca's area and Wernicke's area are located on the side of the brain and Wernicke's area is located the back side compared to the Broca's area.

Many additional brain areas, in addition to Broca's and Wernicke's, are involved in language processing. These are: the angular gyrus, supramarginal gyrus, and inferior parietal lobe. These are interconnected regions in the parietal lobe of the brain. They play important roles in various cognitive functions, including language processing, reading, numerical processing, spatial cognition, and attention. These regions are involved in tasks such as language comprehension, phonological processing, working memory, mental calculations, spatial awareness, and directing attention to relevant stimuli. This shows that, brain doesn't have one module or one specific part related with language. There are many sub-parts of the brain which are responsible with processing different input and

they are all connected with each other. Therefore, while teaching a foreign language, teachers should focus on appealing to many of the language processing parts in brain in order to gain maximum result.

Keysers (2011) argues mirror neurons, which is a sensory-motor cell that could be found in humans, primates and birds, activates when someone performs an action or observes another doing the same action, just like a mirror. Since these mirror neurons are very active in young age, children can imitate the behavior of the people around them such as their parents to understand the world around them. One of the believed tasks of mirror neurons is action comprehension and imitation. Mirror neurons, as has been suggested by Keysers (2011), play a function in observing and understanding the behaviors of others by recreating those actions in the observer's brain. This simulation process may aid in the imitation of observed activities, letting individuals learn and copy the behavior of others. Language learning, according to his work, is an imitation process, and as a learner's connection between their mirror neurons strengthens, they will be more successful in replicating the language.

Caine and Caine (1991) states that brain is designed as a detector of patterns so as educators it is our duty to provide different experiences for students in order for them to understand “connected/related patterns”. According to their work, it is possible to conclude that teachers must acknowledge this inherent tendency and create educational environments that engage the brain's pattern-seeking capacity. Teachers should give students the opportunity to discover new patterns and build connections between seemingly unrelated concepts or ideas by providing them with numerous and varied experiences. These linked or related patterns would allow students to get a more comprehensive understanding, make meaning, and develop more holistic knowledge. This means including a variety of teaching methodologies, learning activities, and real-world examples into the educational process. Teachers should stimulate students' brains to find patterns, make connections, and develop more comprehensive mental models by exposing them to new perspectives, circumstances, and experiences.

Today, human brain still keeps some of its mysteries hidden. We can inspect the activities in our brain with the help of developments in modern technology, but we still have much to understand on how our brain understands and learns concepts or mechanisms such as

language. As Sousa (2010) states, since our understanding of the brain is constantly evolving, so should our understanding of the significance of brain-based research discoveries for teaching and learning. According to his suggestions, since both the potential and the limitations of the human brain are unknown, and as more brain functions are discovered every day, educators' understanding of language education ought to expand along with it. This statement also explains, to some extent, why there are so many different language teaching and learning methods and approaches that exist today.

In recent years many cognitive oriented approaches and techniques such as Neuro-Linguistic Programming or Brain-Based Learning have emerged. Neuro-Linguistic Programming focuses on language learners' thoughts and behaviors. By changing the learners' thoughts and behaviors, NLP tries to achieve a desired outcome which is success in Language Learning (LL). Brain-Based Learning (BBL), as it is described by Jensen (2000; 2010), focuses on cognitive development of language learners and tries to come up with the optimal learning method for brain's learning pattern.

In order to be accounted as the speaker of any language, one has to be proficient in four skills. These are; listening and reading skills at one hand (which are referred to receptive skills), on the other hand speaking and writing skills (which are referred to production/performance skills). Receptive skills are the input side whereas the productive skills are the output of the language knowledge in one's brain. When a learner listens to or reads something in a language, they acquire information or input, leading to the term receptive skills. Through these skills the learner basically creates a knowledge pool of a language in their mind which is also called as "mental lexicon". As one cannot measure the limits of people's mental lexicon inside their brain to see if it is sufficient or not, the closest thing to see their proficiency in a language is checking their performance skills as they are the output of their knowledge in a language.

As students realize what they can achieve with their mind, they may eliminate prejudiced thoughts such as "I understand more than I could speak, I don't have what it takes to learn a language" and may move towards success by knowing how to remember things. In this context, it is anticipated for the study to contribute students to learn a language by heart and make the information that their brain gathered through the process, to be long-lasting knowledge.

Brain-Based Learning (BBL) method has been practiced in different countries for approximately 40 years to teach classes such as math, geometry and foreign language. The usage of such technique and research on the subject is increased in our country every day. Duman (2010) claims that neurolinguistics is the most popular paradigm of our age and that Brain-Based Learning is the reflection of neurolinguistics onto education. As we see the reflection of the developments in science in almost every part of our lives, it is only logical that we may see attempts to implement these freshly gained information to education.

In line with this concept, this thesis will attempt to determine the best teaching technique(s) for strengthening neural networks while learning a language and will investigate the impacts of the Brain-Based Learning educational style on language performance skills.

1.1 Statement of the Problem

Turkey's English Proficiency Index (EPI) average is quite poor, according to results displayed on the EF Education First (n.d.) website. Turkey was ranked 64th out of 111 countries in the investigation in 2022, with a "low" proficiency level. When compared to previous figures, Turkey's proficiency level falls between "low" and "very low." These statistics prove that as English proficiency level is low at most, English language education in Turkey is also very problematic. According to Yaman's (2018) study, learners in Turkey do not get enough practice for their language skills, especially performance skills such as speaking and writing. This study also aligns with the problems identified in this thesis in English language teaching. This thesis will look into the effects of different techniques of English language teaching and how they affect language performance skills (speaking and writing).

As linguist Kachru (1985) describes, there are three circles in English Language speaking countries classification: the inner circle, the outer circle and the expanding circle. The inner circle consists of the countries where English is the first language. The outer circle consists of the countries in which both English and their own local language may be official languages and could be used in education as well. The expanding circle consists of countries where English is taught as a Foreign Language (FL). Language learners in Turkey is in the third circle; meaning little to no exposure to English Language in daily

life and slight chance to practice (communicate or write in) the Target Language (TL). As learners do not always get a chance to put their knowledge into practice, they do not get the chance to internalize, or create mental connection between words they learn. This turns performance/productive skills in language into a problematic issue in Turkey.

Methods, approaches and techniques in language instruction fall into different categories such as structural, cognitive, psychological, functional/communicative and (a rather integrative) whole-person methods. In structural methods, teacher is the main source. In cognitive methods, learner is the center. In psychological methods, rather than being a source or an authority, teacher is a motivator. In functional/communicative methods teachers' role is something a practice partner. Whole-person methods, also known as holistic methods, are approaches to language teaching that take into account the learner as a whole person, including cognitive, emotional, social, and physical characteristics. These approaches emphasize that language learning is influenced by different factors, including learners' attitudes, motivation, cultural background, and personal experiences. In language education in Turkey, many different approaches, methods or models are used in order to teach a language as a Foreign Language (FL).

Despite all the technological improvements and progress in language education, methods in which teachers are the source of information and teaching are used in language teaching since it is thought to be easy for language teachers and learners. However, some of these kinds of methods such as Grammar-Translation Method being the most popular one, do not include language learners in the process, turning learners into relatively passive learners. Language teachers may prefer to give bilingual word lists, have students memorize the target vocabulary by repeating it, or have students write several times to teach vocabulary. Furthermore, they frequently favor providing those lists that include short definitions or L1 equivalents of the words; yet these lists may not operate as planned because students may find it difficult to remember those words after a couple of weeks or more have passed. A similar thing happens when a teacher assigns a reading passage and asks students to translate it into their first language, as McCarthy (1990) states. The students are asked to listen, take notes and only speak when the instructor asks them to. They get a rare chance to speak and put their knowledge into practice. This lack of practice on their productive skills does not allow the neural-networking in human brain to be fully constructed. The information gathered during the class stays in the short-term

memory. As learners do not perform their existing knowledge or recently learned knowledge in the language learning phase, the new information gets forgotten since the brain does not see it as a necessary information anymore. As a result, this new information gathered in class hours get disposed, failing to be stored in long-term memory. This inappropriate method of language education could be the source of the problem.

1.2 Aim of the Study

The purpose of this study is to investigate the effects of Brain-Based Learning (BBL) techniques on language performance skills and contribute to existing knowledge on foreign language teaching. Investigating the application of BBL principles in language education is an important field of research since it tries to understand how the brain works during the learning process. The main intent of this study is to investigate how BBL techniques grounded in neuroscience principles can improve language performance outcomes for learners. It aims to discover the possible benefits and effectiveness of using brain-based techniques in language teaching and learning contexts by investigating neural-networking characteristics of language acquisition and employing BBL techniques. Furthermore, the study will look into the cognitive and affective impact of BBL on language learners, focusing on attitudes, motivation, engagement, and self-efficacy. Drawing on the work of Oxford (2016), the study will explore the interdependence of cognitive and affective components to see how BBL techniques can improve overall language performance and perceived competence in language skills.

This study's findings will benefit the field of language education by giving evidence-based insights into the effectiveness of BBL techniques in improving language performance skills. The findings will have implications for language teachers, curriculum developers, and educational administrators, who can use them to inform instructional practices, design learner-centered approaches, and promote innovative methodologies that use the power of brain-based learning to improve language acquisition.

The research questions seek to investigate the effect of Brain-Based Learning techniques on language performance skills and students' perspectives. The study seeks to investigate the effectiveness of BBL in comparison to traditional teaching methods, the potential benefits of incorporating BBL into the curriculum, and the influence of BBL activities on

students' perceptions of their vocabulary production in writing and speaking by addressing these questions.

This study attempts to find answers to the following questions:

- 1- How effective is BBL technique teaching compared with traditional methods in the manner of language performance skills?
- 2- Is a curriculum enhanced with BBL techniques effective to attain any increase in language performance skills level?
- 3- Is there a difference on students' perceptions toward language performance levels in writing and speaking after implementing BBL technique-oriented activities?

To answer the first study question, a comparison of the language performance skills of students taught using the BBL techniques and those taught using traditional methods will be made. The second research question examines the efficacy of a curriculum improved with the BBL techniques. The study will also look into whether incorporating BBL ideas, techniques, and activities into the curriculum results in measurable gains in students' language performance skills. It will examine the overall impact of the BBL techniques on language performance levels. The third research question is to investigate students' perceptions of their vocabulary performance levels in speaking and writing following participation in BBL technique-oriented activities. This component of the research will investigate students' subjective experiences and perceptions of the efficiency of BBL approaches in improving their vocabulary abilities in productive language tasks. It will reveal how students view the effect of BBL on their language production skills. The study aims to contribute to the existing knowledge on the effectiveness of the Brain-Based Learning technique in the context of language performance skills by addressing these research questions.

1.3 The Significance of the Research

The study of the effects of Brain-Based Learning (BBL) with an emphasis on neural-networking on language performance skills is critical for numerous stakeholders in education and language education. This study contributes to teaching techniques by analyzing the effectiveness of the BBL strategy in improving language performance

skills. This study gives useful insights into instructional strategies that promote more effective and efficient language acquisition by investigating the effects of BBL on language learning and teaching.

Furthermore, the research findings have the potential to enlighten educators, curriculum developers, and language teaching practitioners about successful techniques for improving language performance skills. Educators can create and deploy instructional approaches and activities that maximize language learning outcomes by studying the effects of BBL techniques. This understanding enables educators to help their students develop speaking fluency and writing proficiency, ultimately boosting overall language competence and proficiency. The findings of this study may be used for the betterment of language curriculum, resulting in a more holistic and comprehensive approach to language instruction.

In addition, the study sheds light on the concepts and principles of Brain-Based Learning, specifically in the context of language teaching and learning. The research gives insights into how brain-based principles might be integrated into instructional approaches, resulting in a more learner-centered and neurologically informed approach to language education by investigating the effects of neural-networking through BBL. This knowledge of brain-based principles has the potential to transform language teaching approaches and improve instructional efficacy.

Finally, the importance of this study exists in its possibility to encourage student-centered methods of language teaching and learning. Understanding the effects of BBL allows educators to customize their instructional techniques to students' particular learning needs and preferences, resulting in a more engaging and successful learning environment.

1.4 Statement of Limitations

In the study, language performance skills of English preparatory school learners will be analyzed. During the study, some limitations will be determined. The restrictions are as follows.

The number of students participating in the study is 12 in total and it is the first restriction of the study. 12 students divided in 2 groups, 6 students in each group. More reliable results could be gathered if the study were to be conducted on more students.

The second limitation is the students' busy school schedule. Students have many assignments, homework, and regular tests in their schedule, and they attend 30 hours of English classes including the researcher's class. Students may have to shift their efforts into their own workload as they must gather a passing score and must have this on their agenda. The students in both groups may be discouraged by the extra speaking and writing tests apart from the exams conducted by the institution they study.

It is presumed that the study's participants, a group of 12 students from a university prep school in Turkey, have comparable language competence levels and educational backgrounds. This assumption implies that the improvements in language performance skills observed can be attributed to the intervention (strengthening the neural-networking in brain) rather than to individual differences. Both classes that were chosen were consisted of B2 level students.

In both classes that the study conducted on, there were approximately 15 to 20 students. Participants from both the control and the experimental groups were randomly chosen. Random assignment helps to reduce pre-existing discrepancies between groups and increases the study's internal validity.

It is assumed that each participant's observations and data are independent of one another. This assumption assures that the outcomes are not impacted by dependencies or interactions between group members.

Brain-Based Learning method includes the discipline of neurology into its study as well. So, the better understanding of human brain provided by this practice and combined method presented by both fields of neurology, linguistics and language learning might give us more information in language teaching and learning.

As language teachers, a basic knowledge on how brain and neural-networks of a learner works, proves crucial. As research of Hoffman (2012) points out, neural activity may differ from one person to another depending on gender, emotions, age. Hoffman (2012) suggests, children's neural network activity rate differs from adults. Therefore, methods or approaches used in language teaching might change depending on age. Research that may justify this idea is conducted by Healy (2011). Since university preparatory school

students will be the participants of this study, a combination of methods that are effective for their age is necessary during the research.

As recent research on brain points out, the number of visual receptors that transmit information through neural-networks to brain are 10 times more than olfactory receptors. This also means that learners spend more cognitive effort on visual side. Demircan (2005) claims that in language teaching, usage of visual materials carries a great importance; it helps students to create mental connections between words and real-life objects. So, visualization's importance in teaching should not be undermined as it may help students on "re-calling words" as they speak or write.

As for students, it will be thought that during the process, they will give honest and objective answers in tests and interviews, the students participated in the research will be aware seriousness of the process and will behave sincere and respectful to personal values when they are answering the questions in tests.

1.5 Keywords and Identification

Brain-Based Learning: This term refers to teaching techniques, lesson plans, and educational programs based on the most recent scientific knowledge on how the brain learns, including cognitive development—how learners learn differently as they grow socially, emotionally, and cognitively ("brain-based learning", Jensen, 2000).

Neural-Networking: The term refers to a network of neurons that are created and strengthened by repeated actions. Each activity that is done by an individual leads to firing of certain set of neurons. Memory is formed through the repeated tasks. (Bain, 1873).

Language Performance skills: the actual use of language. Term refers to the 2 language production skills, which are speaking and writing, where the learner has to recall his knowledge on language from his/her mental lexicon (mental representation of all knowledge on a language and its elements that a learner has) to be able to communicate ("language performance skills", Chomsky, 1965.).

Mental Lexicon: It is the assumption that a mental dictionary exists in the human mind (Aitchison, 2012).

Bloom's Taxonomy: A pyramid that incorporates six phases for categorizing educational goals: recall, understand, apply, analyze, evaluate, and create (Bloom, 1956).

Lexical Diversity: refers to the range and variety of words used in a text or speech sample. It is a measure of the breadth of vocabulary employed by a speaker or writer, indicating the richness and diversity of their word choices. A higher lexical diversity score suggests a greater variety of words used, indicating a more extensive vocabulary and potentially more sophisticated language proficiency (Malvern, Richards, Chipere, & Durán, 2004).

Token: In the context of computational linguistics and text analysis, a token refers to an individual instance of a word or a discrete unit of language. Tokens are identified by segmenting a text into its constituent elements, such as words or punctuation marks. Counting the number of tokens provides a quantitative measure of the overall length or size of a text (Manning & Schütze, 1999).

2. LITERATURE REVIEW

The aim of this chapter of the thesis is to review the related literature on the development of Brain-Based Learning and Neural-Networking in the brain, and its impact on Language Performance Skills education in the world and in Turkey. The literature review will be presented under the themes of research related with language receptive skills teaching, research related with curriculum design and classroom environment and research related with increasing academic achievement in language.

2.1 Research Related with Language Receptive Skills

According to Caine & Caine (1991), the brain is designed as a pattern detector, and it is our responsibility as educators to present pupils with a variety of experiences to help them discover "connected/related patterns." The brain-based techniques for language instruction have shown promise in improving language learning outcomes. BBL offers an atmosphere conducive to effective language acquisition by aligning educational approaches with how the brain naturally processes and recalls information.

According to Demircan (2005), the use of visual resources in language instruction is very important since it helps students make mental links between words and real-life objects. Thus, the role of visualization in teaching should not be underestimated, since it may aid students in "recalling words" while they speak or write.

Toprakoglu and Dilman (2014) discovered that learners taught through vocabulary enhancement activities in the experimental group outperformed those taught through traditional vocabulary teaching activities in the control group.

In one classroom of young learners, Çelik (2015) used Brain-Based Strategies, whereas in the other, typical vocabulary teaching strategies such as translating the word into L1 were used. According to the posttest results, learners in experimental group are relatively successful than those in the control group in remembering and using the target vocabulary.

Salem (2017) investigated the effects of BBL in interacting with ESP students in order to improve receptive skills such as listening skills, vocabulary retention and motivation. The

group selected for the study included 36 Business majors. The aim was to optimize their learning. The results of the study argued that BBL is an impactful approach for improving listening skills, vocabulary recalling and retention.

Chen (2017) investigated the effect of using different modalities in language teaching on learners' vocabulary development and reading comprehension. The results showed that combining the auditory, visual, and kinesthetic modalities in language training improved learners' language skills. The study found that by engaging learners through multiple sensory channels at the same time, they were able to form stronger connections with the language material, resulting in greater vocabulary acquisition and reading comprehension. This holistic approach to language learning is based on the principle of multisensory learning, which allows learners to access a variety of linguistic inputs and experiences, resulting in a more thorough knowledge of vocabulary and the development of good reading abilities. Chen (2017) also discovered that using BBL concepts in the language classroom boosted motivation and engagement among language learners.

As stated by Friederici (2019), neuroscience research has also revealed that neural networks in the brain play an important part in language performance abilities. According to research, the neural networks involved for language processing are located in the left hemisphere of the brain, notably in the Broca's and Wernicke's areas (Friederici, 2019). These parts of the brain oversee language production and comprehension, respectively. Moreover, a study carried out by Maguire (2019) has revealed that the neural networks involved for language processing are influenced by the learner's age as well as the manner of instruction used. The study discovered that the brain networks involved for processing a second language in young learners differ from those in adult learners. Furthermore, research has demonstrated that the manner of instruction has an effect on the neural networks involved for language comprehension (Maguire, 2019).

Chiang and Anderson (2020) concluded that another BBL feature is the incorporation of numerous modalities. This indicates that training should use many types of information, such as visual, aural, and kinesthetic, to appeal to different learning styles and assist learners in processing knowledge more successfully. Teaching a new grammar rule, for example, using a visual graphic, an aural explanation, and a kinesthetic activity can help learners with diverse learning styles understand and retain the new material. According

to their research, incorporating several modalities in language teaching can benefit language learners.

Kriegeskorte's (2020) research provides evidence that language exposure has a significant impact on the brain's language processing networks. The study discovered that the brain networks involved in processing a second language differ from those involved in processing an individual's first language, implying that acquiring a second language requires the creation of new neural networks. Besides, when students are exposed to a second language, the neural-networks in their brains that previously processed their original language alter. This process, known as neural plasticity, illustrates the brain's ability to adapt to new experiences. According to Kriegeskorte (2020), neuronal plasticity is thought to be the mechanism by which the brain adapts to new languages and creates unique neural networks, emphasizing the dynamic nature of language learning and its impact on the brain.

In her research, Eriyanti (2020) investigated the integrated Learning Model in strengthening receptive language skills of Education of Indonesian Language students. The study addresses the gaps in how receptive skills are taught utilizing multimodal teaching materials, and an integrated instructional design has been created to include receptive skills in a variety of ways. For students enrolled in receptive skills classes, the effectiveness test was conducted using a quasi-experimental method. The collected data is statistically analyzed using the t-test in SPSS. The results demonstrate a significant difference in student scores for listening and reading skills before and after integrated learning ($0.000 < 0.05$). Eriyanti (2020) concludes that the integrative learning framework was helpful in improving Indonesian Language Education students' receptive language skills.

2.2 Research Related with Curriculum and Classroom Environment Design

Natural learner interest or motivation may cause learners to pay better attention to particular words than others, according to Hatch and Brown (1995). Learners also seem to learn the words if they feel they need them. This of course is caused by the “need of survival” whether it’s an academic, work or social environment, as stated by Jensen (2000).

Previous study (Jensen, 2008; Willis; 2006) has suggested that BBL approaches may be beneficial in language teaching. Jensen (2008), for example, found that implementing brain-compatible techniques in language classrooms boosted student engagement, motivation, and overall language performance. Willis (2006) also emphasized the importance of brain-based techniques in encouraging active learning, critical thinking, and metacognitive skills, all of which are necessary for language performance.

Creating lifelong learners is another crucial objective in teaching according to Tarhan (2009). In the study named "Scaling the knowledge and attitudes of teachers of English as a foreign language in relation to the principles of brain-based learning", some of the points that Tarhan (2009) states are that: teachers should be enlightened in how brain works and should guide students in being autonomous learners. There should be some educational courses for undergraduate students such as "Education Neurology" where future language instructors would find a chance to learn the way brain works and design more suitable curriculum. Also, by making learners discover how their brain learn, they can achieve autonomous learners who do not require any institutional and teaching assistance which also aligns with the BBL principles.

Lee and VanPatten (2015) stated that the encouragement of active learning is key for language performance skills. Rather than being passive recipients of knowledge, learners should be actively involved in the learning process. They concluded that instead of just listening to a teacher explain a new grammatical rule, learners should be invited to participate in activities such as developing their own instances of the rule, teaching the rule to a partner, or solving issues relating to the rule. Active learning has been found in this study to be advantageous for language learners. Another critical feature of BBL is the fostering of active learning, which refers to learners' participation in the learning process.

Çelik (2015) also presented a descriptive analysis of the average number of remembered words. The contrast demonstrates the success of the experimental group, which was trained to remember the words through brain-based activities. In order to assess the students' motivational and emotional outcomes, she handed the students a questionnaire in which they could explain their feelings about the classroom activities. The majority of

the students indicated that brain-based educational activities made them motivated and eager in learning a language.

Yang (2016) suggested that assignments could reduce the potential lack of opportunities for students to use English productively in class, yet receptive skills could still be strengthened. In the study, a total of 21 CLIL and ESP classes were watched, and teachers' perspectives were gathered to better understand how the two methodologies were implemented in the classroom. Furthermore, characteristics such as course type, teacher's first language, and expertise were examined to determine any potentially significant differences. The findings show that CLIL teachers spend far more time on content instruction but far less time on language teaching; in contrast, ESP teachers often focus on both learners' language development and disciplinary knowledge.

Aside from the benefits of BBL for language learners, using BBL in language classrooms can also assist teachers. Fukuda (2018) discovered that teachers who applied BBL concepts in their classroom felt more confident in their teaching abilities and that their lesson was more effective. By adapting to students' different learning requirements, BBL can help to create a more inclusive classroom atmosphere. Fukuda (2018) also stated that incorporating realistic materials in the classroom can boost learners' motivation and engagement, as well as their ability to use the language in real-life circumstances.

According to Daoud (2019), if we want our learners to be qualified and autonomous, capable of taking responsibility for their own learning, we must also have qualified and autonomous educators. These instructors must understand how to design curriculum and implement it. Traditional methods, which are frequently utilized, unfortunately make the learning process dependent on the teacher, which may be okay at the beginner level but not at the advanced level of language learning. Traditional approaches would not be effective for learning a language since students would have trouble learning new words.

2.3 Research Related with Increasing Academic Achievement in Language

Griffiee (2007) conducted research and compared the performance of students taught using Brain-Based Learning and traditional approaches. As an outcome of his study, learners who participated in Brain-Based Learning outperformed those who participated in traditional learning. The research conducted by Griffiee (2007) covered two types of

methods: experimental and traditional. The results of the data, gathered through questionnaires and in-class writing, show that the experimental classes expressed more positive comments than the traditional classes and typically received higher mean Likert scores on an enjoyment scale; however, the low N-size inhibited statistical testing and weakens the hypothesis. However, experimental students had statistically significantly higher final writing scores in the study.

Odabaşı (2010) examined the effects of brain-based learning activities on the academic achievements and knowledge retention of 12th-grade students. Descriptive method was used in his study. The pre-test used to differentiate students' academic achievement levels was created by comparing the mean of preparation test results starting from October 2008 and the mean of 2009 university entrance exam results are used as post-test results. In terms of students' academic achievements, statistically significant differences were discovered between the results of the test administered to students prior to brain-based activities and the results of the university entrance exam.

Duman (2010) also conducted a study on BBL's effect on academic achievements with varying learning styles. The group that was chosen for the study were selected from Social Sciences Teacher Education at Muğla University. Study had an experimental method and the data were collected by using tests on academic achievement and a questionnaire. The study's findings indicated that BBL was effective in increasing students' academic achievement level compared to the CG which had a traditional education.

Gözüyeşil (2012) analysis shows that between the years of 1999 to 2011 there were 42 studies done on BBL's impact on academic achievement. Turkey at that time is taking the lead on these studies with 19 research done on the subject. Gözüyeşil's (2012) analysis also shows that while out of 42 studies most them shows positive impact on academic achievement levels with the percentage of 83.34. This gives the research groups included in her study an advantage also shows that BBL method can help students achieve better results in language learning.

Kondo (2018) states that the utilization of authentic and meaningful surroundings is one of the key principles of BBL. This means that training should be provided in a context that is relevant and entertaining to the learner, as this can help them remember and apply the new information. Teaching vocabulary words in the context of a real-life

conversation, for example, or reading comprehension passages related to the learner's interests, can be more engaging and effective than teaching vocabulary items in isolation or using passages that are irrelevant to the student. According to research conducted by Kondo (2018), incorporating real materials in language courses can benefit language learners.

Akman's (2018) findings on her research also shows that there is a significant change on students' academic achievement and emotional intelligence levels when EG students got a BBL technique based education.

Tadayonifar and Entezari (2020) evaluated the impacts of the Flipped Learning approach (which, in theory, combines aspects comparable to BBL such as pre-exposure in students' learning process). Forty Iranian EFL students completed the PET pre-test and were classified according to their chosen learning styles. They then used the Flipped Learning method for a semester. The paired samples T-Test findings showed a substantial positive change in the students' performance on the post-test ($t(39) = 7.698, p = .000$). The One-way ANOVA results revealed that there were significant variances among learning style groups with the favor of the visual style ($F(4, 35) = 2.299, p = .034$). The Mixed ANOVA results revealed that the most significant difference among skills was found between speaking and writing skills ($F(3, 105) = 8.018, p = .000$).

Salleh (2021) presented a research article on language performance skills. The study was focused on the effective ways of utilizing BBL to increase communication skills. The purpose of the research was to determine the effects of BBL strategies on increasing communication skills of 4 Malay language students. The data in the article was collected through a communication skills questionnaire. The study type used a quantitative data analysis (independent t-tests). The duration of the research was 8 weeks. The findings of the study showed the implementation of BBL approach to teaching a positive result in increasing students' communication skills.

3. METHODOLOGY

In this study, the impacts of Brain-Based Learning (BBL) techniques on language performance skills are investigated using a mixed-methods research methodology. Mixed-methods research methodology provides a thorough concept of the studied phenomenon and mixes both qualitative and quantitative methods to explain a phenomenon from different perspectives of the issue. The quantitative part of this study consists of giving students speaking and writing tests, which will be evaluated using IBM SPSS 26 software to look for statistical patterns and connections. The analyses of the data gathered through the exams will consist the study's quantitative part by enabling the examination of numerical data and the identification of potential impacts of BBL techniques on language performance. Furthermore, the qualitative component includes error, and syntactic analyses that will provide detailed insights into the learners' language production and comprehension processes. Afterwards, a thematic analysis of student answers to semi-constructed face-to-face interview questions will be performed. These qualitative analyses will provide a rich understanding of the cognitive and linguistic aspects of language learning influenced by BBL techniques. The study aims to provide a thorough explanation of the effects of BBL techniques on language performance skills by using a mixed-methods approach.

3.1 Research Design

The study's mixed-methods design, seek answers to three research questions below;

1. How effective is BBL technique teaching compared with traditional methods in the manner of language performance skills?
2. Is a curriculum enhanced with BBL techniques effective to attain any increase in language performance skills level?
3. Is there a difference on students' perceptions toward language performance levels in writing and speaking after implementing BBL technique-oriented activities?

The mixed type design of the investigation provided the necessary data. The first research question sought to assess the tangible outcomes of student accomplishment by examining

the effectiveness of the BBL method's implementation in Prep. school classes, which both groups of students took with the researcher for a semester in their first year. The quantitative data were obtained through 4 exams on both writing and speaking skills with the goal of comparing two groups of students: one using traditional methods and the other using BBL methods. In order to adequately answer this study issue, quantitative data were collected. Triangulation was also done through the use of those data collection tools. Triangulation is a concept that defines the use of many research methods to explore the same phenomenon in the social sciences in order to increase the study's credibility (Bogdan & Biklen, 2003). The qualitative analysis (error and syntactic analyses) will also give insights on students' language performance change. By conducting both qualitative and quantitative analyses, the study aims to reach a more meaningful result.

The second and third research questions were to determine the possibility of broadening students' vocabulary in writing and speaking. Every three weeks, the students took tests. The goal of this program was to track possible changes in their vocabulary production levels to see if they were increasing, decreasing or not changing at all.

The usefulness of the experimental teaching technique, BBL, was the topic of the first research question. Quantitative data, as well as student perspectives on the issue, are analyzed to provide justification for the projected outcome. Students' opinions on the methods used in the classroom during the research, as well as their overall assessment of their own language learning experience, were acquired through semi-structured face-to-face interviews and analyzed through thematic analyses which constitutes a part of the qualitative research progress data.

Various instruments are necessary to collect both qualitative and quantitative data in social research, and the use of triangulation is crucial in ensuring the validity of research findings. Triangulation involves using multiple methods and sources to address the same research question, reducing the risk of individual biases and increasing the reliability and credibility of the research (Denzin, 1978; Creswell, 2014). Triangulation can also show a more comprehensive and nuanced understanding of complex phenomena, as multiple perspectives are incorporated into the analysis (Jick, 1979). By utilizing triangulation in the methodology, this study benefits from both qualitative and quantitative data sources, increasing the rigor and comprehensiveness of the research findings.

3.2 Setting

The research was conducted at a private university in Istanbul, Turkey, which has a multicultural population of students and students with different linguistic backgrounds. Because of its multicultural environment and emphasis on language education, the institution proved to be an ideal setting for investigating the effects of Brain-Based Learning (BBL) techniques on language performance skills. The study was conducted in two language classrooms that were specifically designed for English language teaching and had many tools that could be benefited by the researcher by combining different teaching techniques. These classrooms provided an ideal learning environment for adopting BBL techniques and collecting data for both quantitative and qualitative analyses.

3.3. Participants

There were two groups who were selected from English preparatory school classes in the present study: the CG in which the traditional methods were used (which will be referred as Non-BBL) and the EG in which Brain-Based Learning enhanced techniques were applied (which will be referred as BBL). Both groups were separate classes. The participants in the study were consisted of students in preparatory school and one English Language instructor (which was the researcher) who worked at the same university. 12 students of 6 male and 6 female (whose ages ranged from 18 to 22) from both Turkish and different nationalities were volunteered to participate the study. The students had previously studied most of the B1 level subjects and were identified as B1 level proficient students by the institution. Participants attended 6 hours of English Language Skills lessons per week for 12 weeks and reported difficulty transferring what they learned in class to necessary situations in their daily life.

The researcher had 7 years of teaching experience in English language teaching. The teacher kept a bachelor's degree in English Language Literature and took courses in language skills teaching, in addition to research methods courses to support the credibility of the current research techniques.

3.4 Data Collection

The mixed-method design was used for this study in order to analyze the data in a multi-directional manner. The method integrated quantitative and qualitative research methodologies in order to broaden the scope of the study. The data collection process began at the aforementioned institution during the fourth week of the spring semester of the 2021 - 2022 academic year. For the EG, strategies and procedures, including the BBL techniques, were used. The other group, CG, did not receive BBL technique instruction, instead the curriculum and activities used for this group were suggested by the institution. Students in both groups took a pre-test prior to the study's initiation. Data collection was completed 14 weeks of instruction by the same instructor excluding the exam weeks. Following each session, target vocabulary-based writing and speaking projects were given in order to assess progress. Two midterms and a final test (post-test) were taken to complete the progress check and gain more precise results. After the teaching process, three students from both groups (BBL and Non-BBL) were chosen at random to participate in interviews, which included open-ended and semi-structured questions. Throughout the interview sessions, the answers were written down, and all participants were guaranteed that their information would be kept confidential. Using triangulation, the students' lexical performance and achievement, as well as their general attitude toward the BBL method integrated language learning, were evaluated. Triangulation has been achieved through statistical analyses, error and syntax analyses of the tests and thematic analyses of semi-structured interviews. A 12-week comparative experiment integrating BBL technique language education with university students in their preparatory school year was carried out to determine whether they were effective and beneficial for language performance skills.

3.4.1 Data collection instruments

In this study, three different types of data collection instruments were employed. These instruments were four speaking tests (Appendix 3), four writing tests (Appendix 4) and open-ended and semi-structured interview questions (Appendix 5).

3.4.1.1 Speaking tests

Speaking examinations with open-ended questions were designed to reflect on the persistence of knowledge and learners' ability to correctly employ target vocabulary and grammar within the areas they learnt. Another issue looked into was how effectively the learners would use their language knowledge in speaking and whether they could establish any connections with their own experiences on the familiar subjects they had seen.

The first test was on the topic of “sport and exercise”. The test consisted of three open-ended questions, the first two of which were very straightforward and the third of which required students to employ their critical thinking skills. The outcomes of the students are later used as a pre-test to provide a foundation for comparing their results after the research duration.

The second test was on the subject of “advertisements”. The process was the same, two questions being relatively easy and one aiming the learner to think on the issue. The results of these tests were used to observe any possible stable raise on students’ linguistic diversity.

The third test was on the subject of “jobs”, which was included for the same purpose with second test, same process was followed for the sake of being able to measure stable increase in students’ linguistic diversity.

Lastly, the final test was conducted after the finals week in order to keep students from feeling stressed. This time, students were asked six questions; three from new subjects and three from subjects discussed in previous tests to see if they still had control over the previous weeks’ subjects.

Both the pre-test and post-test results were also analyzed in manner of error analyses and syntax analyses to gain a further insight on their language performances.

3.4.1.3 Writing tests

Writing examinations followed a similar pattern: students were required to submit an essay on an open-ended question to reflect on their knowledge retention and their ability

to correctly apply target language within the areas they learned. Similarly, it was investigated how successfully the learners would use their language knowledge in writing and whether they could make any connections with their own experiences on the familiar subjects they had seen.

The first test was on the theme of "Physical Education". One open-ended issue was presented to the students in order to test their lexical diversity in writing skills. The students' findings are used as a pre-test to give a framework for comparing their final results.

The second and third tests focused on "advertising/commercials and reality". The procedure was the same; one open-ended question aimed at getting students to think about and reflect on their knowledge and experience with the topic. The results of these exams were utilized to look for any consistent increases in students' lexical diversity.

The third test focused on "jobs/unemployment and scams". Same process on the other tests was followed for the purpose of inspecting the change on students' lexical diversity levels in a periodic manner.

Finally, the last test was given after the finals week before their speaking tests. Students were asked to write one essay on a new topic "Inspiring Success Stories" rather than their final speaking test, where they had to answer six questions to see if they still had control over the previous weeks' themes. The findings of this test (lexical diversity counts) were utilized as post-test results.

As it was the issue for the Speaking tests, error analyses and syntax analyses were conducted on pre-test and post-tests for the writing exams.

3.4.1.1 Interviews

Semi-structured interviews were conducted with six students (three from each group) who were chosen at random in order to provide more detailed information. The interview questions were designed to obtain the interviewees' overall perspective on the implementation and effectiveness of the Brain-Based Learning method in language learning, as well as their reflection on their own learning process' in general. Four focus interview questions are as follows:

1. How do you feel about your language learning process?
2. How did our experience help you with Speaking and Writing?
3. Is there anything you wish you could do differently or anything you would like to see more of?
4. How do you feel about your language production level?

The total number of questions was four, being focus interview questions about qualitative data (Appendix A). The interviewer wanted a non-threatening environment for the interviews, which was the yard of a coffee shop on campus, so that the interviewees did not feel pressured (which also aligns with BBL method's teaching principles).

3.4.2 Data collection procedures

The data collection process commenced on the sixth week of the spring semester of the 2019 - 2020 academic year because the first week was spent on introducing the English course to the students and gathering information about their expectations, the second and third weeks were spent covering topics left from the B1 level, and students needed time to adjust to being at the B2 level afterwards. Three weeks before deployment, the scale's developers granted authorization to utilize the scale. Furthermore, because two groups of students from a preparatory school were used in this thesis study, the director of the Foreign Language School and supervisor of the English Preparatory School were contacted to request permission to conduct the study with the students before the data collection process began and the necessary permission was granted.

Because both groups in this study were in their Preparatory School year, a placement test was administered by the institution beforehand, and English classes given to first-year university students studying in prep. Schools, where the teaching medium is English, were conducted using the same procedures and the same English course book (Pioneer Level B2 – Upper-Intermediate). Because all exams were taken online and from the same question pool, both groups' English proficiency level was determined to be Upper-intermediate (B2).

The grammatical themes in the chosen coursebook (again chosen by the university committee) were taught on a weekly basis, in addition to the English Speaking and Writing activities conducted by the English language instructor, who was also the

researcher. Within 14 weeks, fourteen units from the course books (Pioneer Level B1 - Intermediate and Pioneer Level B2 - Upper-intermediate) were completed. The interactive coursebook program installed on the classroom computers enabled students to participate in listening activities and see topic-related videos. For the sake of learning integrity, the students were trained with lexical items offered by the main books supplied by the supervisor of English Preparatory School. The course instructor created the Additional Language Performance Skills activities. For the spring semester, each group had 84 hours of class sessions (6 hours each week as specified in the curriculum), excluding exams.

Vocabulary teaching and learning tactics are extremely important, especially for academic learners, because they will greatly assist English language learners on their language learning journey. A variety of BBL strategies were used in this thesis study with the goal of increasing the fruitfulness of the teaching process. The task types and BBL strategies used for Language Performance Skills instruction are listed in the table below (Table 1).

Table 1. Brain-Based Learning Strategies Applied for Language Performance Skills

Categories of Strategies	Types of Activities
Visual	Mind mapping and visual aids
Social	Group discussions, debate and role-playing
Cognitive	Active listening and note-taking, self-reflection and self-monitoring
Memory	Creating mental images, applying images and sounds

Some activities have been prepared by the teacher in accordance with every week's subject and integrated into the class in order to enhance students' language performance skills. The researcher's activities were solely carried out in the BBL group. The goal of incorporating such exercises into the curriculum was to give a more natural environment for students to utilize their language in a more natural manner, boost motivation, revise vocabulary, improve students' critical thinking skills, and so on (as shown on Table 2).

Table 2. Applied Task Types for Language Performance Skills

Task Types	Descriptions	Features
Role-playing	Learners assume distinct roles and engage in dialogue to practice conversational skills.	- Helps learners use language in a more natural way - Builds confidence in speaking ability.
Storytelling	Learners tell stories in different formats (oral, written, multimedia) to improve writing and speaking skills.	- Improves vocabulary, grammar, and sentence structure - Encourages creativity
Debates	Learners research a topic and prepare arguments for and against it to improve speaking and critical thinking skills.	- Develops ability to construct coherent arguments. - Encourages active listening.
Creative Writing	Learners express their thoughts, emotions, and ideas through various formats (poetry, fiction, non-fiction) to improve writing skills.	- Encourages creativity and imagination. - Develops ability to organize ideas coherently.
Jigsaw Reading	Learners read different parts of a text and share their understanding with each other to improve reading, speaking, and listening skills.	- Develops reading comprehension. - Improves memory retention and critical thinking skills.
Vocabulary Games	Learners play games like word puzzles, crosswords, and word association activities to improve vocabulary skills.	- Reinforces spelling and expands vocabulary. - Encourages cognitive development.

The first group was the Non-BBL group, which used a traditional language teaching method with no integration of BBL methods and was taught using the *Pioneer Level B2 - Upper-intermediate* course book. The interactive course book application deployed on the classroom computer, no BBL activities were used with this group. Until the end of

the spring semester, 14 weeks of traditional lecture were held. Students were required to take notes on target vocabulary throughout the sessions, although participation in language performance skills tasks was voluntary. After 12 weeks of education, an exam was given to collect data for evaluation. The first set of data for the current study was the learners' grades. The second exam week occurred 4 weeks after the first quiz, and the students' second exam grades were the second set of data for the study. Students took their third exam two weeks later, and their fourth exam three weeks later, following finals week. For Control group (the Non-BBL group) the activities carried out and the dates are provided below (Table 3):



Table 3. The Differences in Weekly Application of Curriculum and Activities Between Non-BBL and BBL Groups

DATE	Weekly Application of Non-BBL Group	Weekly Application of BBL Group (activities carried apart from Non-BBL Group's)
14th Feb, Mon. (1st Week)	Introduction to course. Learners' expectations were sought for the semester.	-
21st Feb, Mon. (2 nd Week)	Pioneer Level B1 – Unit 11 Vocabulary related to “Medical Issues”, Clauses of concession and purpose	-
28 th Feb, Mon. (3 rd Week)	Pioneer Level B1 – Unit 12 Expressions with “chance”, Expressions with “time”, Conditionals Type 3	-
7 th Mar, Mon. (4 th Week)	Pioneer Level B2 – Unit 1 Words easily confused, Word building: adjective suffixes, Present Simple vs Present Progressive	Word Collage and Word Web activities were carried out for students to make connections with freshly learned words (Word association).
14 th Mar, Mon. (5 th Week)	Pioneer Level B2 – Unit 2 Vocabulary related to “education and learning”, Word building: nouns, Present Perfect Simple vs Present Perfect Progressive	Students assigned into groups and performed a role-play activity.
21 st Mar, Mon. (6 th Week)	MIDTERM WEEK	MIDTERM WEEK
28 th Mar, Mon. (7 th Week)	Pioneer Level B2 – Unit 3 Vocabulary related to “gestures”, Compound adjectives, Past Simple vs Past Progressive	Charades and gesture scavenger hunt activities had been carried out for speaking part and students were encouraged to write time travel story to put their grammar in use.
4 th Apr, Mon. (8 th Week)	Pioneer Level B2 – Unit 4 Lexical sets and phrasal verbs related to “travel”, Future forms, Conditional Sentences Types 0 and 1	Students were encouraged to make future prediction to put their grammar in use in speaking and asked to write an essay on hypothetical scenarios .
11 th Apr, Mon. (9 th Week)	Pioneer Level B2 – Unit 5 Vocabulary related to “sports”, Modal verbs, Modal verbs + have + past participle	Advice giving and debate activities were carried out for speaking skills and an essay on the topic of “ Regrets and Accomplishments ” was written.
18 th Apr, Mon. (10 th Week)	Pioneer Level B2 – Unit 6 Vocabulary related to “colors”, Passive Voice I & II	Students were asked write a news article about a recent event or news story using the passive voice, and “ News Reporting ” role-play activity has been carried out for speaking part.

25 th Apr, Mon. (11 th Week)	MIDTERM WEEK	MIDTERM WEEK
2 nd May, Mon. (12 th Week)	Pioneer Level B2 – Unit 7 Vocabulary related to “food”, Word building: negative prefixes, Defining and non-defining relative clauses	Learners were asked to correct the mistakes in an essay (Relative Clause Editing), and role-play activities had been carried out to put their new vocabulary into context.
9 th May, Mon. (13 th Week)	Pioneer Level B2 – Unit 8 Vocabulary related to “crime and punishment”, Conditional Sentences Types 2 & 3, Unreal past	Five YouTube videos had been watched and students were encouraged to carry out a debate on “ <i>scams and advertisements</i> ”
16 th May, Mon (14 th Week)	Pioneer Level B2 – Unit 9 Vocabulary and expressions related to “mind”, Infinitives and -ing form, Causative form	Students were asked to write a poem as a creative writing activity to put their new vocabulary in use and a debate on “ Mind and Brain ” has been carried out as speaking activity.
23 rd May, Mon. (15 th Week)	Pioneer Level B2 – Unit 10 Vocabulary related to “jobs and job satisfaction”, Reported speech	Debate and role-play activities were carried out on speaking part, students then asked to write an opinion essay on the topic of “ jobs, job satisfaction and pandemics ”
30 th May, Mon. (16 th Week)	Pioneer Level B2 – Unit 11 Vocabulary related to “environment”, Clauses of purpose, Comparisons	Debate and role-play activities were carried out on speaking part, students then asked to write an opinion essay on the topic
6 th June, Mon. (17 th Week)	Pioneer Level B2 – Unit 12 Vocabulary related to “weather and natural disasters”, Inversion, Double conjunctions	A debate activity was carried out on speaking part, students then asked to write an opinion essay on the topic
13 th June, Mon. (18 th week)	FINALS WEEK	FINALS WEEK

The speaking and writing exams were designed as open-ended questions based on both the course book and all the lexical items covered in class. The data for Non-BBL group was gathered from the lexical diversities of both exam types. The increase in the lexical diversity at the end of the semester put forward the overall success percentage of the learners of the process.

The BBL group was the second group in this study. This group's weekly English classes used a curriculum integrated with a BBL method. Because they are used to different software and websites for their other courses as a consequence of the pandemic, the adaptation process did not pose a problem in gathering data for the study. The main goal of incorporating the Brain-Based Learning method into English classes was to determine if learners' language performance skills would improve and show positive results. In-class activities, discussions, and critical thinking sessions encouraged students to participate actively. The main goal was to increase the level of proficiency by participating in language performance skills activities that were linked with the BBL method, stimulating interest and emphasizing that communication is the key to active language learning.

Similarly, to the Non-BBL group, the other half of the data for this study was gathered through four exams on the speaking and writing skills of the BBL (Experiment) group. The table above (Table 3) shows which activities have been used on a weekly basis.

In the BBL group, the same questions were asked in the speaking and writing exams as in the non-BBL group. The primary book remained unchanged. The first three weeks were uninterrupted as the groups finished the book that was left over from their B1 levels. The curriculum designed for the BBL group was inspired by Bloom's Taxonomy (Bloom, 1956) and Jensen's Brain-Based Teaching Model (Jensen, 2000). Bloom's Taxonomy is a framework for classifying educational aims and objectives into various levels of thought. It is often used to guide the development of lesson plans and assessments. Bloom's Taxonomy has six levels: remembering, understanding, applying, analyzing, evaluating, and creating. Jensen's Brain-Based Teaching Model, on the other hand, emphasizes the necessity of establishing a positive, engaging learning environment that supports the brain's natural learning processes.

Some of the language teaching activities are aided by the use of Quizlet, Kahoot!, Padlet, Quizizz, Nearpod, Mentimeter, and Flipgrid. Utilizing such tools can support with

language learning in a variety of ways that align with both Bloom's Taxonomy and Jensen's Brain-Based Teaching Model as shown in Table 4.

Table 4. Reasons of Utilization of the Tools in accordance with Bloom’s Taxonomy and Brain-Based Teaching Levels

Bloom’s Taxonomy Levels	Reasons of Utilization	Jensen’s Brain-Based Teaching Model Levels
Remembering	All the tools mentioned can be used to create interactive flashcards, quizzes, and other activities that help students memorize vocabulary and grammar rules. This level of thinking is essential for building a strong foundation of language knowledge.	Pre-exposure
Understanding	Tools such as Nearpod and Mentimeter allow teachers to create interactive presentations and polls that encourage students to think critically about the language they are learning. This level of thinking is important for helping students develop a deep understanding of the language and its nuances.	Preparation
Applying	Tools like Quizizz and Kahoot! can be used to create game-like quizzes that encourage students to apply their language knowledge in new and challenging ways. This level of thinking is essential for helping students develop the ability to use the language in real-world situations.	Initiation and Acquisition
Analyzing	Tools like Nearpod and Mentimeter allow teachers to create interactive presentations and polls that encourage students to think critically about the language they are learning. This level of thinking is important for helping students develop a deep understanding of the language and its nuances.	Elaboration
Evaluating	Tools such as Nearpod and Quizlet can be used to create assessments that require students to evaluate their own language performance and progress. This level of thinking is important for helping students develop the ability to assess their own strengths and weaknesses.	Incubation and Memory Encoding

Creating	Tools like Flipgrid and Kahoot! can be used to create opportunities for students to create their own language content, such as video presentations or interactive quizzes. This level of thinking is important for helping students develop the ability to express themselves in the language in a creative and meaningful way.	Verification and Confidence Check & Celebration and Integration
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Overall, adopting these tools in language classrooms can assist language learning at all levels of Bloom's Taxonomy and align with Jensen's Brain-Based Teaching Model by fostering a positive, engaging, and stimulating learning environment that promotes the brain's natural learning processes. The non-BBL control group did not receive such enhancements as they carried out the subjects in their curriculum in the traditional manner.

3.4.3 Data analysis procedures

In this study, the researcher benefited from both quantitative and qualitative data analysis. For the quantitative analysis, IBM SPSS 26 statistics were used to analyze descriptive statistics (means, standard deviations, and frequencies) of the exams, and an independent samples t-test was used to investigate the change in vocabulary achievement of the students during treatment and through the examinations.

The pre-test and post-test transcripts gathered from students' exams in both speaking and writing were also assessed by conducting error and syntactic analyses to gain more insight on the change in students language performance levels. Each student's individual grammatical mistakes and sentence structures will be inspected.

The replies acquired from students via face-to-face interviews supplied points that were on common ground for the qualitative analysis, and those points were located and analyzed under pre-specified categories in accordance with the categorization technique as a qualitative method. About this strategy, the replies students provided during face-to-face interviews were ranked in accordance with repeating contents and themes that appeared in students' answers on the integration of the Brain-Based Learning method in language performance skills. NVivo, a qualitative data analysis software, was used to analyze the themes in each student's answer to interview questions.

4. FINDINGS AND DISCUSSIONS

4.1 Findings

4.1.1 Organization of the findings

In this chapter, the outcomes of the exams taken are statistically displayed using IBM SPSS 26. The qualitative data acquired for this thesis study through semi-structured face-to-face interviews with six randomly selected students after finals week, is additionally presented in this chapter.

The first section will examine the original-word production of both the control and experimental groups in pre-test data. The qualitative analysis will be conducted for both speaking and writing skills individually. The same process will be followed for post-test results.

An investigation will be performed afterwards to evaluate whether there is a steady change in students' speaking and writing levels by analyzing the data collected through ANOVA test results.

Later on, the error analysis and syntactic analysis will be also presented in this chapter. The first and last writing tests of the students (both from BBL and Non-BBL groups) will be analyzed. The same procedure will be followed for the first and last speaking tests as well. The results of these findings will consist of a part of the qualitative portion of the study.

In the final section, the qualitative data, some excerpts from face-to-face interviews with students will be presented to gain an insight on students' perspectives on the methodologies used in the study. A thematic analysis will be conducted on this part.

4.1.2 Pre-test results

The pre-test findings of the BBL (experimental) and Non-BBL (control) groups are shown in this part. An independent t-test was conducted on the results to see if there was

any difference between the groups in terms of their pre-test results for speaking and writing lexical diversity.

Table 5 Speaking Pre-Test Results of the Groups According to the Independent Samples Test

<i>Independent Samples Test</i>												
Levene's Test for Equality of Variances												
t-test for Equality of Means												
Sig. (2-tailed)												
Mean Difference												
Std. Error Difference												
95% Confidence Interval of the Difference												
Lower												
Upper												
Sp. Pre-Test	Equal variances assumed		.795	.394	-1,840	10	.096	-29,833	16,218	-65,970	6,303	
	Equal variances not assumed				-1,840	8,681	.100	-29,833	16,218	-66,728	7,061	

An independent samples t-test was conducted to compare the mean scores on the Speaking Pre-Test between two groups (BBL and Non-BBL groups). Prior to conducting the t-test, Levene's test was used to assess the assumption of equality of variances. The results of Levene's test indicated that the assumption of equal variances was met ($F(10,8) = .795, p = .394$).

The results of the t-test (Table 5) showed that there was a non-significant difference in mean scores between BBL Group and Non BBL Group (as it can be observed in Table 6), $t(8.681) = -1.840, p = .100$. Specifically, Non-BBL Group had a lower mean score ($M = -29.833, SD = 16.218$) than BBL Group ($M = 6.303, SD = 16.218$), but the difference was not statistically significant [95% CI = (-66.728, 7.061)].

Table 6 Writing Pre-Test Results of the Groups According to the Independent Samples Test

<i>Independent Samples Test</i>												
				Levene's Test for Equality of Variances		t-test for Equality of Means						
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
Wr. Test	Pre-Test	Equal variances assumed	variances	,060	,812	-2,150	10	,057	-43,000	19,996	-87,555	1,555
		Equal variances not assumed	variances			-2,150	10,000	,057	-43,000	19,996	-87,555	1,555

The Independent Samples Test was used to compare two groups' Wr. Pre-Test scores. A non-significant Levene's test demonstrated that the assumption of equal variances was met. A t-test for equality of means found no significant difference in Wr. Pre-Test scores between the two groups ($t(10) = -2.150, p = .057$). On the assumption of equal variances, the Non-BBL group had a mean score of -43.000 (SD = 19.996) and the BBL group had a mean score of 1.555 (SD = 19.996), with a mean difference of 57.000 (SE = 26.519) [95% CI = (-87.555, 1.555)]. The mean difference and confidence interval remained unchanged when equal variances were not assumed, however the t-value and degrees of freedom were slightly different ($t(8.697) = -2.150, p = .057$). Overall, the results mean that there were no difference between the lexical diversities.

4.1.3 Post-test results

This section displays the post-test results for the BBL and Non-BBL groups. An independent t-test was conducted on the results to check if there was any difference in the groups' post-test results for speaking and writing lexical diversity.

The mean scores and standard deviations of the Speaking Post-Test were determined for both the Non-BBL and BBL groups. Non-BBL participants had a mean score of 214.17, a standard deviation of 72.281, and a standard error mean of 29.509. The mean score for the BBL group was 806.17, with a standard deviation of 279.963 and a standard error

mean of 114.294. These findings (Table 7) indicate that the BBL group performed better on the Speaking Post-Test than the Non-BBL group.

Table 7 Speaking Post-Test Group Findings Based on Independent Samples Test

Independent Samples Test

				Levene's Test for Equality of Variances		t-test for Equality of Means						
				F	Sig.	t	df	Sig. (2- tailed)	Mean Differenc e	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
Sp. Post- Test	Equal assumed	variances		3,956	,075	-5,015	10	,001	-592,000	118,042	-855,015	-328,985
		Equal not assumed				-5,015	5,664	,003	-592,000	118,042	-885,049	-298,951

An independent samples t-test was conducted to compare the mean scores of the CG and EG on the Sp. Post-Test. Prior to the t-test, Levene's Test was used to evaluate the assumption of equality of variances between the groups. The results showed that under the assumption of equal variances, the F-statistic was 3.956, with a p-value of 0.075, indicating that the assumption of equality of variances was not violated. The t-test results showed a significant difference between the mean scores of the two groups, $t(10) = -5.015$, $p = 0.001$. The mean score of the Non-BBL group ($M = 214.17$, $SD = 72.281$) was significantly lower than that of the BBL group ($M = 806.17$, $SD = 279.963$). The mean difference between the two groups was -592.000, with a standard error of 118.042, and a 95% confidence interval ranging from -855.015 to -328.985. The t-test assuming unequal variances also showed a significant difference between the groups, $t(5.664) = -5.015$, $p = 0.003$, with similar mean differences and confidence intervals (Table 7).

It may be understood that learners in the experimental group improved more than those in the control group in terms of original word production when speaking. Although learners in the control group learned the target vocabulary taught through traditional vocabulary teaching strategies, they improved less in reflecting it to word production when compared to the experimental group taught using Brain-Based Vocabulary Teaching Methods.

The mean, standard deviation, and standard error of the mean for the Writing Post-Test results are displayed in two groups: Non-BBL and BBL. The mean score for the Non-BBL group was 156.50, with a standard deviation of 32.316 and a standard error of the mean of 13.193. The mean score for the BBL group was 419.00, with a standard deviation of 140.454 and a standard error of the mean of 57.340. This (Table 8) implies that the BBL group outperformed the Non-BBL group in terms of mean scores for writing.

Table 8. Writing Post-Test Group Findings Based on Independent Samples Test

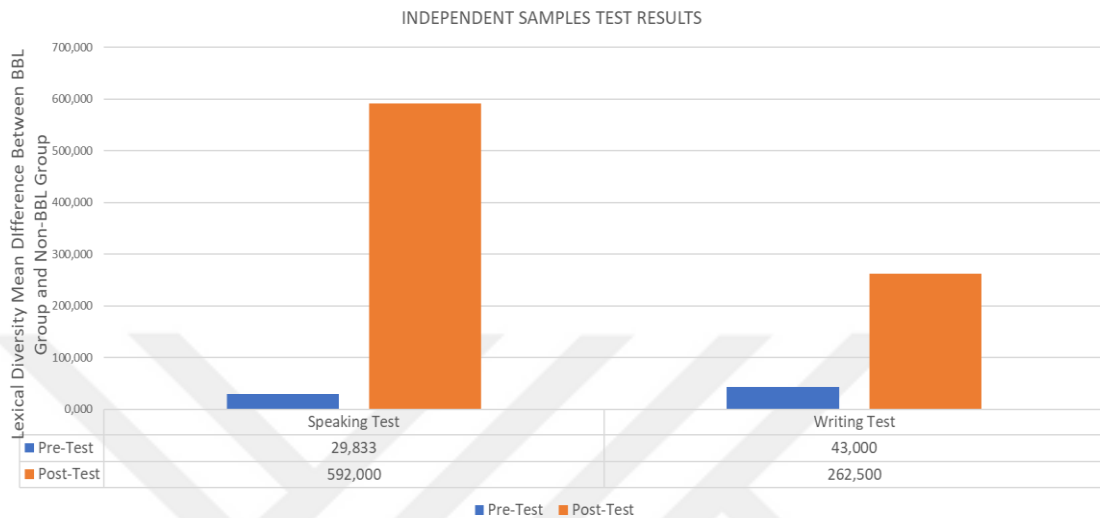
			Levene's Test for		t-test for Equality of Means						
			Equality of								
			Variances		95% Confidence						
					Interval of the						
					Difference						
					Sig. (2-	Mean	Std. Error				
					tailed)	Difference	Difference	Lower	Upper		
			F	Sig.	t	df					
Wr. Post-Test	Equal variances assumed		4,167	,068	-4,461	10	,001	-262,500	58,838	-393,599	-131,401
	Equal variances not assumed				-4,461	5,528	,005	-262,500	58,838	-409,505	-115,495

The independent samples t-test was used to compare the mean writing post-test scores of the Non-BBL and BBL groups. The t-test results were published even though equal variances were not assumed. The results revealed a significant difference in mean scores between the two groups, $t(10) = -4.461$, $p = .005$, with the BBL group outperforming the Non-BBL group on the writing post-test ($M = 156.50$, $SD = 32.32$). The mean difference between the two groups was -262.50 , with a 95% confidence range ranging from -409.51 to -115.50 .

Overall, while there was no significant difference between BBL and Non-BBL groups in terms of lexical diversity in the pre-test, there was a significant difference in the post-test. Students in the BBL group had 592 more words in terms of lexical diversity in speaking post-test compared to Non-BBL group. In writing post-test, this difference is 262 words between BBL and Non-BBL group. According to analyses conducted on data, BBL group

performed better than Non-BBL group in both skills after the instruction process (as shown in Table 9).

Table 9 Difference Between BBL and Non-BBL Groups' Lexical Diversity averages in Pre-test and Post-Test



The effect size was calculated using Cohen's *d*, which measures the standardized difference between the means of two groups. Cohen's *d* is considered a commonly used measure of effect size, with values of $0.2 < d < 0.5$, $0.5 < d < 0.8$ and $0.8 < d$ indicating small, medium, and large effects, respectively. In the present study, the Cohen's *d* value was $d=0.289$ for Speaking post-test and $d=0.257$ for Writing post-test, both showing small effect size ($0.2 < d < 0.5$).

4.1.4 ANOVA test results

In this part of the study, ANOVA test results will be shown for both Non-BBL and BBL groups. These repeated measures test analyses demonstrate if there was steady improvement in students' speaking and writing levels among different groups, given the four exams the students took were administered at different periods throughout the research.

4.1.4.1 Non-BBL group speaking tests ANOVA results

In this part, an ANOVA Test will be conducted to see if there is a steady improvement in Non-BBL Group's speaking test results.

Table 10. Mean Scores of Non-BBL Students in Speaking Tests

<i>Descriptive Statistics</i>			
	Mean	Std. Deviation	N
Sp. Pre-Test	90,67	21,942	6
Sp. Test 2	78,33	51,403	6
Sp. Test 3	120,33	34,886	6
Sp. Post-Test	214,17	72,281	6

As seen in Table 10, students in the Non-BBL Group have varying averages in speaking examinations. As students are not constrained to a specific length of time to speak during the speaking examinations, their speaking averages vary and do not demonstrate steady increase in the means of lexical diversity.

The criterion of Maunchly's Test of Sphericity is met which means the datas' validity for the exams with the p-value 0.183 ($p > 0,05$), as shown in Table 11.

Table 11. Mauchly's Test of Sphericity of Non-BBL Group in Speaking Tests

Measure: NonBBL_Sp_Tests

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Sp.Tests	,125	7,750	5	,183	,514	,700	,333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Sp.Tests

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

The within-subjects effects analysis indicated statistically significant effects of the variable Speaking Tests (given in Table 12 as "Sp.Tests") on the Non-BBL group across all assumed sphericity conditions. The F-test revealed a significant overall effect with a large effect size (partial eta squared = 0.860).

Table 12. Tests of Within-Subjects Effects of Non-BBL Group in Speaking Tests

Measure: NonBBL_Sp_Tests

		Type III				Partial Eta	
Source		Sum of	df	Mean	F	Sig.	Squared
		Squares		Square			
Sp.Tests	Sphericity Assumed	67955,792	3	22651,931	30,594	,000	,860
	Greenhouse-Geisser	67955,792	1,543	44035,463	30,594	,000	,860
	Huynh-Feldt	67955,792	2,100	32360,040	30,594	,000	,860
	Lower-bound	67955,792	1,000	67955,792	30,594	,003	,860
Error(Sp.Tests)	Sphericity Assumed	11105,958	15	740,397			
	Greenhouse-Geisser	11105,958	7,716	1439,336			
	Huynh-Feldt	11105,958	10,500	1057,715			
	Lower-bound	11105,958	5,000	2221,192			

A closer look at the pairwise comparisons revealed significant differences in the levels of the "Sp.Tests" variable. These data highlight a significant change in Non-BBL groups speaking exams throughout the 4 exams made, with a p-value of 0.00 (p<0.05).

4.1.4.2 BBL group speaking tests ANOVA results

In this section, an ANOVA test will be run using the IBM SPSS program to examine the BBL Group's speaking test results' change over time.

Students in the BBL Group have variable averages in speaking examinations, as shown in Table 15. As previously mentioned, students are not limited to a set amount of time to speak during the speaking examinations; their speaking averages vary, and as shown in the table (Table 13), the BBL group shows steady improvement in the means of lexical diversity.

Table 13. Mean Scores of BBL Students in Speaking Tests

Descriptive Statistics

	Mean	Std. Deviation	N
Sp. Pre-Test	120,50	33,116	6
Sp. Test 2	132,17	29,862	6
Sp. Test 3	137,33	27,912	6
Sp. Post-Test	806,17	279,963	6

The criterion of Mauchly's Test of Sphericity is not met for the exams with the p-value of 0.00 ($p < 0,05$), as shown in Table 13. This means that the Greenhouse-Geisser line in the following table should be acknowledged. The Greenhouse-Geisser adjustment is important as it adjusts the degrees of freedom for the analysis while accounting for probable violations of the sphericity assumption. The validity of our inferences is improved by adopting this modification, which yields more precise and trustworthy results.

Table 14. Mauchly's Test of Sphericity of BBL Group in Speaking Tests

Mauchly's Test of Sphericity^a

Measure: BBL_Speaking_Tests

Within Subjects Effect	Mauchly's W	Approx. Chi-Square		df	Sig.	Epsilon ^b		
		Square				Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Speaking_Tests	,000	31,944		5	,000	,339	,343	,333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Speaking_Tests

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Table 15. Tests of Within-Subjects Effects of BBL Group in Speaking Tests

Tests of Within-Subjects Effects

Measure: BBL_Speaking_Tests

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Speaking_Tests	Sphericity Assumed	2058298,458	3	686099,486	36,201	,000	,879
	Greenhouse-Geisser	2058298,458	1,016	2025816,274	36,201	,002	,879
	Huynh-Feldt	2058298,458	1,028	2001899,653	36,201	,002	,879
	Lower-bound	2058298,458	1,000	2058298,458	36,201	,002	,879
Error(Speaking_Tests)	Sphericity Assumed	284287,792	15	18952,519			
	Greenhouse-Geisser	284287,792	5,080	55960,284			
	Huynh-Feldt	284287,792	5,141	55299,622			
	Lower-bound	284287,792	5,000	56857,558			

IBM SPSS 26 was used for the analysis, and the assumption of sphericity was taken into account. The Greenhouse-Geisser correction was used to account for violations of the sphericity assumption.

The within-subjects effects analysis, using the Greenhouse-Geisser correction, revealed that the variable "Speaking_Tests" had significant effects on the BBL group ($F = 36.201$, $p < .002$). The effect size (partial eta squared) was 0.879, indicating a large effect.

4.1.4.3 Non-BBL group writing tests ANOVA results

In this section, an ANOVA test will be run using the IBM SPSS program to examine the Non-BBL Group's writing test results' improvement over time.

As seen in Table 16, students in the Non-BBL Group have varying averages in writing examinations. In a specific given time, students' writing averages vary and do not demonstrate steady increase in the means of lexical diversity.

Table 16. Mean Scores of Non-BBL Students in Writing Tests

<i>Descriptive Statistics</i>			
	Mean	Std. Deviation	N
Wr. Pre-Test	117,83	34,615	6
Wr. Test 2	118,67	35,144	6
Wr. Test 3	113,67	12,785	6
Wr. Post-Test	156,50	32,316	6

The criterion of Maunchly's Test of Sphericity is met again for the exams as it is important for datas' validity, with the p-value of 0.605 ($p > 0,05$), as shown in Table 17.

Table 17. Mauchly's Test of Sphericity of Non-BBL Group in Writing Tests

Mauchly's Test of Sphericity^a

Measure: NonBBL_Writing_Tests

Within Subjects Effect	Mauchly's W	Approx. Chi-Square			Epsilon ^b			
		W	Chi-Square	wdf	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Wr.Tests	,370	3,698	5	,605	,690	1,000	,333	

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Wr.Tests

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

The results of the within-subjects effects analysis revealed significant effects of the variable "Wr.Tests" on the Non-BBL Group as it is shown in Table 18. The F-test indicated a statistically significant overall effect ($F = 6.596$, $p = .005$), suggesting that the variable "Wr.Tests" has a substantial impact on the participants' performance in the measure. The effect size (partial eta squared) was found to be 0.569, indicating a moderate-to-large effect.

Table 18. Tests of Within-Subjects Effects of Non-BBL Group in Writing Tests

Tests of Within-Subjects Effects

Measure: NonBBL_Writing_Tests

Source		Type III			F	Sig.	Partial Eta Squared
		Sum of Squares	df	Mean Square			
Wr.Tests	Sphericity Assumed	7206,333	3	2402,111	6,596	,005	,569
	Greenhouse-Geisser	7206,333	2,069	3483,069	6,596	,014	,569
	Huynh-Feldt	7206,333	3,000	2402,111	6,596	,005	,569
	Lower-bound	7206,333	1,000	7206,333	6,596	,050	,569
Error(Wr.Tests)	Sphericity Assumed	5462,667	15	364,178			
	Greenhouse-Geisser	5462,667	10,345	528,059			
	Huynh-Feldt	5462,667	15,000	364,178			
	Lower-bound	5462,667	5,000	1092,533			

4.1.4.4 BBL group writing tests ANOVA results

In this part, an ANOVA test will be performed using the IBM SPSS program to assess the change in the BBL Group's writing test scores over time.

Students in the BBL Group have variable averages in Writing tests, as shown in Table 19. Students' writing averages shift over time and do not show increase in the means of lexical diversity.

Table 19. Mean Scores of BBL Students in Writing Tests

<i>Descriptive Statistics</i>			
	Mean	Std. Deviation	N
Wr. Pre-Test	160,83	34,655	6
Wr. Test 2	151,17	23,198	6
Wr. Test 3	144,67	21,116	6
Wr. Post-Test	419,00	140,454	6

Table 20. Mauchly's Test of Sphericity of BBL Group in Writing Tests

Mauchly's Test of Sphericity^a

Measure: BBL_Writing_Tests

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Writing_Tests	,003	21,500	5	,001	,357	,375	,333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Writing_Tests

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

As demonstrated in Table 20, the condition of Mauchly's Test of Sphericity is not met for the exams with a p-value of 0.01 ($p < 0,05$). This means that the Greenhouse-Geisser line in the table below should be mentioned once more.

Table 21. Tests of Within-Subjects Effects of BBL Group in Writing Tests

Tests of Within-Subjects Effects

Measure: BBL_Writing_Tests

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Writing_Tests	Sphericity Assumed	321060,833	3	107020,278	23,555	,000	,825
	Greenhouse-Geisser	321060,833	1,071	299803,546	23,555	,004	,825
	Huynh-Feldt	321060,833	1,126	285052,624	23,555	,003	,825
	Lower-bound	321060,833	1,000	321060,833	23,555	,005	,825
Error(Writing_Tests)	Sphericity Assumed	68152,167	15	4543,478			
	Greenhouse-Geisser	68152,167	5,355	12727,969			
	Huynh-Feldt	68152,167	5,632	12101,728			
	Lower-bound	68152,167	5,000	13630,433			

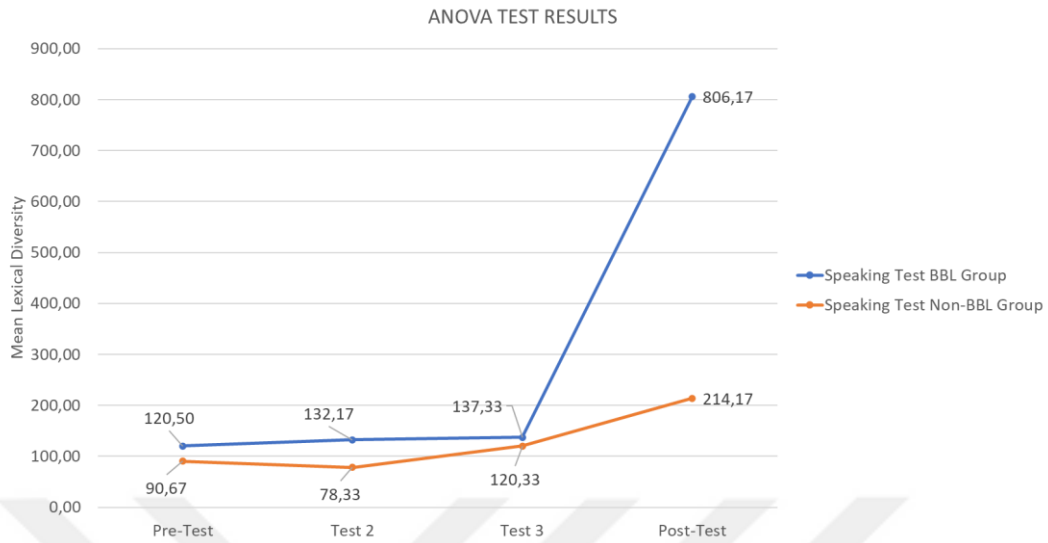
The within-subjects effects analysis, using the Greenhouse-Geisser correction, revealed that the variable "Writing_Tests" had a significant effect on the BBL Group ($F = 23.555$, $p < .004$). The effect size (partial eta squared) was determined to be 0.825, indicating an important impact.

4.1.4.5 Overall assessment of ANOVA test results

ANOVA tests are done on students' speaking and writing skill exams on both Non-BBL and BBL groups in the previous four sections. The repeated measure test results revealed if there was a consistent increase in students' test results from both groups over time for each skill.

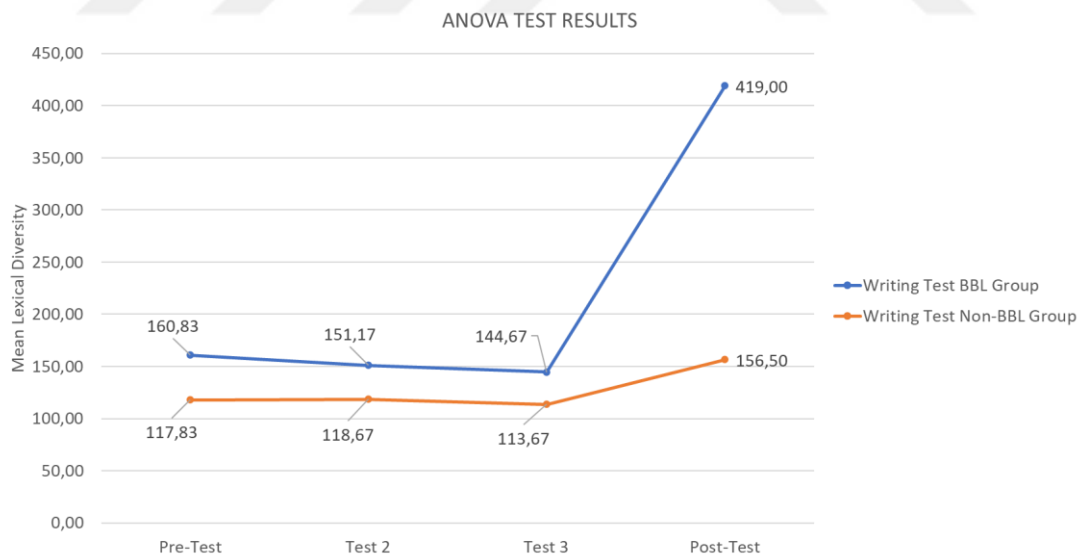
Only the BBL group students' speaking test results showed steady improvement according to ANOVA tests. In all four speaking tests, BBL group's average score a steady increase (as shown in Table 22).

Table 22. Change in Average Scores of BBL and Non-BBL Groups in Speaking Exams



On writing tests however, both groups' average score had fluctuations throughout the exams. Yet, both groups scored higher than they did in the pre-test (as shown in Table 23).

Table 23. Change in Average Scores of BBL and Non-BBL Groups in Writing Exams



However, all of the test results on students' speaking and writing skills in both groups showed a large effect size according to ANOVA test findings. The following are the effect sizes reported in the analyses:

1. For the "NonBBL_Sp_Tests" measure: Partial eta squared = 0.860

2. For the "NonBBL_Writing_Tests" measure: Partial eta squared = 0.569
3. For the "BBL_Speaking_Tests" measure: Partial eta squared = 0.879
4. For the "BBL_Writing_Tests" measure: Partial eta squared = 0.825"

These effect sizes represent the proportion of variance in the dependent variable (test performance) explained by the independent variable (test type or test condition). The greater the partial eta squared value, the greater the independent variable's influence on the dependent variable. In this scenario, all of the provided effect sizes are significant, indicating that the independent variables have a major impact on the respective test measures.

4.1.5 Error and syntactic analyses

In this part of the findings first the error analysis for each student in both groups will be presented. Then their change in errors will be compared. On the second part of this section, syntactic analysis will be conducted on both groups' students.

4.1.5.1 Error analyses

The error analysis for Non-BBL group will be presented in two sections: analysis of the writing tests and analysis of the speaking tests. Each students' errors will be examined under 7 categories. These are:

1. Grammatical Errors
2. Spelling Errors
3. Punctuation Errors
4. Sentence Structure Errors
5. Redundancy
6. Style and Consistency
7. Capitalization Errors

4.1.5.1.1 Error analysis of writing tests for Non-BBL group

On the error analysis of Student 1 from Non-BBL group made total of 19 errors. 8 as grammatical error, 3 as spelling errors, 3 punctuation errors, 1 sentence structure and clarity error, 2 redundancy errors, 1 style and consistency and 1 capitalization error. These are:

1. Grammatical Errors:

- "PE lesson is compulsory for the children at state schools." → "PE lessons are compulsory for children at state schools."
- "children have enough chance" → "children have enough opportunities/chances"
- "As far as im concerned" → "As far as I'm concerned" (capitalization and contraction)
- "PE lessons aren't enough to exercise." → "PE lessons aren't enough for exercise."
- "They do not have enough equipment to train." → "They do not have enough equipment for training."
- "math or art teacher comes the lesson instead of pe teacher." → "math or art teacher comes to the lesson instead of the PE teacher."
- "Moreover in some schools, They do not have PE teacher" → "Moreover, in some schools, they do not have a PE teacher."
- "private schools have enough equipment and qualities but they ignore the importance of this lesson because of their purpose." → "private schools have enough equipment and facilities, but they ignore the importance of this lesson due to their focus on academic success."

2. Spelling Errors:

- "contiditions" → "conditions"
- "trainings" → "training"
- "math" → "maths" or "mathematics"

3. Punctuation Errors:

- "PE lessons aren't enough for physical exercises." → "PE lessons aren't enough for physical exercises," (add comma before starting a new sentence)
- "As a brief" → "In brief," (correct the phrase to introduce a brief conclusion)
- "It is not enough to improve physical health for the time being." → "It is not enough to improve physical health for the long term," (add comma before starting a new sentence)

4. Sentence Structure and Clarity:

- "On the other hand, private schools have enough equipment and qualities but they ignore the importance of this lesson because of their purpose." → The sentence structure is unclear. Consider revising the sentence for better clarity and coherence.

5. Redundancy:

- "For instance, i can give an example from my brother" → "I can give an example from my brother." (remove redundancy)
- "So lets brainstorm about it" → "So let's think about it" (remove redundancy)

6. Style and Consistency:

- Inconsistent use of "PE" and "pe" for physical education. Choose one style and use it consistently throughout the thesis.

7. Capitalization:

- "In turkey we have an idiom" → "In Turkey, we have an idiom" (capitalize the country name)

In the final writing exam, Student 1 is observed to make 11 errors in total. 3 grammatical errors, 1 spelling error, 3 punctuation errors, 1 error each on sentence structure, redundancy, style and consistency and capitalization sections. These are:

1. Grammatical Errors:

- "reasons that supports hardworking and determinations" (reasons that support hardworking and determination) - Subject-verb agreement error.

– "Briefly giving up easily is not a quality for a successful person." (Briefly, giving up easily is not a quality of a successful person.) - Missing comma and incorrect preposition usage.

– "Every new idea is being rejected by community." (Every new idea is rejected by the community.) - Incorrect passive construction.

2. Spelling Errors:

– "such as hardworking and determination" (such as hard work and determination) - Misspelled "hardworking" and used the wrong form of "determination."

3. Punctuation Errors:

– "reasons that supports hardworking and determinations are important elements for success." (reasons that support hardworking and determination are important elements for success.) - Missing comma.

– "You can not know when you will be successful." (You cannot know when you will be successful.) - Incorrectly combined "can" and "not."

– "Everyone knows leyla and mecnun, kerem and asli but no one knows Mehmet and zehra." (Everyone knows Leyla and Mecnun, Kerem and Asli, but no one knows Mehmet and Zehra.) - Proper names not capitalized.

4. Sentence Structure Errors:

– "The second reason is partially connected with first reason." (The second reason is partially connected with the first reason.) - Missing "the" before "first reason."

5. Redundancy:

– "There are several reasons that supports hardworking and determinations are important elements for success." (There are several reasons that support hardworking and determination as important elements for success.) - Unnecessary repetition of "are."

6. Style and Consistency:

- "You can not know when you will be successful." (You cannot know when you will achieve success.) - Inconsistent usage of "successful" and "achieve success."

7. Capitalization Errors:

- "For instance, in spite of all negative reacts" (For instance, in spite of all negative reactions) - Incorrect capitalization of "reacts" to "reactions."

As the analysis shows, Although, the number of errors is reduced to almost half Student 1 kept making errors on the exam conducted after the teaching process.

The Student 2 on the first writing test made 9 errors in total. 3 grammatical errors, 1 error each from spelling, punctuation, sentence structure, redundancy, style and consistency and capitalization sections. These are:

1. Grammatical Errors:

- "an opportunity for students for several reasons which are it motivates students" (an opportunity for students for several reasons, which are that it motivates students) - Missing comma and incorrect sentence structure.
- "For example, when I was ten years old , I did not like exercises and did not practice them" (For example, when I was ten years old, I did not like exercise and did not practice it) - Incorrect plural form "exercises" and pronoun agreement error.
- "in short Physical education classes In addition to being an opportunity" (In short, physical education classes are an opportunity) - Missing comma and incorrect capitalization.

2. Spelling Errors:

- "giveing them the opportunity" (giving them the opportunity) - Misspelled "giving."

3. Punctuation Errors:

- "Firstly , It motivates students" (Firstly, it motivates students) - Incorrect placement of comma.

4. Sentence Structure Errors:

- "Physical education classes are an opportunity for them." (Physical education classes provide an opportunity for them.) - Awkward sentence structure.

5. Redundancy:

- "Physical education classes are pretty good for the students , I recommend that all the students should do it and not miss any class" (Physical education classes are beneficial for students. I recommend that all students participate actively and attend every class.) - Repetition of "students" and "class."

6. Style and Consistency:

- "Physical education classes are one of the best things in schools and are no less useful than classrooms." (Physical education classes are one of the best components in schools and are equally beneficial as classrooms.) - Inconsistent comparison structure.

7. Capitalization Errors:

- "For instance , students stay for hours sitting without any movement in the clases" (For instance, students stay for hours sitting without any movement in the classes) - Incorrect capitalization of "clases" to "classes."

On the final writing test however, Student 2 is observed to make 13 errors. These are 3 grammatical, 2 spelling, 1 punctuation, 1 sentence structure, 2 redundancy, 2 style and consistency and 1 capitalization errors. The examples for student's errors are as follows:

1. Grammatical Errors:

- "Each of us have hobbies" (Each of us has hobbies) - Incorrect subject-verb agreement.
- "having a strict disicipline through our dreams" (having a strict discipline towards our dreams) - Misspelled "discipline" and incorrect preposition.
- "I firmly think that having a determinated mindset" (I firmly believe that having a determined mindset) - Incorrect adjective "determinated" and incorrect verb.

– "hardwork can take us a dream" (hard work can help us achieve a dream) - Incorrect preposition.

2. Spelling Errors:

– "ambition is necessity" (ambition is a necessity) - Missing article "a."

– "hardwork" (hard work) - Two separate words.

3. Punctuation Errors:

– "For the reasons such as keeping a one goal straight, having an forward looking ambition and making hardwork and effort can make an individual achieve their goal."
(For the reasons, such as keeping a one goal straight, having a forward-looking ambition, and making hard work and effort, can make an individual achieve their goal.) - Missing commas and incorrect punctuation.

4. Sentence Structure Errors:

– "But how many of us passionately put an effort and having a strict disicipline through our dreams?" (But how many of us passionately put an effort and maintain strict discipline towards our dreams?) - Incorrect sentence structure and verb tense.

5. Redundancy:

– "keeping a one goal straight" (keeping one goal straight) - Unnecessary use of "a."

– "hardwork and determination" (hard work and determination) - Two separate words.

6. Style and Consistency:

– "having a determinated mindset and hardwork" (having a determined mindset and hard work) - Inconsistent style and missing article "a."

– "having an forward looking ambition" (having a forward-looking ambition) - Missing hyphen in "forward-looking."

7. Capitalization Errors:

– "forward-looking" (forward-looking) - Incorrect capitalization.

On the final test, Student 2 shows struggle on the language. The analysis shows that the student's errors are increased by 4 in total.

The Student 3 made 12 errors in total on the first writing exam, although the student wrote just a paragraph instead of an essay which was rather shorter compared to the other students in the same group. Student made 4 grammatical, 1 spelling, 1 punctuation, 3 sentence structure, 1 redundancy, 1 style and consistency and 1 capitalization errors. The examples are as follows:

1. Grammatical Errors:

- "we don't do exercise well" (we don't exercise enough) - Incorrect verb usage.
- "As technology develops, devices do our tasks for us." (As technology develops, devices do tasks for us.) - Incorrect pronoun usage.
- "For example if we work hard we don't have time for sports." (For example, if we work hard, we don't have time for sports.) - Missing commas.
- "when we see people doing sports" (when we see people participating in sports) - Incorrect verb usage.

2. Spelling Errors:

- "physical education classes can be a chance to exercise for some reasons." (physical education classes can be a chance to exercise for several reasons) - Incorrect word choice.

3. Punctuation Errors:

- "if it's a lesson we consider as a important reason." (if it's a lesson, we consider it an important reason.) - Missing comma and incorrect word order.

4. Sentence Structure Errors:

- "this can be motivation for us." (this can be a source of motivation for us.) - Missing preposition.
- "Moreover when we exercise with our friends we don't get bored." (Moreover, when we exercise with our friends, we don't get bored.) - Missing commas.

– "In our daily life doing exercise cannot always seems like important thing for us" (In our daily life, doing exercise may not always seem important to us) - Incorrect sentence structure.

5. Redundancy:

– "In our daily life sometimes we cannot have time for exercise." (In our daily life, sometimes we don't have time for exercise.) - Unnecessary repetition.

6. Style and Consistency:

– "physical education classes can be a chance to exercise" (physical education classes can be an opportunity for exercise) - Inconsistent word choice.

7. Capitalization Errors:

– "p.e classes" (P.E. classes) - Incorrect capitalization.

In the final exam, Student 3 made 13 errors; 3 grammatical, 1 spelling, 3 punctuation, 2 sentence structure, 1 redundancy, 2 style and consistency and 1 capitalization errors. These are:

1. Grammatical Errors:

– "hard work is key of success." (hard work is the key to success.) - Incorrect preposition.

– "When we are unwilling to do something, we always put off." (When we are unwilling to do something, we always put it off.) - Missing object pronoun.

– "If we continue put off, it becomes our habit." (If we continue to put off, it becomes our habit.) - Missing infinitive marker.

2. Spelling Errors:

– "dilatoriness" (dilatatoriness) - Correct spelling.

3. Punctuation Errors:

– "first hard work, second, stick-to-itiveness, third, common sense." (first, hard work; second, stick-to-itiveness; third, common sense.) - Missing commas.

– "Said Thomas A. Edison." (Said Thomas A. Edison.) - Missing capital letter at the beginning of the sentence.

– "hard work, second, stick-to-itiveness, third, common sense." (hard work, second, stick-to-itiveness, third, common sense.) - Remove commas after "second" and "third."

4. Sentence Structure Errors:

– "We are nothing without determination." (We are nothing without determination.) - The sentence is repeated.

– "We can handle it through determination." (We can handle it with determination.) - Incorrect preposition.

5. Redundancy:

– "First of all, disorganization leads us to failure." (First of all, disorganization leads to failure.) - Unnecessary pronoun usage.

6. Style and Consistency:

– "hard work is key of success." (hard work is the key to success.) - Inconsistent word choice.

– "If you believe, you can succeed, you are already half way there." (If you believe you can succeed, you are already halfway there.) - Incorrect comma placement.

7. Capitalization Errors:

– "hard work is key of success." (hard work is the key to success.) - Missing capital letter at the beginning of the sentence.

As it could be concluded from the analysis for Student 3, the student increased his/her error number even though the student wrote an essay rather than a paragraph. The word count for the two writing answers were somewhat similar even though the student wrote on the correct format on the final exam.

The student 4 made 8 errors in total on the first exam. The examples are as follow:

1. Grammar Errors:

- "However all of them don't have possibility to do sports." (However, not all of them have the possibility to do sports.) - Incorrect word order and missing article.
- "Most of students like physical education classes." (Most students like physical education classes.) - Incorrect article usage.

2. Spelling Errors:

- No spelling errors detected.

3. Punctuation Errors:

- "In physical education lessons children learn the rules of different sports like football, basketball, volleyball etc." (In physical education lessons, children learn the rules of different sports like football, basketball, volleyball, etc.) - Missing commas.

4. Sentence Structure Errors:

- "For example first time of my volleyball experience was in middle school's physical education lesson and I like it." (For example, the first time I experienced volleyball was in middle school's physical education lesson, and I liked it.) - Incorrect sentence structure and missing pronoun.

5. Redundancy:

- "physical education classes give students a proper chance to exercise because, physical education lessons allows children to meet different sports" (physical education classes give students a proper chance to exercise because physical education lessons allow children to experience different sports) - Repeated phrases.

6. Style and Consistency:

- "physical education lessons allows children" (physical education lessons allow children) - Incorrect verb agreement.

7. Capitalization Errors:

- "In sum physical education classes provide you opportunities for do exercise." (In sum, physical education classes provide opportunities for doing exercise.) - Incorrect capitalization.

On the final exam however Student 4 made 8 errors. These mistakes are as follow:

1. Grammar Errors:

- "So it is mean we have to do something for reach a result." (So it means we have to do something to reach a result.) - Incorrect verb form.
- "All of us have different dreams and goals and we should focus our goals and work hard for them." (All of us have different dreams and goals, and we should focus on our goals and work hard for them.) - Missing preposition and incorrect verb agreement.

2. Spelling Errors:

- "achieve" (achieve) - Typo in the word.

3. Punctuation Errors:

- "All of us have different dreams and goals and we should focus our goals and work hard for them." (All of us have different dreams and goals, and we should focus our goals and work hard for them.) - Missing comma.

4. Sentence Structure Errors:

- "I believe people can achieve their goals and dreams through hard work and determination because, working hard helps you spot your mistakes and people who work hard are accepted in the society." (I believe people can achieve their goals and dreams through hard work and determination because working hard helps you spot your mistakes, and people who work hard are accepted in society.) - Incorrect comma placement.

5. Redundancy:

- "achieve the achieve" (achieve their goals) - Repeated word.

6. Style and Consistency:

- "reach the achieve" (achieve the goal) - Incorrect word choice.

7. Capitalization Errors:

- "For example in business life the employers prefer the employee who work hard" (For example, in business life, employers prefer employees who work hard.) - Incorrect capitalization.

The student 4 made same number of mistakes in each section in the error analysis. Indicating that there were no improvement or a decrease in language use.

The Student 5 in the group, has made 7 errors in the first writing exam. These are:

1. Grammar Errors:

- "Physical education lesson is very important for the student to learn the activities that they can do physically." (Physical education lessons are very important for students to learn physical activities.) - Incorrect verb agreement and word order.
- "Thirtly" (Thirdly) - Misspelled word.

2. Punctuation Errors:

- "In this way, students are not left alone and their development is uninterrupted with the support of physical education teachers." (In this way, students are not left alone, and their development is uninterrupted with the support of physical education teachers.) - Missing comma.

3. Sentence Structure Errors:

- "An asocial student can discover her talent by being in a group with her friends thanks to a physical education lesson." (An introverted student can discover her talent by being in a group with her friends, thanks to a physical education lesson.) - Incorrect adjective choice and missing comma.

4. Redundancy:

- "physical education lesson" (physical education class) - Repeated phrase.

5. Style and Consistency:

- "physical education class gives us a chance to learn sports discipline and rules."
(Physical education classes give students a chance to learn sports discipline and rules.) - Inconsistent use of verb form.

6. Capitalization Errors:

- "Thirtly" (Thirdly) - Incorrect capitalization.

On the final exam, the student 5 made 13 mistakes. These are as follow:

1. Grammatical Errors:

- "in my opinion, If you want to succeed at something..." (In my opinion, if you want to succeed at something...) - Capitalization and punctuation errors.
- "The firstly main reasons for Successful people don't make excuses." (The first main reason is that successful people don't make excuses.) - Incorrect sentence structure and missing verb agreement.
- "The second main reasons for Sustainability I think it is important..." (The second main reason is sustainability. I think it is important...) - Incorrect sentence structure and missing verb agreement.
- "The thirtly main reasons for Learning from seemingly negative experiences." (The third main reason is learning from seemingly negative experiences.) - Incorrect adjective form and missing verb agreement.

2. Spelling Errors:

- "nirvana" (nirvana) - Incorrect spelling.

3. Punctuation Errors:

- "As in the understanding of change of the famous philosopher Heraclitus;" (As in the understanding of the change of the famous philosopher Heraclitus,) - Incorrect punctuation.

4. Sentence Structure Errors:

- "Shortly As in the understanding of change of the famous philosopher Heraclitus;" (In short, just like the understanding of change by the famous philosopher Heraclitus,) - Incorrect sentence structure and missing verb.
- "In brief success is an inevitable end if regular work is continued without stopping after exiting in a way." (In brief, success is an inevitable outcome if one continues regular work without stopping after starting in a way.) - Incomplete sentence and unclear meaning.

5. Redundancy:

- "firstly main reasons" (first main reason)
- "second main reasons" (second main reason)
- "thirtly main reasons" (third main reason)

6. Style and Consistency:

- Inconsistent use of capitalization, e.g., "The firstly main reasons" and "The second main reasons."

7. Capitalization Errors:

- "As in the understanding of change of the famous philosopher Heraclitus;" (As in the understanding of the change of the famous philosopher Heraclitus,) - Incorrect capitalization.

The analysis conducted on Student 5's answers to both writing tests show that the error numbers are increased by 5 on the final exam. It could be concluded that the student's language use in writing is worsened.

The last student on the Non-BBL group, Student 6 has made 12 errors in the first writing exam. The examples are as follow:

1. Grammatical Errors:

- "Do you know most children s favorite subject is physical education." (Do you know that most children's favorite subject is physical education?) - Missing possessive apostrophe and incorrect sentence structure.
- "most children dont have a chance for exercise" (most children don't have a chance for exercise) - Missing apostrophe in "don't."
- "Because of that everybody dont have enough money" (Because of that, not everybody has enough money) - Incorrect sentence structure and missing verb agreement.
- "but physical education is a chance for doing exercise" (but physical education provides a chance to do exercise) - Incorrect sentence structure.
- "However parents support children these days for Physical Education classes" (However, parents support their children these days for physical education classes) - Incorrect capitalization and missing possessive pronoun "their."

2. Spelling Errors:

- "pilates" (Pilates) - Incorrect capitalization.

3. Punctuation Errors:

- "Otherwise school is best place to exercise ." (Otherwise, the school is the best place to exercise.) - Missing comma.

4. Sentence Structure Errors:

- "When you are in the school you can do exercise when you want anytime." (When you are in school, you can exercise whenever you want.) - Incorrect sentence structure.

5. Redundancy:

- "you take physical education classes . If you want to be fit and healthy." (If you take physical education classes, you can be fit and healthy.) - Repetition of the same idea.

6. Style and Consistency:

- Inconsistent capitalization, e.g., "Physical Education" and "physical education."

- Inconsistent use of verb tense, e.g., "you should go" and "you have to do."

7. Capitalization Errors:

- "Physical Education" - Incorrect capitalization.

On the final exam, the Student 8 has made the same amount of errors as shown by the examples below:

1. Grammatical Errors:

- "Do you know 90% of succesful people said that they worked so much." (Do you know that 90% of successful people said that they worked so much?) - Incorrect spelling of "successful" and missing punctuation.
- "So people can achieve their goals and dreams through hard work and determination." (So, people can achieve their goals and dreams through hard work and determination.) - Missing comma.

2. Spelling Errors:

- "worknig" (working) - Typo.

3. Punctuation Errors:

- "The most important reason is that people look up against you." (The most important reason is that people look up to you.) - Incorrect preposition.
- "Otherwise people both look up and envy ." (Otherwise, people both look up and envy you.) - Missing comma and incorrect sentence structure.
- "For instance Lionel Messi who greatest footballer of the world is a most succesful player." (For instance, Lionel Messi, who is the greatest footballer in the world, is a very successful player.) - Missing commas and incorrect sentence structure.

4. Sentence Structure Errors:

- "According to people who achieve anything , being smart does not work out without hardworking." (According to people who achieve anything, being smart does not work without hard work.) - Incorrect sentence structure.

– "people respect accomplished person." (People respect accomplished persons.) - Incorrect verb agreement.

5. Redundancy:

– "The last but not least reason is that feeling self confidence." (The last but not least reason is feeling self-confidence.) - Redundant use of "that."

– "If you want to be succesful you have to keep trying for reach success." (If you want to be successful, you have to keep trying to reach success.) - Repetition of "for."

6. Style and Consistency:

– Inconsistent capitalization, e.g., "succesful" and "successful."

7. Capitalization Errors:

– "self confidence" - Incorrect capitalization

It could be understood from the examples, the number of errors of the Student 6 in both writing tests did not change which shows no improvement or a decrease. Overall, except from one student (Student 1), the number of errors in both writing test did not change or it increased for the students.

4.1.5.1.2 Error analysis of writing tests for BBL group

On the first writing test conducted on BBL group, Student 7 has made 11 errors. These errors are as follow:

1. Grammatical Errors:

– "Exercise should be at a certain point in everyone's life." → "Exercise should be a certain point in everyone's life." (Spelling error - "everone's" should be "everyone's.")

– "It is very important to have a healthy system from a young age." → "It is very important to have a healthy lifestyle from a young age." (Replace "healthy system" with "healthy lifestyle.")

– "Students get a lot of benefits from physical education classes." → "Students gain a lot of benefits from physical education classes." (Use "gain" instead of "get.")

– "The students can also retain a higher level of knowledge as a result of the overall health." → "Students can also retain a higher level of knowledge as a result of overall health." (Remove the article "the" before "students.")

2. Spelling Error:

– "everone's" → "everyone's"

3. Punctuation Error:

– "Due to the lack of sufficient space and equipment in some schools, students cannot perform their exercises the way they want." → "Due to the lack of sufficient space and equipment in some schools, students cannot perform their exercises the way they want," (Add a comma after the introductory phrase.)

4. Sentence Structure Error:

– "These students are encouraged by both their families their teachers however because they have enough time, they exercise very comfortably and usefully." → "These students are encouraged by both their families and teachers. However, because they have enough time, they exercise very comfortably and usefully." (Separate the sentence into two sentences and add "and" after "their families.")

5. Redundancy:

– "physical education classes in schools are a nice advantage for exercising" → "physical education classes in schools are advantageous for exercising" (Avoid repetition and use "advantageous.")

6. Style and Consistency:

– "due to this time restriction,they" → "due to this time restriction, they" (Add a space after the comma for consistency.)

7. Capitalization Errors:

– "As an example in America they play sports for several hours every day of the week." → "As an example, in America, they play sports for several hours every day of the week." (Capitalize the starting word and add commas for clarity.)

- "Due to the lack of sufficient space and equipment in some schools, students cannot perform their exercises the way they want." → "Due to the lack of sufficient space and equipment in some schools, students cannot perform their exercises the way they want."
(Capitalize the first letter of the sentence.)

On the final test the Student 7 has made 9 errors which had a decrease in number of errors compared to the student's first exam. These are as follow:

1. Grammatical Errors:

- "then it falls to that person to continue this work tirelessly until the end." → "then it is up to that person to continue this work tirelessly until the end." (Subject-verb agreement error)
- "There are many stories of famous people in their life to us" → "There are many stories of famous people in their lives." (Incorrect use of "their life" instead of "their lives.")
- "she lost a leg in a car accident and only her imaginary paintings of the famous painter of that time" → "she lost a leg in a car accident and continued to create her imaginative paintings, becoming a famous painter of her time." (Unclear sentence structure and incorrect use of "imaginary" instead of "imaginative.")

2. Spelling Errors:

- "Abdaham Lincoln" → "Abraham Lincoln"

3. Punctuation Errors:

- "The realization of the imagined things takes a certain amount of time, but on the other hand, it also requires work and determination." → "The realization of imagined things takes a certain amount of time, but on the other hand, it also requires work and determination." (Remove the unnecessary comma after "time.")
- "yet a serious health issue began when I was very young" → "yet she faced a serious health issue when she was very young" (Add a comma after "yet" for clarity.)
- "in the end she is also a renowned painter." → "in the end, she also became a renowned painter." (Add a comma after "end" and use the correct verb form.)

4. Sentence Structure Errors:

- "The beginning of every job in life comes from perseverance and determination, and then it falls to that person to continue this work tirelessly until the end." → "The beginning of every journey in life starts with perseverance and determination, and it is up to that person to continue this journey tirelessly until the end." (Revise the sentence for better clarity and coherence.)

5. Redundancy:

- "the real path begins here because then it remains to continue whatever work you are doing and dreaming about with this belief." → "the real path begins here because it is up to you to continue whatever work you are doing and dreaming about with this belief." (Remove the redundant phrase "then it remains.")

As it could be seen, Student 7 made no errors on style and consistency and capitalization error sections. The number of errors are decreased by two which shows a little improvement on the parts such as grammar but shows improvement in style and consistency or capitalization error sections.

The student 8 on the first exam made 11 errors in total. These are as follow:

1. Grammatical Errors:

- "Some people are not lucky burn as rich family child." → "Some people are not born into a wealthy family." (Incorrect verb form and word order)
- "if we want to achieve a goal we have to working hard" → "if we want to achieve a goal, we have to work hard." (Incorrect verb form and missing comma)
- "Because of this we have draw a line" → "Because of this, we have to draw a line" (Incorrect verb form and missing preposition)

2. Spelling Errors:

- "hardworking" → "hard work" (Use the correct noun form)

3. Punctuation Errors:

- "In my opinion we can achieve our goals or dreams with hardworking." → "In my opinion, we can achieve our goals or dreams with hard work." (Add a comma after "opinion")
- "To sum up if we planned our achievement and if we try to reach our goals we can see our progress and it gives us positive energy." → "To sum up, if we plan our achievement and try to reach our goals, we can see our progress, and it gives us positive energy." (Add commas for clarity and proper punctuation)

4. Sentence Structure Errors:

- "Let's imagine, we are starting our own business." → "Let's imagine we are starting our own business." (Remove the comma after "imagine")

5. Redundancy:

- "First of all, if we want to achieve a goal we have to working hard" → "First of all, if we want to achieve a goal, we have to work hard." (Remove the redundant phrase "first of all")
- "In addition, we are human, we can make mistakes but if we want to achieve new skills we can not give up." → "We are human, and we can make mistakes, but if we want to achieve new skills, we cannot give up." (Remove the redundant phrase "in addition" and add necessary conjunctions)

6. Style and Consistency:

- The text switches between present tense ("if we want," "we can see," "we should make peace") and past tense ("let's imagine," "there was something went wrong"). Choose one tense and use it consistently throughout the passage.

7. Capitalization Errors:

- "Lamborghini" → "Lamborghini" (Proper name not capitalized correctly)

On the final exam, the student has made 6 errors in total. The examples are:

1. Spelling Errors:

- "calleses" → "classes" (Spelling error)

2. Punctuation Errors:

- "Our classmate and I for a long time didn't know what is P.E class and what kind of class it is." → "Our classmates and I, for a long time, didn't know what P.E. class is and what kind of class it is." (Add commas for clarity and correct the punctuation of "P.E.")

3. Sentence Structure Errors:

- "5 years after we pass the secondary school and we could take the P.E class." → "5 years after passing the secondary school, we could take the P.E. class." (Use the correct verb tense and add a period after "P.E.")

4. Redundancy:

- "When they take the P.E class firstly they learn how to deal with it." → "When they take the P.E. class, they learn how to deal with it." (Remove the redundant "firstly")

5. Capitalization Errors:

- "Physical Education calleses" → "Physical Education classes" (Proper name not capitalized correctly)

6. Consistency and Style:

- "I strongly believe Physical Education calleses give a proper chance to exercise." → "I strongly believe that Physical Education classes give a proper chance to exercise." (Add "that" for clarity and consistency)

Student 8 in the final exam has made an improvement by lessening error numbers by 5 in total and not making any mistakes on grammar section.

The student 9 makes 12 mistakes in total on the first exam. These are:

1. Grammatical Errors:

- "if you hard worker person" → "if you are a hardworking person" (Correct adjective and article usage)

- "being achieve" → "achieving" (Correct verb form)
- "he/she have to determined" → "he/she has to be determined" (Correct verb form and article usage)
- "For example Aziz Sancar who won nobel prize." → "For example, Aziz Sancar, who won the Nobel Prize," (Add comma and capitalize "Nobel Prize")
- "he work 18 hours a day until he was 40." → "he worked 18 hours a day until he was 40." (Correct verb tense)

2. Punctuation Errors:

- "In my opinion, if someone wants to be achievement he/she have to determined and hardworker." → "In my opinion, if someone wants to achieve, he/she has to be determined and hardworking." (Add comma, correct verb form, and add hyphen to "hardworker")

3. Sentence Structure Errors:

- "Even you can realize the progress of success yourself." → "You can even realize the progress of success yourself." (Rearrange the sentence for better clarity)

4. Redundancy:

- "we all see on the Internet or news, people, who is successful, they says I am always be hardworking person in my whole life." → "We often see on the Internet or in the news, people who are successful saying, 'I have always been a hardworking person in my whole life.'" (Remove redundancy and correct verb form)

5. Style and Consistency:

- "hard worker person" → "hardworking person" (Use consistent adjective "hardworking")
- "if someone wants to be achievement" → "if someone wants to achieve" (Use consistent verb form)
- "determined and hardworker" → "determined and hardworking" (Use consistent adjective "hardworking")

6. Capitalization Errors:

- "Only talent is not always enough to being achieve." → "Only talent is not always enough to achieve." (Remove unnecessary capitalization)

On the final exam, Student 9 makes 9 errors in total. These are:

1. Spelling Errors:

- "pyhsical" → "physical" (Spelling error)
- "toddlers" → "children" (Usage of "toddlers" seems out of context; "children" is more appropriate)

2. Punctuation Errors:

- "Firstly, parents complain that their children are constantly spending time playing video games." → "Firstly, parents complain that their children are constantly spending time playing video games," (Add a comma before starting a new sentence)
- "Therefore, these lessons give students a chance to exercise." → "Therefore, these lessons give students a chance to exercise," (Add a comma before starting a new sentence)

3. Sentence Structure Errors:

- "In this way, students can increase their pyhsical development and they realise their interest in sports even if they are not talented." → "In this way, students can increase their physical development and realize their interest in sports, even if they are not talented." (Correct spelling and add a comma for clarity)
- "Although they are not professionals, they include sports in their lives thanks to these lessons." → "Although they are not professionals, they include sports in their lives, thanks to these lessons." (Add a comma for clarity)

4. Redundancy:

- "So that physical education class, helps toddlers to developing their physical skilss." → "Physical education class helps children develop their physical skills." (Remove redundancy)

5. Style and Consistency:

- "So that physical education class, helps toddlers to developing their physical skills."
→ "Physical education classes help children develop their physical skills." (Consistent use of plural form "classes" and remove the unnecessary "so that")

6. Capitalization Errors:

- "physical education class" → "Physical Education classes" (Capitalize "Physical Education" consistently)

The student 9 did not make any mistake on spelling on the first and grammar on the final exam. Although sectionwise this shows a stelmate, the number of errors are decreased by 3 which is a small improvement.

Student 10 from the BBL group on the first exam has made 9 errors in total as given below:

1. Grammatical Errors:

- "Physical education is called the branch of education aimed at improving the physical health and skills of a person." → "Physical education is the branch of education aimed at improving the physical health and skills of a person." (Remove redundant "called")
- "Physical education is based on the idea that a person needs physical education as much as mental education." → "Physical education is based on the idea that a person needs physical education as much as mental education does." (Add "does" for clarity and parallelism)
- "I strongly believe that physical education classes give students a proper chance to exercise because it provides ease in terms of time and ensures that the fatigue of the day is eliminated." → "I strongly believe that physical education classes give students a proper chance to exercise because they provide ease in terms of time and ensure that the fatigue of the day is eliminated." (Replace "it" with "they" for clarity and parallelism)

2. Spelling Errors:

- "etut centers" → "etude centers" or "tutoring centers" (Correct the spelling of "etut" to the appropriate term)

3. Punctuation Errors:

- "They take exams to determine which quality of school to attend from middle school to high school and from high school to university." → "They take exams to determine which quality of school to attend, from middle school to high school and from high school to university." (Add a comma after "attend" to separate the clauses)

4. Sentence Structure Errors:

- "In Turkey, students in the age group take an exam." → "In Turkey, students in this age group take an exam." (Add "this" for clarity)

5. Redundancy:

- "Other benefits of sports are that they regulate the rhythm of the heart, strengthen the heart, increase blood flow to the heart, reduce the risk of heart attack, and increase respiratory capacity." → "Other benefits of sports include regulating the rhythm of the heart, strengthening the heart, increasing blood flow, reducing the risk of heart attack, and improving respiratory capacity." (Remove repetitive wording and rephrase for clarity)

6. Style and Consistency:

- "That is why physical education classes are so important for them." → "That is why physical education classes are important for them." (Remove "so" for better flow)

7. Capitalization Errors:

- "It is time to stand up and do sports in the physical education classes." → "It is time to stand up and do sports in the physical education classes." (Capitalize "Physical Education Classes" for consistency)

On the final exam Student 10's number of errors is increased by 3, making it 12 in total. These errors are:

1. Grammatical Errors:

- "However, being without expectation and aimless brings planlessness." → "However, being without expectations and aimless brings about planlessness." (Use "about" for clarity and correct the plural form of "expectation")
- "Because in order to feel happy, we need to be aware of ourselves and what we do." → "Because, in order to feel happy, we need to be aware of ourselves and what we do." (Add a comma after "Because" for proper punctuation)
- "Through discipline, it will be that you create habits," → "Through discipline, you will create habits," (Remove "it will be that" for clarity)
- "hardwork" → "hard work" (Separate "hard" and "work" for correct spelling)

2. Spelling Errors:

- "becuase" → "because" (Correct the spelling of "because")

3. Punctuation Errors:

- "However, discipline is also applied to a different aspect of your life including fitness, school/university-related stuff, work-life, and dating life." → "However, discipline is also applied to different aspects of your life, including fitness, school/university-related stuff, work-life, and dating life." (Add a comma after "life" for better punctuation)
- "Victory or defeat from the hardwork spurs success and betterment, which in turn increases, hardwork increases." → "Victory or defeat from the hard work spurs success and betterment, which, in turn, increases hard work." (Remove the redundant "increases" and add commas for better clarity)

4. Sentence Structure Errors:

- "However, being without expectation and aimless brings planlessness." → "However, being without expectations and being aimless brings about planlessness." (Add "being" for parallelism)

5. Redundancy:

- "It is not our wishful thoughts that will lead us to success, it is what we do." → "It is not our wishful thoughts that will lead us to success; it is our actions." (Remove redundancy and rephrase for clarity)
- "If you believe in what you are doing and who you are 100%, then achieving your dreams will be a child's play." → "If you have full belief in what you are doing and who you are, achieving your dreams will be a child's play." (Remove redundancy and rephrase for clarity)

6. Style and Consistency:

- "With determination, hardwork is like a loop." → "With determination, hard work is like a loop." (Separate "hard" and "work" for consistency)

7. Capitalization Errors:

- "If you have dreams and goals, you should work hard and do your best." → "If you have dreams and goals, you should work hard and do your best." (Capitalize "If" for consistency)

As it could be seen on the analysis, the error number has increased on the final writing test for student 10. Although the students number of errors are increased. The students word count on the essay has also increased almost by double.

The Student 11's error number is 13 in total for the first writing exam. These errors are as follow:

1. Grammatical Errors:

- "Physical education is a favorite kind of education" → "Physical education is a favorite type of education" (Replace "kind" with "type" for better grammar)
- "In our days in prim school second and even in high school" → "In our days, from primary school to high school" (Correct the sentence structure for clarity)
- "Physical Education classes give students a proper chance to exercise for 3 major reasons" → "Physical Education classes give students a proper chance to exercise for three major reasons" (Use the numeral "3" or the word "three" consistently)

2. Spelling Errors:

- "prim school" → "primary school" (Correct the spelling of "primary")

3. Punctuation Errors:

- "In our days, from primary school to high school we can find physical education" → "In our days, from primary school to high school, we can find physical education." (Add a comma after "high school" for proper punctuation)
- "Physical Education classes give students a proper chance to exercise for three major reasons: reduce the levels of stress, improvement of academic performance, and help students focus better." → "Physical Education classes give students a proper chance to exercise for three major reasons: reducing the levels of stress, improving academic performance, and helping students focus better." (Use colons and rephrase the sentence for better punctuation and grammar)

4. Sentence Structure Errors:

- "because they are pressurized to perform." → "because they are under pressure to perform." (Use "under pressure" for better expression)
- "Even after spending hours in the classroom, they get a lot of homework to tackle away from the student." → "Even after spending hours in the classroom, they get a lot of homework to tackle away from school." (Replace "student" with "school" for proper context)
- "Therefore, physical activity can be an outlet for getting rid of stress and anxiety. It can also facilitate emotional resilience and stability." → "Therefore, physical activity can be an outlet for getting rid of stress and anxiety, and it can also facilitate emotional resilience and stability." (Combine sentences for better flow)

5. Redundancy:

- "Physical education looks like just amusement and entertainment for children, but it's more than that." → "Physical education may appear as just amusement and entertainment for children, but it's more than that." (Remove "looks like" for clarity)

6. Style and Consistency:

- "Physical education looks like just amusement" → "Physical education may appear as just amusement" (Use "may appear as" for better expression)
- "they require more than one break in a day if they focus their attention on books ." → "they require more than one break in a day when they focus their attention on books." (Replace "if" with "when" for better clarity)

7. Capitalization Errors:

- "Finally, in students' life," → "Finally, in students' life," (Capitalize "Finally" for consistency)

On the second exam however, the student 11's error number has decreased to 10 in total. These mistakes are:

1. Grammatical Errors:

- "A dream does not become reality through magic ; it takes sweat, determination ,and hard work “ → "A dream does not become reality through magic; it takes sweat, determination, and hard work." (Remove unnecessary spaces and add proper punctuation)
- "As far as I am concerned any individual can achieve their goals and dreams through hard work and determination for two major reasons" → "As far as I am concerned, any individual can achieve their goals and dreams through hard work and determination for two major reasons." (Add a comma after the introductory phrase for better grammar)

2. Punctuation Errors:

- "Let's give an example for something basically which happens in our world ." → "Let's give an example of something basic which happens in our world." (Add a comma after "example" for proper punctuation)
- "My grandfather told me once that I should see my life like chess and what I wanted to become , simple pawn or a Bishop or King ." → "My grandfather told me once that I should see my life like chess and what I wanted to become: a simple pawn or a Bishop or King." (Use a colon to introduce the options)

3. Sentence Structure Errors:

- "An important factor is kneeling for hard-work and accept the pain and start to get enjoy from that ." → "An important factor is embracing hard work, accepting the pain, and finding enjoyment in it." (Rephrase for better sentence structure)
- "Determination is an important factor in the overall success or failure of a person's effort ." → "Determination is an important factor in determining the overall success or failure of a person's efforts." (Use "determining" for clarity)

4. Redundancy:

- "you have to get knowledge about hard-working and get used to it if you want to be successful in your life" → "you have to understand the concept of hard work and get used to it if you want to be successful in your life" (Remove redundancy)

5. Style and Consistency:

- "Let's give an example of something basic which happens in our world." → "Let's give an example of something basic that happens in our world." (Use "that" instead of "which" for better style and consistency)
- "It's fact that usually poor people who grow up in hard conditions achieves to become successful" → "It's a fact that usually, poor people who grow up in hard conditions achieve success." (Use "a fact" and rephrase for better style and consistency)

6. Capitalization Errors:

- "In this world" → "In this world" (Capitalize the beginning of a sentence)

As Student 11's comparison of error number on writing tests show, the student has decreased the error number in writing and also made no spelling mistakes on the final writing test. This indicates that the student made small improvement on writing skills.

The last member of the BBL group, Student 12 has made 10 errors in total in the first writing test. These are shown as example below:

1. Grammatical Errors:

- "Exercising – which is one of the healthiest activity- is a necessary activity for the human body." → "Exercising – which is one of the healthiest activities – is necessary for the human body." (Use "activities" and add a hyphen for better grammar)
- "people had better walk at least 10.000 footsteps per day" → "people are better off walking at least 10,000 footsteps per day" (Use "are better off" and add a comma for better grammar)
- "curriculum contains physical activity class" → "curriculum includes a physical activity class" (Use "includes" instead of "contains")

2. Punctuation Errors:

- "The enormous gap between exercising and not exercising can be seen easily in teenagers indeed." → "The enormous gap between exercising and not exercising can be seen easily in teenagers, indeed." (Add a comma after "teenagers" for proper punctuation)

3. Sentence Structure Errors:

- "That is why curriculum contains physical activity class." → "That is why the curriculum includes a physical activity class." (Rephrase for better sentence structure)
- "Imagine, 2 persons, 1 of them has daily and weekly routine with less time, other one does every exercise in 1 day but other days are free." → "Imagine two persons: one of them has a daily and weekly routine with less time, the other one does all the exercise in one day but has other days free." (Use a colon to introduce the example and rephrase for clarity)

4. Redundancy:

- "Two of the most important reasons are: Doing for the sake of procedure and being insufficient time for students." → "Two of the most important reasons are doing it for the sake of procedure and insufficient time for students." (Remove redundancy)

5. Style and Consistency:

- "According to doctors, people had better walk at least 10.000 footsteps per day" → "According to doctors, people are better off walking at least 10,000 steps per day" (Use "steps" instead of "footsteps" for consistency and clarity)
- "The second reason for insufficiency of gym lesson is that 2 hours of gym class lesson is not capable of providing weekly exercise of a teenager" → "The second reason for the insufficiency of the gym lesson is that 2 hours of gym class is not capable of providing weekly exercise for a teenager" (Rephrase for clarity)

6. Capitalization Errors:

- "The lesson is being misusing" → "The lesson is being misused" (Correct the capitalization)

On the final writing exam however, Student 12 has made 7 mistakes in total. These are shown below:

1. Grammatical Errors:

- "Two of the most important reasons are: causing unignorable effect on the way of success and opening up opponents' lead." → "Two of the most important reasons are causing an unignorable effect on the way to success and opening up opportunities for the opponents."
- "The second reason why pushing ourselves is such an effective method to achieve a purpose is that success does not have only one parameter; one of them is being the person who reaches first." → "The second reason why pushing ourselves is such an effective method to achieve a purpose is that success does not have only one parameter; one of them is being the first person to reach it."

2. Punctuation Errors:

- "Since the start of the social media platforms, people have been influenced by countless successful and rich people; therefore, people want to break the bank via the easiest and the fastest way." → "Since the start of the social media platforms, people have

been influenced by countless successful and rich people. Therefore, people want to break the bank via the easiest and the fastest way."

3. Sentence Structure Errors:

- "I strongly believe that the gap between moving on the path of success with hardwork and without it is enormous indeed." → "I strongly believe that the gap between moving on the path of success with hard work and without it is indeed enormous."
- "To sum up, great achievement stories are not coincidences." → "To sum up, great achievement stories are not just coincidences."

4. Style and Consistency:

- "Mounting evidence with survey and experience concerning this issue suggest that people -who did not study to anything- reach success without hardwork percentage is really low." → "Mounting evidence from surveys and experiences concerning this issue suggests that the percentage of people who reach success without hard work is really low."

5. Capitalization Errors:

- "No pain, no gain." → "No pain, no gain." (This is a common phrase, but the capitalization is not necessary in this context)

The error analysis comparison between the first and the final writing test for Student 12 show that the student has improved in writing skills slightly as in error numbers. Although the change in the numbers were little Student 12 did not make any mistakes in the manner of spelling both exams and did not make any mistake on the redundancy on the final writing exam.

4.1.5.1.3 Error analyses for speaking exams for Non-BBL group.

For Student 1 on the first speaking exam, the error number is 2. There were no other mistakes on other sections.

1. Grammatical Errors:

- "Because in Turks we said..." - "Because in Turkish, we say..."

- "If people start the exercising..." - "If people start exercising..."

On the last speaking exam however Student 1 made twice the grammatical error. Examples are as follows:

1. Grammatical Errors:

- "I'm not completely fine because I'm dealing with an illness now." - "I'm not completely fine because I'm dealing with an illness now."
- "Yeah, Doctor said it's fallen jet and." - "Yeah, the doctor said it's a fallen jet and."
- "I have a lot of medicine, but it cannot be cured for me." - "I'm taking a lot of medicine, but it doesn't seem to be curing me.")
- "So I'm dealing. I have been dealing." - "So I'm dealing with it. I've been dealing with it for at least three or four weeks."

As it could be seen in Student 1's responses, the student made more errors while speaking compared to the first exam. It could be stated that the student's speaking skill decreased over time.

As for Student 2, the student made errors 7 in total. The examples are shown below:

1. Grammatical Errors:

- "I do the exercise twice in the week." - "I exercise twice a week."
- "I I got to play football and sometimes basketball." - "I play football and sometimes basketball."
- "The first thing I do when I I'm in the gym, it's running." - "The first thing I do when I'm in the gym is running."

2. Sentence Structure Errors:

- "Actually, at 5:00 PM I I got to play football and sometimes basketball." - "Actually, at 5:00 PM, I play football and sometimes basketball."

- "I used to go like four times in the week, but right now in Turkey I go just once or twice in the week." - "I used to go four times a week, but right now in Turkey, I go just once or twice a week."
- "Sometimes maybe I go 20 or 30, it depends on it depends on the time." - "Sometimes I run for 20 or 30 minutes; it depends on the time."
- "That's it." - "That's it for my exercises."

On the final speaking exam Student 2' error numbers are increased to 8.

1. Grammatical Errors:

- "I was worried about it. For for like a month ago." - "I was worried about it - like a month ago."
- "No, no, maybe I think they. They will visit me." - "No, no, maybe I think they will visit me."
- "But from my country, not nowadays." - "But not nowadays, from my country."
- "That's like attached to back and these days because a lot of companies like, they, they don't say the truth about their products because maybe they want to sell more products but." - "That's happening a lot nowadays because many companies don't tell the truth about their products in their advertisements just to sell more."
- "Yeah. OK. Well, thank you Mohammed Abdul Majid and for being here." - "Yeah, okay. Well, thank you, Mohammed Abdul Majid, for being here."

2. Sentence Structure Errors:

- "Because you know before, like 3 months before, three months or more, I think." - "You know, like three months ago or even more, I think."
- "When like when I go. To study or work face to face?" - "When I go to study or work face to face?"
- "It may can bring help to cheat because like even if it was a camera or something like that, it will be easier for the students to neglect the study and like tend to cheat." - "It may

lead to cheating because even with a camera or similar technology, it's easier for students to neglect studying and tend to cheat."

Through the analysis it could be said that the Student 2's speaking skills also decreased over time.

Student 3 also made 3 mistakes in total for the first speaking exam. These are:

1. Sentence Structure Errors:

- "Four days a week or. Three days a week could be." - Improvement: "Four days a week or maybe three days a week."
- "Running and. Lifting, you know, lifting deadlifts, but a small amount of weight." - Improvement: "Running and lifting, you know, doing deadlifts, but with a small amount of weight."
- "And three or four days a week." - Improvement: "About three or four days a week."

On the final speaking exam, Student 3 has made 7 errors in total. The examples are shown below:

1. Grammatical Errors:

- "Yes, yes, of course, which I could started before." - Improvement: "Yes, yes, of course. I think physical education should be encouraged from a young age."
- "Working face on." - Improvement: "Working online" or "Working from home."
- "Wildfires is not a natural disaster." - Improvement: "Wildfires are not always natural disasters."
- "Because of because of the hot weather..." - Improvement: "Because of the hot weather..."

2. Sentence Structure Errors:

- "It means. Honest or? Yeah, huh." - Improvement: "What do you mean by ethical? Do you mean being honest? Yes, huh."

- "I'm not going to dive into any politics on this issue." - Improvement: "I'm not going to discuss any political aspects of this issue."
- "Have you heard of any inspiring stories like these?" - Improvement: "Have you heard of any inspiring stories like the ones I mentioned?"

As the comparison shows, Student 3's error number also increased on the last speaking exam.

Student 4 has made 4 errors on the first speaking exam. The examples are as follow:

1. Grammatical Errors:

- "We started with my university friends and you know them, it's my and be there." - "I started going to the gym with my university friends, and you know them, they are my companions."
- "Because I was in the gym in the morning. I can say I often do sports in a week." - "I went to the gym in the morning, so I can say I exercise frequently in a week."

2. Sentence Structure Errors:

- "No, my mother at my father day, day two walking every weekend morning." - "No, my mother and father walk every weekend morning."
- "I find it boring, so I don't prefer." - Improvement: "I find it boring, so I don't prefer it."

On the final exam Student 4 has made 6 errors in total. The examples below show the student's errored responses to speaking exam questions:

1. Grammatical Errors:

- "It's going to be a little bit different from the previous ones." - "It's going to be a little different from the previous ones."
- "I want to be a. I want to be with my colleagues" - "I want to be with my colleagues."
- "Yeah, they should be more ethical, but most of them don't be ethical" - "Yeah, they should be more ethical, but most of them aren't ethical."

2. Sentence Structure Errors:

- "Because when we are in the young age, our body is better than the older age."-
"Because when we are at a young age, our body is better than at an older age."
- "Probably we can't do our best performance, but if we start in our young age, it will be better for us." - "Probably we can't give our best performance, but if we start at a young age, it will be better for us."
- "Actually, they're natural, as we say, but we can take some. Productions I I'm not sure about." - "Actually, they're natural, as we say, but we can take some precautions. I'm not sure about."

Compared between the Student 4's final speaking exam analysis and the first, it could be observed that the student has made 1 more error on each section which indicates a decrease in the speaking skill level.

The Student 5 has made 3 errors in total for the first speaking exam. The errors are shown below:

1. Grammatical Errors:

- "Usually to make an exercise one week is 3 days or four days." - "Usually, I exercise three or four days a week."
- "I make a exercise." - "I do exercises."

2. Sentence Structure Errors:

- "I think doing football and doing yoga is same to bodybuilding or public and exercise because all on traumas is benefit the body." - "I think playing football and doing yoga are similar to bodybuilding exercises because all of these activities benefit the body."

Student 5 on the final speaking exam has made 4 errors. The errors are:

1. Grammatical Errors:

- "I am I am not not suggest my prior priority time." - Improvement: "I am not prioritizing my time well for English learning."

– "Office area improve is very important to improve work life." - Improvement: "Face-to-face communication in the office is very important for improving work life."

– "I think more thing, but you know." - Improvement: "I have more to say, but you know."

2. Sentence Structure Errors:

– "I think very important improve the after the time I think." - Improvement: "I think it's very important to start improving from a young age."

The comparison for Student 5 also shows an increase in error numbers although, the change is slight by one error compared to the first exam.

The last student from Non-BBL group, Student 6 has also made 5 errors in total on the first speaking exam. The errors are shown below:

1. Grammatical Errors:

– "OK. Welcome, meet." - "OK. Welcome back."

– "I do I go gym?" - "I go to the gym."

– "I do if if I." - "If I go..."

– "I go five times a week and I have 4/6. Chest body biceps 3 steps I do exercise, yeah."

- "I go to the gym five times a week. On Monday, I focus on chest and biceps. On other days, I do different exercises for the rest of my body."

2. Sentence Structure Errors:

– "I think if you are children you can." - "I think physical education should be encouraged for children."

On the final exam Student 6's error count is 6 in total. These errors are:

1. Grammatical Errors:

– "All right, welcome it." - Improvement: "All right, welcome back."

– "I will. I will. I will study." - Improvement: "I will study."

– "I don't. I don't know." - Improvement: "I don't know."

2. Sentence Structure Errors:

- "You have weight and you don't like this life." - Improvement: "If you don't exercise, you gain weight and may not enjoy life."
- "I think physical education will be, will be we are we, we have a schedule in the shadow." - Improvement: "I think physical education is essential, as it helps us maintain a healthy schedule and lifestyle."
- "You can't. I don't. I don't. I don't have any idea now." - Improvement: "I can't explain it right now. I don't have any ideas."

When compared, Student 6's error count also increased in number just as the other students in the Non-BBL group.

4.1.5.1.4 Error analysis of speaking tests for BBL group

The first student from the BBL group, Student 7 has made 6 errors in total. These errors are shown below:

1. Grammatical Errors:

- "Add your add sport in your life because it's important." - "Including sports in your life is important."
- "It can be a exercise it's working." - "It can be considered an exercise; it's beneficial."
- "Discover you. You can discover your power." - "Discovering yourself and your capabilities."
- "You can add more things if you want like I think, and is for socializing and for your health." - "You can explore various activities to socialize and improve your health."

2. Sentence Structure Errors:

- "Actually, unfortunately I'm saying I don't do actually." - "Actually, unfortunately, I don't exercise much."
- "But actually, it's not because exercise is different the." - "However, walking alone may not be enough since exercise includes different activities."

On the final speaking exam Student 7's errors were as shown below:

1. Grammatical Errors:

- "It's definitely so important for their health, but firstly because you are getting more stronger." - "It's definitely important for their health, and most importantly, it makes them stronger."
- "Yes, I believe that." - "Yes, I believe so."
- "It was a what was that?" - "It was a... what was that?"
- "OK, well good examples so." - "OK, those are good examples."
- "When it happens all all lot of people suffers from that." - "When it happens, a lot of people suffer from that."
- "So how do you learn about these? From the news? From the Internet, from friends and family." - "So how do you learn about these stories? From the news? The Internet? Friends and family?"

2. Sentence Structure Errors:

- "We are solving math tests." -: "We are taking math tests."
- "So they should tell the truth because later or soon." - "So, they should tell the truth because sooner or later."
- "What I mean by inspiring stories, you know, there are some people who are extremely poor and become very rich in couple of months or years." - "By inspiring stories, I mean stories about people who were extremely poor and became very rich in a couple of months or years."

The comparison shows that there is an increase in Student 7's error numbers by 3. Although, unlike Non-BBL group, student's speech time has also increased over 5 minutes.

The student 8 on the first speaking exam has made 4 errors. The errors are:

1. Grammatical Errors:

- "I'm going outside. I I'm go, I go to the literal and run for 30 minutes." - "I go outside and run for 30 minutes."
- "Also I'm riding bicycle." - "I also ride a bicycle."

2. Sentence Structure Errors:

- "Of course, first of them I think." - Improvement: "Of course, one of the reasons I think is..."
- "Also, I don't know. Helps students focus more, I mean." - "Also, it helps students focus more, I mean."

On the final speaking exam the same student has made 4 errors. The examples of Student 8's mistakes are:

1. Grammatical Errors:

- "Because I graduated from preparation school and now next year I will studying at my department." - "Because I graduated from preparatory school, and next year I will be studying in my department."
- "Once I was looking on the Internet to buy myself." - "Once I was looking on the Internet to buy some shoes for myself."

2. Sentence Structure Errors:

- "I I tried I. About it." - "I tried to order it."
- "If you get something for free and easy, you can lose. Very easy." - "If you get something for free and easy, you can lose it very easily."

The comparison shows that there were no increase or decrease in student's error count for Student 8. Although, as Student 7, Student 8's speech time has also increased.

As for Student 9, the error count was 5. The errors are as follow:

1. Grammar and Phrasing Errors:

- "Until three months ago. I do exercise each day, every two off day." - "Until three months ago, I used to exercise every day, with two days off."
- "I don't have too much time to doing exercise." - "I don't have much time for exercise."
- "So multiple multi. You know? I asked." - "So, it's kind of a mix, you know? I do various things."
- "Yes, not too much, but debits." - "Yes, not too much, but occasionally."

2. Sentence Structure Errors:

- "But if they getting together face to face, they have too much fun and they have more."
- "But if they get together face to face, they have much more fun and build more trustable friendships."

The error count on the final speaking exam for Student 9 was as follows:

1. Grammar and Phrasing Errors:

- "Far as you know" - Improvement: "As you know"
- "How's life for you?" - "How is life for you?"
- "Even if weekend so it's." - "Even on weekends, it's busy, but it's good."

2. Sentence Structure Errors:

- "For example, in the past there is a brand which is." - "For example, in the past, there was a brand that..." or "For example, there is a brand that..."

The comparison shows that there was a betterment in Student 9's speech on the final exam. Although the change is slight, the student's speech time has also increased.

Student 10's errors on the first speaking exam is as follow:

1. Grammar and Phrasing Errors:

- "And I think it's opinion is right." - "And I think that opinion is correct."

- "Anyway, we do lesson all day and we need to have a break I think." -: "Anyway, we have lessons all day, and I believe children need a break."

2. Sentence Structure Errors:

- "Maybe it's had a flexible." - "Maybe it's good for flexibility."
- "And they deserve to have fun." - "And they deserve to have fun activities."

The student 10's error count has increased by 3 in the final exam. The errors are shown as below:

1. Grammar and Phrasing Errors:

- "This Sanji maybe is who is won the Nobel Prize chemistry." - "There's this person named Sanji who won the Nobel Prize in Chemistry."

As it could be concluded from the comparison, Student 10 had only 1 error in the final exam. The speech time has also increased for the student.

For Student 11 the first speaking exam error count numbers were as follows:

1. Grammar and Errors:

- "But now I can't go to the gym. I think there is no any reason but." - "But now I can't go to the gym. There is no specific reason for it."
- "The other side do and." - "Others do, but not me."
- "If you don't do any fitness or sport or." - "If you don't do any fitness or sports, your muscles can weaken."

The last speaking exam error numbers for the same student was 2. The examples of the errors are shown below:

1. Grammar and Errors:

- "They are rubbing their own brands by curing other fake advertising brands." - "They were mocking other fake advertising brands while promoting their own."
- "We we read a text in our class and there was a woman and she was homeless." - "We read a text in our class about a homeless woman."

The comparison also shows a slight betterment in Student 11's speech both error-wise and time-wise. Compared to the first exam, student has decreased the grammar error numbers by 1.

The last student of the BBL group, Student 12's error count on the first speaking exam was 2. The errors are shown below:

1. Grammar and Phrasing Errors:

– "If walking this is a case is a regular thing is not exercise." - "If walking is a regular thing, it's not considered exercise."

2. Sentence Structure:

– "Yeah, because we adapt. When we add up something. It's become useless for us." - "Yes, because our bodies adapt when we do something regularly, it becomes less effective."

On the final speaking exam Student 12 error count . The errors of the student are as shown below:

1. Grammar Errors:

– "So, some people consider walking as exercise." - "So, some people consider walking as exercise."

– "Because yeah, I. Work everywhere with my laptop." - "Yes, because I can work everywhere with my laptop."

– "For example you, you know in YouTube every Turkish YouTube challenge is challenged translates the English Youtubers" - "For example, you know on YouTube, every Turkish YouTube challenge translates into English for the English YouTubers."

The comparison shows that on the analysis comparison there is a slight increase on error count by 1 for Student 12. Yet again, the student's speaking time has increased and the student did not make any structural mistakes on the last speaking exam.

4.1.5.1.4 Overview of error analyses

The analyses conducted on both Non-BBL and BBL groups' speaking and writing tests show that while only one or two students from Non-BBL group show somewhat

improvement on the final exams, majority of them had either no change in their error counts or it got worsened.

However compared to the Non-BBL group, BBL group student showed improvement both by the error count and error category-wise with the exceptions of one or two students being from either speaking or writing exams.

4.1.5.2 Syntax analyses

In order to give an overall idea on students' syntactic performance, rather a general information will be shared in this section. The information will be presented in a manner such as:

- *“Student A from X group had 5 simple sentences, 4 compound sentences in the final exam.”*

Both groups' results on writing will be shared under same sub-section while the speaking exam transcripts will be omitted for this analysis as the recordings were mostly lagged due to the connection issues which yields in broken sentences multiple times in the transcripts and would not give a reliable result for the study's purpose.

4.1.5.2.1 Syntax analyses for writing tests

The student 1 from Non-BBL group had 5 simple sentences, 2 compound sentences, 3 complex sentences, 1 question sentence, 1 sentence with a transitional word and 1 with an adverbial phrase on the first writing exam. On the final writing exam however, the student had 4 Simple Sentences, 1 Question Sentence, 4 Compound Sentences, 5 Complex Sentences, 1 Conditional Sentence. This shows an improvement on the learner's writing skill.

Student 2 had 3 simple sentences, 1 question sentence and 6 complex sentences in total on the first exam. On the final test, the student had 3 simple sentences and 9 complex sentences. Student had no compound or conditional sentences in both writing exams but still increased the number of complex sentence use.

Student 3 had 5 simple sentences, 2 complex sentences, 1 compound sentence on the first writing exam while having 5 simple sentences, 7 complex sentences increasing the

complex sentence use by 5. This also indicates that Student 3 had a minor improvement in writing.

Student 4 had 5 simple sentences, 1 question sentence and 7 complex sentences on the first exam while on the final exam, the student had 4 simple sentences, 7 complex sentences and one compound sentence. The results were somewhat similar.

Student 5 had 4 simple sentences, 1 question sentence, 5 complex sentences on the first, while having 4 simple sentences, 15 complex sentences and 1 conditional sentence on the final exam. Which indicates an increase in the skill.

The last student from Non-BBL group, Student 6 had 4 simple and 13 complex sentences on the first exam and had 5 simple, 2 question and 10 complex sentences showing a slight variety in sentence structures but decrease in complex sentences in the final exam.

The first student from BBL group Student 7 had 3 simple sentences, 1 question, 10 complex sentences and 1 compound sentence on the first exam while having 6 simple and 29 complex sentences in the final exam showing a great improvement, yet, a slight decrease in sentence structure types.

The student 8 had 9 simple and 20 complex sentences in the first writing exam, while on the final exam, the student had 6 simple and 33 complex sentences. Which shows an increase in complex sentence use but no change in variety on sentence types.

Student 9 had 5 simple and 8 complex sentences on the first exam. Later, on the final writing exam the same student had 4 simple, 9 complex and 1 conditional sentences. This shows a slight increase in student's writing skills and sentence type variety.

Student 10, on the first exam, had 2 simple sentences, 2 question sentences, 2 complex sentences and 1 conditional sentence. On the last test, the student had 1 simple 4 complex and 1 conditional sentence.

Student 11 had 1 simple and 4 complex sentences in the first writing exam while on the final exam the student had 1 simple sentence and 6 complex sentences. This shows a slight change in complex sentence structure but overall, an insignificant improvement in writing skills.

The last student in BBL group, Student 12 on the first writing exam, had 3 simple and 10 complex sentences. However, on the final exam the student had 6 simple and 6 complex sentences, indicating a minor decrease in both writing skill overall and complex sentence structures.

All in all, in the syntactic analysis, students from Non-BBL group had their ups and downs with their writing skills, BBL group on average had an improvement with one or two students as exceptions.

4.1.6 Semi-structured interviews

Semi-structured face-to-face interviews were performed with 3 different students chosen at random from each group to gain a broader perspective on what learners think about the use of BBL in language lessons and their instructors incorporating such technologies into their teaching. The use of interviews led to the adoption of a mixed method study design, which, as Creswell (2015) states, provides additional insights by combining qualitative and quantitative findings. The responses were recorded as the interviews took place and then made into a transcript afterward. The interviewees were given anonymity and their names would not be used in the study.

Four focus interview questions were used in the interviews. Thematic analysis of semi-structured interviews will be presented in this section of the study under 4 headings.

4.1.6.1 Mixed feelings about language learning process

Student 5 acknowledges feeling frustrated at times with their language learning process, indicating the challenges they face in retaining grammar rules and applying them in speech and writing.

“I feel like my language learn process is good, but it can be difficult. I always try to learn new things, but sometimes I don't understand everything..” (Student 5 from Non-BBL group)

Student 7 mentions that their language learning journey has been good, but they still find it difficult to understand everything, reflecting the mix of positive experiences and occasional difficulties.

“I have been learning English for some time now, but our classes with you make it better. Actually, I can see and feel the progress I’m, uh, make, and it’s really good.” (Student 7 from BBL group)

4.1.6.2 Positive Experience and Helpful Teacher

Student 5 expresses that the classes with the teacher have made a significant difference in their language learning journey and that they can see and feel the progress they've made, indicating the positive impact of the teacher's approach.

“Our class made a very big difference for me. I noticed my understanding skills are better now. It is much easier to understand conversations and written texts. Something really changed, teacher.” (Student 5 from Non-BBL group)

Student 7 emphasizes the helpfulness and kindness of the teacher, and they appreciate the engaging activities and materials provided, such as group discussions and funny videos, which contribute to a positive learning experience.

The way you teach classes, uh, it really made a difference in my speaking and writing skills. For speaking, I feel more confident now. I can speak more fluently and I'm not as afraid as before to making mistakes. For writing, I learned so many valuable techniques to increase my written communication. My writing is improved since I started this class, I think. (Student 7 from BBL group)

4.1.6.3 Challenges in Speaking and Writing

Student 5 and Student 7 both recognize that they still make grammar mistakes, suggesting the challenges they encounter in language production despite their positive experiences.

“Sometimes I feel I’m do circles, you know? Like, I learn new grammar rules, but then I forget it when I try to use it in my speaking or writing. Like my brain is playing tricks on me.” (Student 5 from Non-BBL group)

For writing, I write good essays, better. But I am still not really good. Speaking, I speak faster now and I can express myself more clearly. I was very slow and

not finding the right words, but now I feel more comfortable when I speak.
(Student 7 from BBL group)

4.1.6.4 Aspiration for Improvement in Language Production

Student 5 expresses the desire for more practice and exposure to the language to become more fluent in speaking, aligning with their aspiration to improve their language production level.

"I really need more practice to become more fluent and, um, raise my English." (Student 5 from Non-BBL group)

Student 7 and Student 10 both express their eagerness to get better and speak more comfortably, highlighting their dedication to continuous improvement in their language skills.

Honestly, I'm really proud of myself. My language production level is improved significantly. I feel more comfortable speaking in English, and I notice that I do less grammar mistakes. Of course, it can be better, and I'm eager to get better. I think if I do more practice, I can get to a better level. (Student 7 from BBL group)

"I think, I come a long way since I started this. I'm excited to get better." (Student 10 from BBL group)

4.2 Discussion

In this section, the investigation results are discussed within the framework of the research questions to clarify them. The findings were presented in the previous section for the purpose of investigating BBL's effect.

This chapter will discuss and explore the findings' significance for both pedagogical and theoretical development, and also provide data for future research. The researcher analyzed the data collected through research instruments both quantitatively and qualitatively in an attempt to appropriately relate to the subjects of this study.

The analyses in this part are carried out using the data from the previous section. Each research question will be thoroughly answered one by one. The following are the study's research questions:

1. How effective is BBL method teaching compared to the non-BBL method teaching in the manner of language performance skills?
2. Is a curriculum enhanced with BBL method effective to attain any increase in language performance skills level?
3. Is there a difference on students' perceptions toward their vocabulary production levels in writing and speaking after implementing BBL method-oriented activities?

The recommendations for further research on similar subjects will be discussed in the following chapter of this study.

4.2.1 Discussion of findings for the RQ1

The first research question was to determine whether there is a substantial difference in language performance between the BBL and non-BBL groups. Two groups were taught classes using different techniques in order to collect the relevant data. To examine and contrast the differences between these two groups, independent samples t-tests were used in IBM SPSS 26 statistics program, later error and syntax analyses were conducted on the same data gathered and presented in the findings section of the study.

Both groups took four exams, and the BBL group fared higher in Mean difference (lexical diversity). Following the final examinations, BBL group students improved the most in both the speaking and writing skills exams. The technique applied to language teaching is the main distinction between this significant difference. While there are no meaningful differences on the students' lexical diversity in speaking and writing pre-tests, there are significant differences on post-tests with mean scores of 806,16 and 419 for BBL group on speaking post-test and writing post-test respectively.

Cohen's *d*, which assesses the standardized difference between the means of two groups, was used to calculate the effect size. Cohen's *d* is a regularly used measure of effect size, with values indicating small, medium, and large effects of $0.2 < d < 0.5$, $0.5 < d < 0.8$, and $0.8 < d$, respectively. The Cohen's *d* value in the current study was $d = 0.289$ for the

Speaking post-test and $d=0.257$ for the Writing post-test, both indicating a small effect size ($0.2 < d < 0.5$). Odabaşı's (2010) findings are also in line with this study's findings, as she claims that BBL-oriented studies have a major impact on improving the academic achievement of learners. Since the increase in language production skills show indications for increase in academic achievement. Odabaşı's (2010) findings are in line with the findings of the study. Demircan (2005), Duman (2010) and Gözüyeşil (2012) who conducted research on a similar topic in different settings and participants, also lines with the findings of the study as they state that BBL increases overall academic achievement scores of the learners compared to the traditional education.

Students were given the opportunity to put their vocabulary knowledge into practice through various tasks throughout the incorporation of BBL into language teaching in the BBL group. The students were shown how to complete each task in writing and speaking. These exercises mostly required them to reflect on actual occurrences in which they may find a sense of relevance or connection. The error and syntactic analyses also provided more insight for the same purpose as BBL students showed a more stable increase in reflecting, or in other words, performing their knowledge in the mentioned analyses as well. Toprakoglu and Dilman (2014) discovered that learners taught through vocabulary enhancement activities in the experimental group outperformed those taught through traditional vocabulary teaching activities in the control group. The current study confirms the inadequacies of traditional teaching practices. The findings of Toprakoglu and Dilman's (2014) study were similar to the current study in terms of emphasis teaching through activities that actively engage learners in the learning process.

Yang (2016) suggested that assignments could reduce the potential lack of opportunities for students to use English productively in class, yet receptive skills could still be strengthened. The goal of assigning assignments in this study was to revisit the vocabulary studied. The study's findings also revealed that the tasks served their goal. As a result, the findings are in accordance with the research question. As Kriegeskorte (2020) also claim that being exposed to a constant input, which is language in this case, may also help learning a language better and faster, as the study conducted by Kriegeskorte (2020) reveals that it strengthens and/or creates neural networks in brain. Friederici's (2019) study also proves this idea in a different setting.

4.2.2 Discussion of findings for the RQ2

The second research objective was to determine the efficacy of BBL enhanced curriculum in improving learners' language performance skills. Apart from standard classroom material which were *Pioneer Level B1 - Intermediate* and *Pioneer Level B2 - Upper-intermediate* books that were used in the classroom, various topic appropriate videos and activities chosen by the researcher were integrated into the curriculum. In order not to miss any target vocabulary that the student might face in exams, some of the repetitive and uninteresting tasks as students claim, were replaced with the correlated videos and tasks.

As evidenced by the mean values of the repeated measures ANOVA tests on both groups, BBL group show a rather steady improvement, especially on their speaking levels. Although both groups show meaningful difference, a gradual improvement, in original word production in both speaking and writing skills, BBL group shows a linear increase in their levels, while Non-BBL group shows a rather unstable one. In Non-BBL group's results, their performance gets its high and lows in tests number 2 and 3 in both skills but eventually gets into a higher level in the post-tests. BBL group's results show a decrease relatively only in third test of the writing skill while still maintaining a higher level of lexical diversity than the Non-BBL group. The speaking skill was of the BBL group, however, show a steady improvement on each test, improving greatly especially in the post-test.

Griffiee (2007) conducted research and compared the performance of students taught using Brain-Based Learning and traditional approaches. As an outcome of his study, learners who participated in Brain-Based Learning outperformed those who participated in traditional learning. The current study also shares a similar outcome on students' language performance skills.

According to Daoud (2019), if we want our learners to be qualified and autonomous, capable of taking responsibility for their own learning, we must also have qualified and autonomous educators. These instructors must understand how to design curriculum and implement it. Traditional methods, which are frequently utilized, make the learning process dependent on the teacher, which may be okay at the beginner level but not at the

advanced level of language learning. Traditional approaches would not be effective for learning a language since students would have trouble learning new words. As evidenced by their responses in semi-structured face-to-face interviews, students feel more motivated as an active learning environment has been created in language classrooms.

Eriyanti (2020) also shows that multimodal teaching is very beneficial for students' receptive skills, reading and listening. In the research, through statistical analyses conducted by Eriyanti (2020) conclude that students in the experimental group have shown improvement in reading and listening skills. This proves the importance of implementation of multimodal teaching techniques such as BBL in language learning. Alongside the findings of Eriyanti (2020), this study's findings also show the positive effects of such implementation into language teaching curriculum.

Finally, another research shows that pre-exposure and in-class activities designed for language performance skills are beneficial to improve students' skills in speaking and writing. In their research, Tadayonifar and Entezari (2020) show that students in the experimental group of their research design performed better than the students that got traditional education. Implementations such as pre-exposure boosts students' performance skills.

4.2.3. Discussion of findings for RQ3

The outcomes of the prior two research questions, speaking and writing, were analyzed using the IBM SPSS 26 data analysis program, error and syntactic analyses. The quantitative portion of the study is comprised of these questions. However, the third research question of the study constitutes the qualitative portion of the study.

Based on the quantitative data analysis, it could be concluded that students who received a language education in a curriculum that was supplemented with BBL-oriented activities had stronger language production skills in terms of original word production. In order to gain a broader perspective on the topic, this section will include student opinions expressed in interviews through thematic analysis.

Natural learner interest or motivation may cause learners to pay better attention to particular words than others, according to Hatch and Brown (1995). Learners also seem

to learn the words if they feel they need them. This of course is caused by the “need of survival” whether it’s an academic, work or social environment, as stated by Jensen (2000). Students in the BBL group indicated that the material chosen for the lessons was intriguing and the activities were engaging, making them feel like they were in real life circumstances, which was a big factor for their interest in classes. Students in both groups responded that they believe they need to improve. Yet, while students in Non-BBL group struggled putting the words they’ve seen in the class into practice, the ones in BBL group performed a better outcome than their peers.

According to Demircan (2005), the use of visual resources in language instruction is very important since it helps students make mental links between words and real-life objects. Thus, the role of visualization in teaching should not be underestimated, since it may aid students in "recalling words" while they speak or write. BBL group students stated that they found the videos fun and interesting both during the research process and on the interviews. During the classes that were modified with topic-related videos, students were focused on the subject and all students participated into the discussion sessions that were conducted after seeing each video. When the students from BBL group approached the researcher during the recesses informally, students claimed that the videos were engaging as it had elements that they can come across in real-life situations and gave them a lot to think about. Whereas the students in Non-BBL group showed indications of boredom and were unable to focus throughout the time tasks that were assigned. These statements also align with Jensen’s (2008) and Willis’s (2006) suggestions in their work: providing engaging materials and promoting active learning boosts student engagement, motivation and overall language performance.

As motivation and engagement play a role at this point, the research conducted separately by Chen (2017), Salem (2017) and Salleh (2021) coincide with the thematic analysis findings of this study. Both Chen (2017) and Salem (2017) claim that BBL activities enhanced curriculum are more motivating for students and therefore helpful in increasing their language output indirectly. Salleh (2021) also argues that including BBL activities into curriculum directly affects students’ language performance skills, which coincides with the findings in this study as well. The findings of two distinct studies conducted by Maguire (2019) and Chiang and Anderson (2020) correspond with the findings of the

present research as they also claim utilizing different senses through various activities may boost students' comprehension and therefore their performance in language. Lee and VanPatten (2015) also reveal that motivation is the key in learning language and motivated students had better language performance skills in his study.

Çelik (2015) discovered positive emotional impacts on learners taught using Brain-Based Learning techniques, in addition to the academic accomplishment of young learners. Akman's (2018) findings on her research also shows that there is a significant change on students' academic achievement and emotional intelligence levels when classes are conveyed in a BBL method. In the study, students were asked if they were satisfied with how the classes were conducted or if there was anything they would alter. The BBL group students expressed that they were also thankful for teacher's guidance throughout the process. As a result, students taught using Brain-Based Teaching techniques were more motivated, focused, and enthusiastic throughout classes. They also stated that they can incorporate the things they have learnt better in real life situations, which goes in parallel with the findings of Caine & Caine's (1991), Kondo's (2018) and Fukuda's (2018) findings in their research as they both emphasize the inclusion of meaningful input in an authentic environment would boost the students overall academic achievement in language learning, help students recall words easier.

Along with stating that incorporating learnt words into real-life situations easier, BBL group students also stated that they were motivated to learn more as the way classes conducted by the instructor inspired them. They stated that they were struggling with putting freshly learnt vocabulary into use before and now that they can handle this issue. This also brings Tarhan's (2009) implications on creating lifelong learners (as students were guided to discover "their" way of learning) and the importance of instructors who are aware of how brain learns.

In brief, it can be argued that Brain-Based Learning techniques have a good impact not only on their whole perceptions towards language learning.

5. CONCLUSION AND IMPLICATIONS

This research examined the exciting field of Brain-Based Learning Technique, which is a relatively new and emerging area of education research and practice. This technique's basic concepts and mechanisms have been investigated throughout this study, as well as its potential implications for teaching and learning. Brain-Based Learning Technique, which incorporates insights from neuroscience and cognitive psychology, provides a new viewpoint on how the brain processes and retains information, with the goal of optimizing educational practices. As this field of study evolves, it has the potential to revolutionize existing educational approaches and pave the way for more effective and efficient learning experiences. In this final chapter, we will reflect on the major findings and contributions of the Brain-Based Learning Technique, shedding light on its potential impact on educational practices and suggesting future study and implementation possibilities.

It is critical to recognize the advances made in the field of Brain-Based Learning Technique thus far. Empirical research has found that including brain-compatible techniques into instructional design, such as increasing active learning, multisensory experiences, and providing an enriched learning environment, has favorable impacts. The findings of this study show that the Brain-Based Learning Technique has the potential to improve students' engagement, retention, and overall academic achievement.

The main purpose of the study was to investigate the impacts of strengthening neural-networks through Brain-Based Learning oriented teaching on language performance skills. Three research questions were presented in this study. Each question in the study made the next step more meaningful. The goal of the first research question was to determine whether there was a significant improvement in students' language production skills in terms of original word production. If there was, what was the size of the effect? According to the results of independent t-tests conducted with students' post-test results, students who received a language education modified with the BBL technique demonstrated a significant difference from students who received a traditional education. Despite the minor impact size, there was a substantial difference in their language

production skills when compared to the Non-BBL group. This made the second stage of the analysis more meaningful.

The goal of the second research question was to observe students' improvement in terms of lexical diversity and determine if there was any consistent increase after each exam taken. According to the repeated measures ANOVA test results, whereas students in the non-BBL group experienced ups and downs in their original word output in examinations, students in the BBL group exhibited a constant increase in speaking exams. Despite a little decline in their original word output level in the third writing exam, they surpassed the level on the fourth. This resulted in the conclusion students who received a language education in a BBL-modified class showed an exceptionally consistent increase in their language production levels as compared to students who received a traditional education.

The final research question sought students' opinions on their language learning experiences and whether or not they were satisfied with their language performance skills progress. Semi-structured face-to-face interviews were conducted to gather their perceptions, and three students from each group were chosen at random. Students from both groups stated that there was a room for improvement on their language levels. The final research question sought students' opinions on their language learning experiences and whether or not they were content with their language performance skills progress yet there were room for improvement. Students from both groups stated that they could enhance their language skills. While students in the Non-BBL group reported that they required more exercises and activities to put into practice what they had learned, students in the BBL group were motivated with how the classes were conducted. Students in the BBL group also claimed that they feel more confident and fluent in both speaking and writing, as well as being able to hold their own in real-life settings.

It is crucial to emphasize that implementing BBL in language classrooms is not a one-size-fits-all approach, and that the specific strategies and techniques utilized may vary based on the classroom situation and the learners' specific requirements. BBL should also be used in conjunction with other effective teaching strategies, such as form-focused instruction and communicative language teaching.

Implications: The study investigated the effects of Brain-Based Learning on learners' language performance skills in terms of original vocabulary production. Based on the data obtained, the following implications can be drawn in this context.

Implications for Educational Practices: The study's findings have important implications for educational practice, particularly language teaching and learning. Brain-Based Learning Techniques may improve teaching practices and create more effective learning environments. The following implications highlight the research's practical applications:

1. **Pedagogical Approaches:** Instructors can incorporate brain-compatible practices into their instruction. Teachers can improve students' engagement, retention, and overall learning results by using active learning techniques, multisensory experiences, and providing an enriched environment.
2. **Curriculum Design:** The results highlight the significance of combining curriculum design with brain-based principles. Teachers may plan lessons and learning activities that include the brain's natural learning processes. This includes opportunities for repeated practice, the incorporation of real-world applications, and the use of a variety of educational materials and resources.
3. **Professional Development:** Professional development programs focusing on the Brain-Based Learning Technique should be prioritized by educators and administrators. Sessions that provide a thorough understanding of neuroscience principles and their implications for instructional design can be beneficial to teachers. Ongoing educator assistance and collaboration can help to improve the integration of suitable activities in the classroom.
4. **Learning Environment:** It is critical to create an environment that promotes brain-based learning. Collaboration, active involvement, and positive emotional experiences should be encouraged in the classroom. Educators can maximize students' cognitive functioning by designing flexible learning environments, properly utilizing technology, and incorporating mental stimulation and physical exercises. Classrooms should have enough room for students in general, not only when students need to perform activities such as role-plays or debates.
5. **Assessment Practices:** Assessment techniques should be consistent with the concepts of the Brain-Based Learning Technique. Educators can experiment with different

assessment methods that test students' understanding and application of knowledge through authentic tasks, performance-based exams, and self-reflection exercises. This shift in assessment procedures has the potential to deliver a more comprehensive and accurate representation of students' learning outcomes.

Educators and institutions can fully realize the potential of the Brain-Based Learning Technique by incorporating these implications into their educational practices. Adopting these strategies can result in increased student engagement, greater learning outcomes, and the creation of lifelong learners with essential cognitive and metacognitive skills.

It should be noted that the successful application of the Brain-Based Learning Technique necessitates collaboration among partners such as teachers, administrators, and researchers. Continued investigation, evaluation, and exchange of best practices may advance the field forward and contribute to ongoing advancements in educational practice.

Implications for Further Research: This section contains beneficial recommendations for broadening the field of research. This part contains recommendations for further study on the same or similar research subjects.

First and foremost, this study was developed for small groups of university preparatory school students in both groups. This study also designed practices for the target words in *the Pioneer Level B2 - Upper-Intermediate* book. A larger scale of participants and usage of diverse sources may yield generalizable results while also revealing divergent results.

Furthermore, the integration of BBL techniques took place in a short amount of time, which was 6 hours of class per week. The amount of class time may be expanded in order to obtain more definite and accurate data; as a result, the outcomes are likely to vary and the usefulness of the BBL technique in language instruction may become apparent. The research took 14 weeks, which is considered a short time period for the duration of an academic year. This period can be extended for further studies. This may yield a more effective outcome.

Finally, the study relied quantitative data. Further qualitative data, such as recorded observations, weekly interviews, or feedback sessions, may shed more light on the student motivation element of BBL-oriented language education for future studies.



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APPENDICES

Appendix 1: 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 2: Institutional 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 3: Speaking Exam Questions

Speaking Exam 1

- 1- How often do you exercise?
- 2- Do you consider walking an exercise?
- 3- Do you think “physical education” classes should be encouraged for children or people at young age?



Speaking Exam 2

- 1- Do you think advertisements are telling the truth?
- 2- Have you ever been hooked or tricked into buying anything or any product?
- 3- In your opinion, should companies be more moral when they're selling their products?



Speaking Exam 3

- 1- Have you ever had a job before? What was it?
- 2- Do you prefer working from home or the office?
- 3- When is the perfect age to start working and retire? Why?



Speaking Exam 4

- 1- There are many natural disasters happening all over the world. How do you learn about these and what are the causes of these disasters?
- 2- Have you heard of any inspiring stories (E.g., A person being rich from homeless)?
- 3- From which platform did you learn about them? How?



Appendix 4: Writing Exams Questions

Writing Exam 1

Topic 1: Fitness & Health

Write an opinion essay based on the following topic:

Do you think Physical Education classes give students a proper chance to exercise?



Writing Exam 2

Topic 2: Advertisements/Commercials and Reality

Write an opinion essay based on the following topic:

Do you think companies should bend the truth about what they're advertising to influence people or to sell more?



Writing Exam 3

Topic 3: Job/Unemployment and Scams

Write an opinion essay based on the following topic:

When you're applying for a new job, would you like the interviews to be face-to-face or online? Why/Why not?



Writing Exam 4

Topic 4: Inspiring Success Stories

Write an opinion essay based on the following topic:

Can any individual achieve their goals and dreams through hardwork and determination?



Appendix 5: Semi-Structured Face-to-Face Interview Questions

Interview Questions

1. How do you feel about your language learning process?
2. How did our experience help you with Speaking and Writing?
3. Is there anything you wish you could do differently or anything you would like to see more of?
4. How do you feel about your language production level?



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