

T.C.
SAKARYA UNIVERSITY
INSTITUTE OF EDUCATIONAL SCIENCES
DEPARTMENT OF FOREIGN LANGUAGES EDUCATION
ENGLISH LANGUAGE EDUCATION PROGRAM

**COMPARISON OF WORKSHEET-BASED AND DIGITAL GAME-BASED
VOCABULARY EXERCISES IN TERMS OF VOCABULARY RETENTION AND
INTRINSIC MOTIVATION**

MASTER'S THESIS

HASAN ALİ ŞAHİNKAYA

SUPERVISOR
ASSOC. PROF. DR. CİHAT ATAR

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DECLARATION OF ETHICS

In this study that I prepared following the Sakarya University Institute of Educational Sciences Thesis-Project Writing Guide, I declare:

- I have obtained and presented all the information and documents included in the thesis within the framework of academic and ethical rules,
- I refer to the works I have used and cite them as a source,
- I have not made any changes in the data used,
- I do not present the whole or any part of this thesis as another thesis study.

Hasan Ali ŞAHİNKAYA

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ABSTRACT

COMPARISON OF WORKSHEET-BASED AND DIGITAL GAME-BASED VOCABULARY EXERCISES IN TERMS OF VOCABULARY RETENTION AND INTRINSIC MOTIVATION

Hasan Ali ŞAHİNKAYA, Master Thesis

Supervisor: Assoc. Prof. Dr. Cihat ATAR

Sakarya University, 2024

Two techniques for vocabulary learning and retention that educators have effectively utilized thus far are digital game-based vocabulary exercises, which incorporate elements of gamification, and worksheet-based vocabulary exercises. The significance of vocabulary retention and motivation is undeniable in English as a foreign language (EFL) education. Paper worksheets have served as an effective technique for learning and enhancing vocabulary retention. On the other hand, the evolving learning preferences of today's "digital natives" and the challenges they encounter, such as difficulties in vocabulary retention, have underscored the importance of integrating technology and digital game-based vocabulary exercises into language teaching. In essence, the study aims to explore and compare the potential effects of digital game-based vocabulary exercises, utilizing two platforms, Memrise and Easy Notecards, with those of worksheet-based exercises, on vocabulary retention and intrinsic motivation regarding doing vocabulary exercises.

The study was conducted at the School of Foreign Languages of a state university. The participants consisted of Turkish EFL students enrolled in the preparatory school. Participants who could not complete the final module, B2, were studying in the Summer School program to continue their studies. The study, which focuses on two distinct groups, the control group (n= 19) and the experimental group (n= 25), aims to comprehend the potential impact of digital game-based exercises and worksheets on vocabulary retention and intrinsic motivation levels. Methodologically, the study was conducted using a quasi-experimental design with both control and experimental groups, employing a pre-test and a post-test. The study involves 44 B2 level students (23 male, 21 female) enrolled in an English preparatory program over a 4-week period.

The results of the ‘Vocabulary Retention Test’ and ‘Intrinsic Motivation Inventory Regarding Doing Exercises’, which are data collection tools, indicate a significant improvement in both groups in terms of vocabulary retention and intrinsic motivation. However, statistically significant differences in post-test scores between digital game-based and worksheet-based exercises were not found, suggesting similar effectiveness for both approaches. On the other hand, the intrinsic motivation inventory regarding doing exercises indicates a moderate increase in positive motivation for both groups and suggests potential advantages of digital game-based exercises in reducing stress levels. In conclusion, the findings of the study demonstrate that both digital game-based and worksheet-based vocabulary exercises can be used as effective instructional methods in foreign language education, promoting both intrinsic motivation and supporting vocabulary retention.

Keywords: Digital Game-Based Learning, Gamification, Intrinsic Motivation, Vocabulary Retention, Worksheet-Based Learning.

ÖZET

ÇALIŞMA KAĞIDI TEMELLİ İLE DİJİTAL OYUN TABANLI KELİME ALIŞTIRMALARININ KELİMELERİN HAFIZADA KALICILIĞI VE İÇSEL GÜDÜLENME BAKIMINDAN KIYASLANMASI

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Sakarya Üniversitesi, 2024

Kelime öğrenme ve akılda tutma için eğitimcilerin şu ana kadar etkili bir şekilde kullandığı iki teknik, oyunlaştırma unsurlarını içeren dijital oyun tabanlı kelime alıştırmaları ve çalışma kâğıdı temelli alıştırmalardır. Yabancı dil olarak İngilizce eğitiminde kelimelerin hafızada tutulmasının ve motivasyonun önemi yadsınamaz. Kâğıt alıştırmaya sayfaları, öğrenme ve kelimelerin hafızada kalıcılığını geliştirmede etkili bir teknik olarak hizmet etmektedir. Öte yandan, günümüzün "dijital yerlilerinin" gelişen öğrenme tercihleri ve karşılaştıkları kelimelerin hafızada tutulmasındaki gibi zorluklar, teknolojinin ve dijital tabanlı oyunlaştırılmış kelime bilgisi alıştırmalarının dil öğretimine entegre edilmesinin önemini altını çizmiştir. Temel olarak, bu çalışma, Memrise ve Easy Notecards adlı iki platformu kullanan dijital oyun tabanlı kelime alıştırmalarının, çalışma kâğıdı temelli alıştırmalarla kelimelerin hafızada tutulması ve kelime egzersizleri yapmaya ilişkin içsel güdülenme üzerindeki potansiyel etkilerini keşfetmeyi ve karşılaştırmayı amaçlamaktadır.

Araştırma bir devlet üniversitesinin Yabancı Diller Yüksekokulu'nda gerçekleştirilmiştir. Katılımcılar hazırlık okuluna kayıtlı Yabancı dil olarak İngilizce öğrenen Türk öğrencilerinden oluşmaktadır. Son modül olan B2 seviyesini tamamlayamayan katılımcılar, eğitimlerine devam etmek için Yaz Okulu programında eğitim görmekteydiler. Kontrol grubu (n= 19) ve deney grubu (n= 25) olmak üzere iki ayrı grubu inceleyen çalışma, dijital oyun tabanlı alıştırmaların ve çalışma kâğıtlarının kelimelerin hafızada kalıcılığı ve içsel güdülenme düzeyleri üzerindeki potansiyel etkisini kavramayı amaçlamaktadır. Metodolojik olarak çalışma, hem kontrol hem de deney gruplarıyla, ön test ve son testten oluşan yarı deneysel bir tasarım kullanılarak gerçekleştirilmiştir. Çalışmaya 4 haftalık bir süre boyunca İngilizce hazırlık programına kayıtlı 44 B2 düzeyindeki öğrenci (23 erkek, 21 kadın) katılmıştır.

Veri toplama aracı olan ‘Kelimelerin Hafızada Kalıcılığı Testi’ ve ‘Alıştırmaları Yapmaya İlişkin İçsel Gdlenme Envanteri’ sonuları, her iki grup iin de kelimelerin hatırlanmasıyla ve gdlenmeyle ilgili nemli bir iyileşme ortaya koymaktadır. Ancak, alıřmada dijital oyun tabanlı ve alıřma kâğıdı temelli alıřtırmaların son test skorları arasında istatistiksel olarak anlamlı bir fark bulunmamıřtır; bu, her iki yaklaşımın da benzer etkililiğini gstermektedir. te yandan, isel gdlenme envanteri, her iki grup iin de orta seviyede olumlu ynde bir motivasyon artışı gstermekte olup, dijital oyun tabanlı alıřtırmaların stres seviyelerini azaltma konusunda potansiyel avantajlar gsterdiğini ortaya koymaktadır. Sonu olarak, alıřmanın bulguları, dijital oyun tabanlı ve alıřma kâğıdı temelli kelime alıřtırmalarının, yabancı dil eēitiminde kelime ēreniminde hem isel gdlenmeyi teřvik eden hem de kelimelerin hafızada tutulmasını destekleyen etkili bir ēretim yntemi olarak kullanılabileceğini gstermektedir.

Anahtar Kelimeler: alıřma kâğıdı temelli ērenme, Dijital oyun tabanlı ērenme, İsel gdlenme, Kelimelerin hafızada kalıcılığı, Oyunlařtırma.

TABLE OF CONTENTS

DECLARATION OF ETHICS.....	i
ACKNOWLEDGEMENT.....	ii
ABSTRACT	iii
ÖZET	v
TABLE OF CONTENTS	vii
LIST OF TABLES.....	x
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER I.....	1
INTRODUCTION	1
1.1. Statement of the Problem	1
1.2. Purpose of the study	3
1.3. Significance of the study	3
1.4. Research questions	6
1.5. Hypotheses of the study.....	7
1.6. Limitations	8
1.7. Definitions	9
CHAPTER II	11
LITERATURE REVIEW.....	11
2.1. Vocabulary.....	11
2.1.1. Learning vocabulary.....	14
2.1.1.1. Receptive and productive vocabulary	18
2.1.1.2. Incidental and intentional vocabulary	20

2.1.2. Significance of vocabulary learning in English language learning.....	23
2.1.3. Vocabulary learning through technology	25
2.1.4. Vocabulary retention	27
2.1.5. Teaching vocabulary in EFL.....	30
2.2. Gamification	33
2.2.1. Gamification and vocabulary learning	36
2.3. Motivation	40
2.3.1. Integrative and instrumental motivation.....	40
2.3.2. Other approaches to motivation and second language learning.....	42
2.3.3. Motivation theories related to gamification.....	44
2.3.3.1. Maslow's hierarchy of needs theory	44
2.3.3.2. Self-determination theory	47
2.3.3.2.1. Amotivation	49
2.3.3.2.2. Intrinsic and extrinsic motivation.....	50
2.3.4. Motivation and gamification.....	56
CHAPTER III	61
METHODOLOGY	61
3.1. Research design	61
3.2. Setting and participants	64
3.3. Data collection tools.....	68
3.3.1. Vocabulary retention test.....	69
3.3.2. Intrinsic motivation inventory regarding doing exercises	74
3.4. Application process.....	76
3.4.1. The pilot study	76
3.4.2. Instruction of digital game-based vocabulary exercises.....	78

3.4.3. Digital game-based exercises implemented in the study.....	80
3.4.3.1. Memrise	80
3.4.3.2. Easy notecards.....	84
3.4.4. Instruction in the control group.....	88
3.5. Data analysis	88
CHAPTER IV	90
FINDINGS	90
4.1. Findings of pre-test and post-test.....	90
4.2. Findings obtained from intrinsic motivation inventory regarding doing exercises	93
CHAPTER V	106
CONCLUSION, DISCUSSION AND SUGGESTIONS	106
5.1. Conclusion and discussion.....	106
5.1.1. The discussion of pre-test and post-test of the experimental group.....	107
5.1.2. The discussion of pre-test and post-test of the control group.....	108
5.1.3. The discussion of post-tests of experimental and control group	110
5.1.4. The discussion of intrinsic motivation inventory regarding doing exercises results of experimental and control group.....	113
5.2. Suggestions	117
5.2.1. Pedagogical implications	118
5.2.2. Suggestions for future research.....	119
REFERENCES	121
APPENDICES	154

LIST OF TABLES

Table 1. Quasi-Experimental Design Process of the Research.	63
Table 2. The Distribution of Participants by Gender	67
Table 3. The Distribution of Participants by their Departments.....	68
Table 4. Demographic Characteristics of the Expert Group	70
Table 5. Retention Test Item Analysis Results	71
Table 6. Descriptive Statistics of Retention Test.....	73
Table 7. Shapiro Wilk Normal Distribution Test Results	89
Table 8. Comparison of Pre-test and Post-test Scores of Experimental Group Students	90
Table 9. Comparison of Pre-test and Post-test Scores of Control Group Students	91
Table 10. Analysis Results for Comparison of Students' Post-Test Retention Scores.....	92
Table 11. Descriptive Statistics of IMI in Control Group.....	93
Table 12. Descriptive Statistics of IMI in Experimental Group.....	94
Table 13. Descriptive Data for Interest and Enjoyment Sub-Dimension.....	96
Table 14. Descriptive Data for Perceived Competency Sub-Dimension.....	98
Table 15. Descriptive Data for Effort / Importance Sub-Dimension.....	100
Table 16. Descriptive Data for Pressure / Tension Sub-Dimension.	101
Table 17. Descriptive Data for Perceived Choice Sub-Dimension.	103
Table 18. Descriptive Data for Value/Usefulness Sub-Dimension	104

LIST OF FIGURES

Figure 1. Maslow's hierarchy of needs pyramid	45
Figure 2. Hierarchy of the players' needs	46
Figure 3. The self-determination continuum	50
Figure 4. Self-determination theory and intrinsic needs	54
Figure 5. Game elements hierarchy	58
Figure 6. Quasi-experimental design with control and experimental group	62
Figure 7. 2021-2022 Academic year summer school B2 module syllabus	66
Figure 8. Macmillan education everywhere teacher app	70
Figure 9. Multiple-choice exercises	82
Figure 10. Typing questions exercises	83
Figure 11. Audio choices challenge	84
Figure 12. The feature to add and customize images	85
Figure 13. The quiz feature	86
Figure 14. Matching service	87
Figure 15. Bingo game service	87

LIST OF ABBREVIATIONS

CG	: Control Group
DGB	: Digital Game-Based
EFL	: English as a Foreign Language
EG	: Experimental Group
GSRS	: Gamified Student Response Systems
IMI	: Intrinsic Motivation Inventory
L1	: First Language
L2	: Second Language
LTM	: Long-Term Memory
SDT	: Self-Determination Theory
STM	: Short-Term Memory

CHAPTER I

INTRODUCTION

1.1. Statement of the problem

A crucial element for proficient language use is the acquisition of vocabulary (Bakar & Nosratirad, 2013). Furthermore, mastering a second language involves gaining proficiency in the vocabulary, necessitating learners to familiarize themselves with a substantial number of words in the target language (Hulstijn & Laufer, 2001). While acquiring an extensive vocabulary is crucial, it is typically one of the most challenging aspects of language learning. According to Nation (2001), adopting a methodical strategy is crucial for systematically enhancing learners' vocabulary, which helps them communicate more clearly and effortlessly.

One fundamental challenge faced by students is the difficulty of retaining and recalling vocabulary in the target language, a problem that even students with a high level of language proficiency may encounter (Sze Lui, 2014). According to Schmitt (2010), a key element of the foreign language learning process is the alignment of teachers' and students' understanding of the importance of vocabulary. It is widely acknowledged that learning vocabulary is both essential and demanding. The effective teaching of vocabulary has been a continuous source of concern for foreign language educators. (Coady & Huckin, 1997).

In addition to the challenges associated with vocabulary learning, today's learners, predominantly categorized as millennials, encompass both digital immigrants and digital natives (Prensky, 2001). According to Nguyen and Khuat (2003), students exhibit disinterest in current methods that involve mechanical and repetitive exercises, leading to feelings of boredom and lack of motivation. Consequently, instructors face the formidable task of aligning with the high technical knowledge levels of this new generation of

learners. Integrating technology into the classroom becomes crucial to meet the evolving requirements of learners, offering mutual benefits for both learners and instructors (Musti-Rao, 2017). Moreover, one of the key challenges educators face is keeping students engaged, motivated, and excited about the topics taught in the classroom. This involves not only capturing their interest but also sustaining it throughout the learning process. Educators must constantly find innovative ways to make the subject matter appealing and relevant to ensure that students remain actively involved and enthusiastic about their learning process. Deng and Hu (2007) assert that educators need to develop strategies and solutions to tackle the problems of decreased motivation and declining interest in lessons. The utilization of gamification and digital game-based approaches can effectively connect traditional vocabulary teaching/learning methods with the learning styles of these “digital natives.”

Gamification is a concept gaining attention for its potential in different areas. According to Werbach (2014), it is about making activities more like games. Gamification revolves around incorporating game features such as challenges, rewards, and interactive engagement into non-game environments (Chou, 2023). Initially rooted in the marketing sector, gamification has swiftly expanded its reach into diverse areas including education, wellness, business, marketing, advertising, and government, owing to its promising outcomes. In educational settings, gamification has many uses from teaching lessons to formative assessments. By implementing features like leaderboards and progress bars, educators can encourage a sense of friendly competition among students, which helps to enhance motivation and involvement. Additionally, gamification promotes collaborative problem-solving, which is especially effective in boosting student motivation for tasks that might otherwise seem uninteresting.

In summary, this study aims to contribute to the field by investigating and contrasting the effects of digital game-based vocabulary exercises and worksheet-based exercises on vocabulary retention and intrinsic motivation.

1.2. Purpose of the study

The primary aim of this study is to examine and compare the potential effects (if any) of digital game-based vocabulary activities, specifically Memrise and Easy Notecards, with worksheet-based exercises on the retention of vocabulary in Turkish students studying English as a Foreign Language (EFL) in the preparatory school of a state university. Furthermore, the second objective of this study is to determine whether digital game-based vocabulary activities and worksheet-based exercises influence the intrinsic motivation levels of students.

1.3. Significance of the study

Mastering vocabulary is a pivotal aspect of language learning, and as such, its instruction stands as a vital and inseparable element within language teaching. Additionally, the methods of vocabulary acquisition vary among learners and their individual learning styles. As a result, it is vital to conduct ongoing research in order to discover techniques that can enhance vocabulary development, encouraging educators to continuously explore new and efficient teaching methods that are customized for their students' individual learning preferences. It is important to address the challenge of maintaining high motivation, especially for 'digital natives' who are constantly immersed in the interactive realm of technology and gaming, while also responding to different learning styles. Cheng and Dörnyei (2007) asserted that motivation plays a crucial role in the achievement of proficiency in foreign and second languages, emphasizing the importance of not overlooking motivation strategies in language learning studies. Aligning with this objective, adjustments within our teaching environment can be implemented to enhance students' motivation, consequently contributing to their overall success.

The evident and swift progression of digital technology is most prominently observed in the rise of technological devices, computer games, and applications. As technology continues to evolve at a fast pace, education has emerged as a key beneficiary, making the

most of its advancements. With the advancement of this educational technology, learners are adapting to innovative approaches within the classroom. Due to their frequent use of technology daily, they are open to experimenting with novel approaches when acquiring vocabulary. However, a significant issue has emerged: today's students, often referred to as digital natives, exhibit a growing tendency to become demotivated and disinterested in conventional educational methods (Açıkgöz, 2019; Çakır, 2019; Karatekin, 2017; Prensky, 2001; Sağlık, 2017; Ünal, 2018; Uyar, 2019). Therefore, this tendency brings about considerable difficulties, specifically in acquiring vocabulary in foreign language classes.

Several similar studies have explored methods related to gamification and game-based vocabulary teaching, investigating their effects on student' motivation towards vocabulary learning (Açıkgöz, 2019; Çakır, 2019; Karatekin, 2017; Özayaşar, 2021; Sağlık, 2017; Uyar, 2019; Ünal, 2018). According to Kapp (2012) in contemporary educational settings, educators have increasingly integrated gaming elements into their pedagogical approaches. However, within the restricted array of empirical investigations on gamification, numerous studies encounter methodological deficiencies. These shortcomings include the absence of comparison groups, brief durations of interventions, reliance on singular evaluation methods, and the lack of validated data collecting tools (Hamari, Koivisto, & Sarsa, 2014). While gamification is a commonly used strategy, the effectiveness of its various elements has yet to be thoroughly evaluated (Hanus & Fox, 2015).

Furthermore, this study seeks to assess the potential impact of digital game-based and worksheet-based exercises on the intrinsic motivation levels of users while doing vocabulary practices. The participants consisted of tertiary-level EFL students who had already experienced a compulsory four-module English language preparatory program, ranging from A1 to B2 proficiency levels. Ning and Hornby (2014) highlight a body of research indicating that students' intrinsic motivation to learn English as a foreign language (EFL) tends to decline as they progress from lower to higher academic levels (Carreira, 2011; Xu & Shu, 2006; Yang & Nicholas, 2008). Additionally, Busser and Walter (2013) observed that German learners at tertiary level in the United Kingdom experienced a significant decline in their intrinsic motivation, effort, and confidence in learning the language, despite their strong desire to become proficient. This observation implies a

significant decline in intrinsic motivation among tertiary EFL learners, thus highlighting a notable gap in the literature that this study seeks to address.

Moreover, this study employs two digital game-based applications, namely Memrise and Easy Notecards, which are seldom utilized in English Language Teaching (ELT) investigations. Furthermore, while there are a few studies testing the effects of Memrise on vocabulary retention (Karjo, 2018; Łuczak, 2017; Wahyuningsih, 2020; Wahyuningsih & Putra, 2022; Widyaningrum & Putro, 2020), there is a notable absence of research experimenting with the effects of Easy Notecards on vocabulary retention. The research conducted by Luan, Duyen, Khoa, and Dien (2023) aims to explore students' perceptions of utilizing Quizlet for independent study. Although the name 'Easy Notecards' is mentioned once in the study, there is no exploration or examination of its effects or usage within the research.

When examining other studies, it is evident that Kahoot, Quizlet, and other commonly searched gamification apps (e.g. QuizGame, Quizizz, Wordable) were commonly used. Moreover, these gamification apps are applied through gamified student response systems (GSRS). GSRS, known as engaging technological tools, are commonly referred to as 'clickers' or 'audience response systems'. These systems have been discussed and utilized in various studies (Bergtrom, 2006; Caldwell, 2007; Lantz, 2010). They enable students to answer questions using keypads and share their responses in real-time. This interactive feature not only facilitates active participation but also promotes a collaborative learning environment where students can simultaneously see and compare their responses with others, enhancing the overall educational experience. On the other hand, the digital game-based applications Memrise and Easy Notecards, employed in this study, create a self-study environment within the classroom. This feature proves particularly beneficial for learners who face challenges in adapting to the general pacing of the class. The interactive nature of these applications allows students to progress at their own pace, providing a more personalized learning experience.

In conclusion, while gamification has emerged as a prevalent strategy in modern educational settings, there persists a notable gap in comprehensive research regarding its various components and their impacts on intrinsic motivation. This study seeks to address

some of these gaps by specifically examining the potential effects of digital game-based applications on intrinsic motivation levels among Turkish EFL learners. By utilizing the Intrinsic Motivation Inventory (IMI) regarding doing exercises during the Summer School period, the study endeavours to explore the potential effects of digital game-based exercises on vocabulary retention and intrinsic motivation. Moreover, the study's focus on less commonly explored apps like Easy Notecards contributes to a deeper understanding of effective teaching methods in language education, offering potential implications for future pedagogical practices and research endeavours in the field. By following a strong research design in the field of language education, this study fills gaps in the existing research and offers a deeper look into effective teaching methods in vocabulary learning.

1.4. Research questions

The study seeks to address the following questions:

- 1) Is there a significant difference in vocabulary retention between the pre-test and post-test scores of the experimental group, which used digital game-based exercises, and the control group, which used worksheet-based exercises?
- 2) Does the post-test indicate a significant difference in vocabulary retention between the control group, which used worksheet-based exercises, and the experimental group, which used digital game-based exercises?
- 3) To what extent do digital game-based exercises and worksheet-based exercises influence the intrinsic motivation levels towards vocabulary learning among preparatory school students in the experimental and control groups, respectively, and is there a significant difference in intrinsic motivation levels between the experimental group exposed to digital game-based exercises and the control group exposed to worksheet-based exercises?

1.5. Hypotheses of the study

Some previous studies (Karjo, 2018; Łuczak, 2017; Wahyuningsih, 2020; Wahyuningsih & Putra, 2022; Widyaningrum & Putro, 2020) have demonstrated that Memrise has an impact on the vocabulary retention levels of EFL learners. Based on this, the hypothesis of this study posits that the impact on vocabulary retention among learners will be more favourable with Memrise and Easy Notecards exercises compared to worksheet-based exercises. Furthermore, there is an expectation that students will react favourably to the integration of digital game-based applications in their lessons. This anticipation stems from the growing trend of digital engagement in education and the general appeal of gamified learning among younger audiences. The positive feedback is likely to highlight aspects such as increased interest, enhanced interaction, and a more dynamic learning environment, all of which contribute to a more immersive and enjoyable educational experience. Consequently, the study aims to offer insights into gamifying vocabulary learning, potentially facilitating the integration of more game-based applications to enhance language learning in EFL classes. These hypotheses will be put to the test through the application of this study. The hypotheses are given below.

H0: $\mu_{\text{Worksheet}} \geq \mu_{\text{Memrise/Easy Notecards}}$: The null hypothesis posits that there is no significant difference in vocabulary retention between learners using worksheet-based exercises and those utilizing Memrise/Easy Notecards exercises.

H1: $\mu_{\text{Worksheet}} < \mu_{\text{Memrise/Easy Notecards}}$: The alternative hypothesis suggests that the impact on vocabulary retention is more favourable with Memrise and Easy Notecards exercises compared to worksheet-based exercises.

H2: $\mu_{\text{Worksheet}} \geq \mu_{\text{Memrise/Easy Notecards}}$: Alternative hypothesis 2 suggests that there is no significant difference in intrinsic motivation levels towards vocabulary learning between learners using worksheet-based exercises and those utilizing Memrise/Easy Notecards exercises.

H3: $\mu_{\text{Worksheet}} < \mu_{\text{Memrise/Easy Notecards}}$: Alternative hypothesis 3 suggests that the intrinsic motivation levels towards vocabulary learning are higher among learners using Memrise and Easy Notecards exercises compared to worksheet-based exercises.

1.6. Limitations

Initially, the study sample comprised 44 students, divided into the control group ($n= 19$) and the experimental group ($n=25$), mirroring the structure of a typical classroom in an English language preparatory school. Although the sample size was a true representation of classroom conditions, it restricted the potential for conducting more in-depth analyses suitable for a quasi-experimental study. Conducted in a preparatory school in Türkiye, the study's results may not be readily generalizable to larger groups or different circumstances.

The study was conducted during the summer school session of the 2021-2022 academic year, affording the researcher a limited timeframe of a four-week intensive course. Due to this constraint conducting a delayed post-test was not feasible within this timeframe. It is possible that both instructional methods were effective in the short term, but differences might emerge in the long-term if the study were extended.

Additionally, the transition from online to face-to-face classes for summer school, particularly during the COVID-19 pandemic, may have influenced students' performance and motivation in relation to the study. This transition occurred concurrently with the implementation of the study, potentially impacting the students' engagement and motivation levels during the intervention.

Relatively, another limitation of the study was the lack of qualitative data post-treatment, which was due to the constraints of the summer school setting. After the treatment, participants left the city, and challenges arose in conducting interviews online or via mobile phone, leading to the unavailability of this qualitative data collection method.

The lack of randomization among participants posed obstacles in replicating the study. The nature of the preparatory school's operations restricted the random selection of students into groups. Instead of a different method, two unaltered groups from identical educational

stages were chosen for the study, a choice that might lead to biases potentially impacting the findings.

An additional limitation stemmed from different instructors in the experimental and control groups due to the intensive class schedule. Because of practical limitations, the researcher assigned their own class as the experimental group (EG), as it wasn't feasible to apply the treatment simultaneously to both groups. This decision aimed to facilitate a more manageable study and ensure easier and consistent data collection. Another class was selected as the control group to maintain neutrality, as the researcher did not directly impact this group. Using the same teacher for both groups could introduce unintended bias or influence. The control group (CG) was formed by choosing a class whose teacher willingly agreed to participate in the study.

The final limitation of the study is related to the timing of administering the Intrinsic Motivation Inventory regarding doing exercises. The decision to only administer the IMI following the implementation phase was made because the inventory's items were not considered relevant to the learners prior to the intervention. However, the absence of a pre-test poses a limitation in understanding the baseline motivation levels before the treatment. Without data collected before the treatment, it becomes challenging to ascertain whether the treatment had any effect on the intrinsic motivation levels for vocabulary learning. This limitation restricts the ability to directly measure the impact of the intervention on intrinsic motivation. Consequently, the researcher relied solely on quantitative analysis, interpreting the frequency of given answers, rather than employing a statistical analysis method that would require pre-test data for comparison.

1.7. Definitions

Digital Game-based Exercises: In this study, digital game-based vocabulary exercises specifically refer to the utilization of digital platforms, namely Memrise and Easy Notecards.

EFL: English as a Foreign Language (EFL) pertains to situations in which students are acquiring English with the intention of using it with other English speakers globally, such as for tourism or business purposes. EFL students commonly undergo language studies within their own country or participate in short courses in English-speaking nations like the USA, Canada, Australia, New Zealand, Ireland, Britain (Harmer, 2001).

Gamification: The application of gaming principles and elements in a non-game setting to create a setting reminiscent of a game, particularly focusing on enhancing engagement. (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011).

Intrinsic Motivation: Engaging in an activity for internal satisfaction rather than focusing solely on external outcomes and investing effort in an activity for the intrinsic value of the activity itself rather than pursuing external rewards (Ryan & Deci, 2000a).

Post-test: The test that was carried out after the treatment.

Pre-test: The test that was carried out prior to the study to evaluate the students' pre-existing knowledge of vocabulary.

Retention: The capacity to remember and retain information studied over time, maintaining it in memory even after a certain period has passed (Longman, 2013).

Treatment: In the study, the treatment involves one of the vocabulary tasks, which includes either Memrise and Easy Notecards exercises or worksheet-based exercises.

Vocabulary Learning: Vocabulary learning fundamentally involves both understanding the meaning of a word and effectively employing it in communication (McCarthy, 1984).

Worksheet-based Exercises: In this study, worksheet-based vocabulary exercises are instructional activities aimed at improving students' vocabulary skills through structured sheets. These worksheets involve diverse exercises, such as word-definition matching, sentence completion, discussion parts and so on (Appendix 5).

CHAPTER II

LITERATURE REVIEW

2.1. Vocabulary

Vocabulary is defined as a collection of lexemes which includes individual words, multi-word expressions, and idioms, according to the Longman Dictionary of Language Teaching (2013). Hiebert and Kamil (2005) stated that vocabulary is generally understood as the understanding of word meanings. Even though vocabulary is about words, it can be difficult to clearly define what exactly a word is (McCarthy, O'Keeffe, & Walsh, 2010). This is because words can have many different uses and meanings, making the concept of a word more complex than it might seem at first. Their point underlines the idea that understanding vocabulary involves more than just knowing words; it is also about understanding how they are used in different situations.

Also, Schmitt (2000) points that defining vocabulary goes beyond mere words, as it encompasses countless numbers of linguistic forms, from single words to idiomatic expressions. The term "word" encompasses a broad range of linguistic forms, including phrases, phrasal verbs, and idiomatic expressions. These diverse forms, termed as "lexemes" or "lexical units," all have their own meanings even though they might be made up of more than one word (Nation & Waring, 1997). Furthermore, the complexities of vocabulary extend to grammatical and morphological variations, adding layers to the definition of a word. Inflections and derivatives pose challenges in traditional word categorization, where variations like "walked" and "walking" share a base word, while "stimulative" and "stimulation" alter the word class (Nation & Waring, 1997). These distinctions are crucial for understanding the scope of vocabulary and addressing questions about language proficiency (Nagy, Anderson, Schommer, Scott, & Stallman, 1989). Different experts have different ideas about the number of words in English and native speakers' lexical knowledge, reflecting different definitions and conceptualizations of

vocabulary (Nagy et al., 1989). As a result, using precise terminology is essential for effectively navigating vocabulary complexities and informing language instruction.

Defining vocabulary can be a difficult task, so some experts divide it into categories for more detailed analysis. Ellis and Tomlinson (1981) divide vocabulary into two distinct categories. Firstly, 'passive or receptive vocabulary' encompasses words that learners can understand when they hear or read them but may not use in their own speech or writing. On the other hand, 'active or productive vocabulary' consists of words that learners not only understand but also regularly use in their own verbal or written communication. This distinction is crucial in language teaching, as it helps educators tailor their methods to enhance both types of vocabulary in learners. According to Akar (2010), passive vocabulary includes all the words a learner is familiar with, which is typically larger than their active vocabulary. Active vocabulary refers to the words a learner can use accurately in speech and writing. In other words, the sum of words that a learner can comprehend accurately forms their passive vocabulary, whereas their active vocabulary is made up of all the words they can use correctly in their communication.

According to Schmitt (2007), one potential starting point for comprehending vocabulary learning is to define the concept of knowing a word. While many might assume that knowing a word's meaning and spelling or pronunciation is adequate, achieving full mastery necessitates a deeper level of knowledge (Nation, 2001). According to Nation (2001) there are three dimensions of word knowledge, encompassing 'form', 'meaning', and 'use' aspects. Mastery goes beyond recognizing a word's form and meaning; it involves understanding its nuances, connections, and grammatical functions. Furthermore, familiarity with word parts, common phrases, and usage constraints contributes to a more comprehensive word knowledge (Nation, 2001). Achieving proficiency in vocabulary necessitates a holistic grasp across these dimensions, enhancing one's ability to use words effectively in different situations.

As mentioned, knowing a word involves more than just recognizing its individual components. It requires a deeper understanding various aspect of the word, including its form, meaning, and usage. For instance, individuals should be familiar with a word's pronunciation, spelling, meaning, conceptual nuances, associations, grammatical functions,

and collocations to employ it effectively in diverse contexts (Nation, 2001). In essence, understanding a word entails having complete knowledge of it, enabling us to accurately use it in our speech and writing.

Nation (2001) further elaborates on understanding word knowledge, categorizing it into nine aspects across three categories: “1. form (sound, spelling, word structure), 2. meaning (associations, referents, the concept expressed) and 3. use (word patterns, collocations, constraints on word usage)” (p.27). He underscores that learning these types of knowledge is a gradual process and suggests three key processes that lead to the acquisition of a word: noticing, retrieval, and generative use.

As the primary trigger for learning, noticing manifests when language learners are provided with explanations of words through definitions, synonyms, or translations in their first language (Nation, 2001). When a language element is perceived not as a standalone message but as an integral part of language, decontextualization occurs. The subsequent significant process is retrieval, which involves the repetition of language items. The frequency of retrieval directly impacts the pace of word memorization by language learners. Following the initial noticing phase, which may involve auditory or visual exposure, highlighting, or noting of the word, it becomes crucial to retrieve its meaning to facilitate vocabulary acquisition (Kırmızı & Topçu, 2014). The final process, generative use, entails elaboration as it not only involves retrieval but also enriches and reinforces the memory for a word. 'Generative use' occurs when previously encountered words are encountered or employed in ways different from their initial encounter, such as in a different grammatical form, context, or with new meanings (Allum, 2004; Nation, 2001). In summary, the generation effect (Barcroft, 2007) positively influences retrieval because individuals tend to remember vocabulary items better when they are required to generate them independently (Slamecka & Graf, 1978).

Thornbury (2002) argues that vocabulary has long been neglected in language teaching. It is usually not regarded as a primary skill like listening, speaking, writing, and reading, but rather as a secondary ability. However, communicative methods for language learning have greatly advanced today, with a focus on vocabulary as it forms the foundation of communication and is essential for understanding and using a language. Therefore, to gain

a deeper understanding of vocabulary, the next section will primarily focus on the vocabulary learning.

2.1.1. Learning vocabulary

According to Thornbury (2002), with the decline in popularity of the grammar-translation method and the emergence of communicative approaches in the 1970s, vocabulary learning gained prominence as an essential component. This shift emphasized the necessity of learning vocabulary for effective communication in the target language. Alqahtani (2015) emphasizes that in second language learning, while vocabulary acquisition holds utmost importance, it extends beyond rote memorization of word definitions. Instead, it involves grasping the word's form, usage in diverse contexts, and multiple meanings.

Schmitt (2008) emphasizes that one of the key aspects of vocabulary learning is the size of the vocabulary. The quest for vocabulary acquisition begins with setting reasonable learning goals (Laufer, 1988). Initially, it was believed that understanding around 95% of lexical items sufficed, but recent studies suggest a higher threshold of 98-99%, particularly for written discourse (Hu & Nation, 2000). To engage in informal daily conversations, approximately 6000–7000-word families are needed, indicating a substantial vocabulary requirement (Nation, 2006). However, comprehension studies indicate that lower coverage rates may suffice, with comprehension improving significantly beyond 90% coverage (Bonk, 2000). Estimates vary for vocabulary needs, ranging from under 800 to over 3000 word families for listening comprehension, and 8000-9000 word families for reading authentic texts (Nation, 2006; Schmitt, 2008). These figures underscore the complexity of vocabulary acquisition, compounded by a great number of word forms within families and the prevalence of phrasal lexical items (Schmitt, 2004; Wray, 2002). Overcoming this challenge requires a proactive approach involving students' active participation, guidance from teachers, insights from researchers, and effective materials provided by writers (Leech, Rayson, & Wilson, 2001; McCrostie, 2007). Collaboration among these partners is crucial, as failure in any part could hinder overall success in vocabulary acquisition endeavours.

The depth of vocabulary knowledge is, also, crucial alongside vocabulary size, requiring learners to grasp various aspects beyond mere form and meaning. While some aspects, like word meaning and form, are readily teachable, contextualized aspects such as collocation demand extensive exposure to the language (Nation, 2001). This highlights the need for a balanced approach to vocabulary learning that combines explicit teaching with repeated exposures, such as through extensive reading (Chang & Read, 2006). Additionally, vocabulary acquisition is an incremental process, requiring multiple encounters with words to develop mastery across different word knowledge types (Nation, 2001). Recognizing the differences between receptive and productive vocabulary levels, as well as disparities between written and spoken language usage, underscores the complexity of vocabulary acquisition (Laufer, 2009; Milton & Hopkins, 2006). While written and spoken vocabulary sizes may not directly correlate, they generally increase in tandem, with proficiency influencing the balance between phonological and orthographic knowledge (Milton & Hopkins, 2006). Therefore, a nuanced understanding of vocabulary learning as a gradual, multifaceted process is essential for effective pedagogy (Schmitt, 2008).

Another crucial issue that should be mentioned in learning vocabulary is the importance of word form. According to Schmitt (2008) the significance of word form in vocabulary acquisition is often overshadowed by an emphasis on meaning, yet research reveals its pivotal role in language learning (Bensoussan & Laufer, 1984; Laufer, 1988). Learners frequently encounter challenges with word forms, particularly when similarities between words are misleading, such as suffixes or vowel variations (Laufer, 1988). Moreover, the presence of numerous orthographic neighbours in the target language amplifies confusion (Grainger & Dijkstra, 1992). Additionally, the deeply ingrained processing strategies developed in the native language may hinder the acquisition of word forms in a second language, necessitating a paradigm shift in processing methods (Cutler et al., 1986; Cutler & Norris, 1988). This difference between first language (L1) and second language (L2) processing is evident both orally and in written language (Koda, 1997, 1998). Despite Ellis' assertion that form acquisition primarily occurs through exposure (Ellis, 1997), addressing word form directly in vocabulary exercises can enhance overall vocabulary learning, aiding in the acquisition of additional word senses (Bogaards, 2001). However, to optimize

learning outcomes, form-focused activities must be integrated with meaning-oriented tasks, recognizing the finite processing capacity of learners (Barcroft, 2002).

In the realm of adult L2 vocabulary acquisition, a notable characteristic is the divergence between lexical and semantic development (Jiang, 2004). Unlike in first language acquisition, where lexical growth often coincides with significant semantic enrichment, adult L2 learners frequently rely on their pre-existing semantic framework (Ellis, 1997). However, owing to disparities in the form-meaning mapping between the learner's native language and the target L2, successful utilization of L2 vocabulary often requires semantic restructuring (Paribakht & Wesche, 1999). Debate persists among researchers regarding the efficacy of such restructuring endeavours (Henriksen, 1999). Available evidence suggests that semantic development in adult L2 learning progresses gradually and incompletely, with even proficient learners persistently leaning on their native semantic system (Jiang, 2000). This distinction underscores the importance of emphasizing semantic development in L2 vocabulary research, a dimension frequently overshadowed by studies predominantly focused on word retention and acquisition factors. For these reasons, in the study, semantic vocabulary retention levels of participants were evaluated through a vocabulary retention test.

The process of acquiring new vocabulary in a L2 entails two primary stages: comprehension and development. Initially, learners must grasp the core meaning of new words within their existing semantic framework, linking L2 forms to pre-existing concepts or translations from their native language (Jiang, 2000). This comprehension stage is fundamental for establishing meaningful word retention and production. However, mastery of L2 vocabulary extends beyond mere translation equivalents, necessitating a deeper semantic development stage (Paribakht & Wesche, 1999). In this stage, learners engage in an ongoing process of elaborating and refining word meanings, often requiring the restructuring of semantic content originally transferred from their native language (Henriksen, 1999). The extent to which learners accomplish this semantic restructuring determines their ability to use L2 words accurately and idiomatically, akin to native speakers (Jiang, 2000). While some argue that increased exposure to contextualized L2 input facilitates the formation of new concepts, others caution that incomplete restructuring

may occur due to persistent reliance on L1 meanings (Ellis, 1997). Hence, effective L2 vocabulary acquisition involves not only initial comprehension but also sustained semantic development, where learners refine their understanding of words through exposure to diverse contexts and usage patterns.

In accordance with Jiang (2004), the disparities in how words are mapped to meanings between an individual's native language and their second language necessitate the restructuring of semantic understanding for accurate usage of L2 vocabulary. Building upon this notion, Jiang (2004) elaborates on the multifaceted process of acquiring new words in a second language, outlining several crucial sub-processes and tasks. Before a word can be fully integrated into one's automatic linguistic competence, several preliminary steps are essential. These encompass recognizing the word within the language, comprehending its morphosyntactic and semantic attributes, and assimilating it into one's mental lexicon to facilitate automatic retrieval when needed. Jiang (2004) further categorizes this vocabulary learning process into two primary phases. The initial phase, termed lexical development, is characterized by the retention, consolidation, and automatization of vocabulary. During this stage, learners actively engage in understanding semantic restructuring, thereby laying the foundation for constructing initial cognitive maps essential for long-term retention. Subsequently, the focus shifts to semantic development, wherein learners systematically transfer knowledge to expand and refine their understanding over time. This initial phase is commonly denoted as the lexical comprehension stage, followed by the semantic development stage (Özyaşar, 2021).

As mentioned, the research findings highlight the gradual and incomplete progress of semantic development among adult L2 learners, indicating their persistent reliance on native semantic frameworks even at advanced proficiency levels. This underscores the importance of prioritizing semantic development within L2 vocabulary research, an aspect often overshadowed by studies focused primarily on word retention and acquisition factors. Effective L2 vocabulary acquisition extends beyond initial comprehension, necessitating ongoing semantic refinement through exposure to varied contexts and patterns of usage. Therefore, the current study evaluated participants' retention of semantic vocabulary

through a comprehensive vocabulary retention test, recognizing the crucial role of semantic development in enhancing vocabulary proficiency.

Nation (2001) states that vocabulary acquisition constitutes a multifaceted process encompassing various dimensions of knowledge. Among the most comprehensive specifications of vocabulary acquisition are receptive and productive vocabulary learning, which represent two additional crucial components in the process of language learning. Thus, these aspects will be further examined in the following section.

2.1.1.1. Receptive and productive vocabulary

Receptive vocabulary refers to the lexicon of terms that learners comprehend when encountered within context, yet they are unable to utilize these terms themselves. According to Stuart (2008), this type of vocabulary comprises terminology that children are able to recognize during reading activities but refrain from incorporating into their own writing or spoken language. On the contrary, productive vocabulary encompasses terms that students not only comprehend but also possess the ability to pronounce accurately and utilize effectively in both written and spoken communication. This form of vocabulary acquisition necessitates the capacity to select and employ appropriate words for effective communication. Stuart (2008) suggested that learners may employ these words to articulate their thoughts to others, thus demonstrating proficiency in productive vocabulary usage. To summarize, while receptive vocabulary refers to terms that students grasp but do not actively use, productive vocabulary encompasses terms that students both understand and can employ proficiently in communication.

Taebenu and Katemba (2021) assert that within the framework of communicative language instruction, a distinction is made between receptive and productive vocabulary. Receptive vocabulary pertains to learners' comprehension of vocabulary when encountered in auditory or written form. It encompasses the word order recognized by students during listening, speaking, reading, or writing activities. Essentially, receptive vocabulary signifies the understanding of words or phrases within verbal or written contexts.

As mentioned, according to Nation (2001), vocabulary knowledge encompasses various dimensions, including form (pronunciation, spelling, and word parts), meaning (relationships between form and meaning, concepts and referents, associations), and use (grammatical functions, collocations, and usage constraints). These aspects can be acquired both receptively and productively.

Laufer (1988) categorized productive vocabulary knowledge into two types: controlled and free productive knowledge. Controlled productive knowledge involves being able to produce words when given a cue, while free productive knowledge refers to using words spontaneously without specific prompts, such as in free composition. These definitions focus mainly on the meaning and form of vocabulary knowledge.

However, Henriksen (1999) proposed a broader view of vocabulary knowledge, suggesting it comprises three dimensions. Firstly, there's a partial-to-precise dimension, indicating the extent of understanding of word meanings. Secondly, there's a depth dimension, akin to building a network, which reflects the connections between words. Finally, there's a receptive-productive dimension, demonstrating learners' ability to control and access word knowledge.

Among many ways to learn vocabulary, with the technology, learners have the opportunity to learn vocabulary through game-based applications such as Kahoot, Memrise, Quizlet and so on. The study by Senior (2022) examines the effectiveness of the Quizlet Mobile application in teaching vocabulary to EFL learners. It investigates whether using Quizlet improves learners' ability to recognize and understand new words (receptive vocabulary retention) and their ability to actively use these words in context (productive vocabulary retention). Additionally, the study explores whether these improvements are sustained over time, indicating long-term retention and the ability to use the vocabulary learned through the Quizlet Mobile app. Senior (2022) suggests that digital game-based applications like Quizlet are effective for teaching vocabulary meanings, leading to a notable improvement in short-term receptive vocabulary knowledge. However, their impact on productive vocabulary knowledge, especially in the long term, is considerably less pronounced.

Similarly, Çeçen (2020) explored students' views on Quizlet using a technology acceptance model, discovering that the app was particularly favoured by lower-level learners.

Additionally, Ulla et al., (2020) identified Quizlet as one of the most popular mobile applications among English university lecturers, as it transforms classrooms into dynamic and engaging environments for learning English. In a similar vein, Sangtupim and Mongkolhutthi (2019) conducted a study which reported that second language learners effectively used Quizlet for vocabulary learning. It is noted that the gamification features enabled students to retain vocabulary more quickly than traditional methods.

According to Ebrahimzadeh and Alavi (2017), commercial digital games have been shown to aid in vocabulary acquisition and improve the retention of receptive knowledge concerning form-meaning recognition. Similarly, Chen and Hsu (2019) discovered that digital games are not only beneficial for acquiring receptive form-meaning knowledge of vocabulary but also for acquiring content knowledge. Additionally, Bahari (2020) noted that digital games, in general, have the potential to expand both the depth and breadth of English vocabulary knowledge among players.

2.1.1.2. Incidental and intentional vocabulary

The way in which individuals acquire vocabulary while learning a second language is a widely researched topic in the field of second language acquisition. In the realm of L2 vocabulary acquisition, two modes of learning that many studies focus on are incidental and intentional vocabulary acquisition. In general, incidental vocabulary learning describes scenarios where a learner acquires a target vocabulary word unintentionally, often by picking up contextual cues while their primary focus is on something else. In contrast, intentional vocabulary learning involves a deliberate and well-structured approach to acquiring new vocabulary (Meganathan et al., 2019).

When it comes to vocabulary acquisition, incidental vocabulary learning is considered an efficient way to acquire new vocabulary words within a particular context (Day, Omura, & Hiramatsu, 1991; Jenkins, Stein, & Wysocki, 1984; Nagy, Herman, & Anderson, 1985). The crucial aspect of incidental learning is that words are not explicitly explained, and the learning process occurs naturally and implicitly. Krashen (1980) asserts that this method closely mirrors the natural process of vocabulary acquisition seen in first language

development, making it an optimal approach to learning vocabulary. Regarding how incidental learning facilitates word acquisition, input-rich extensive reading is considered the key method for unintentionally acquiring vocabulary (Atar, 2018; Brown, Waring, & Donkaewbua, 2008; Horst, 2005; Krashen, 2004; Pigada & Schmitt, 2006). Another key element in incidental learning is the mechanism of making inferences or guessing the meaning based on context. Since all reading materials possess certain textual and lexical structures, learners have the capacity to deduce word meanings through textual indicators such as text organization, cause-and-effect relationships, or from lexical hints such as the language register and the words surrounding the target vocabulary (Atar, 2018).

Atar (2018) identifies several concerns regarding incidental learning. These encompass issues such as vocabulary size, which is defined as "number of known words" acquired incidentally (Schmitt, 2014). Additionally, concerns extend to the depth of knowledge, signifying the level of understanding learners attain when encountering words incidentally. Schmitt (2014) describes the term "depth of knowledge" as "how well those words are known" (as cited in Atar, 2018, p.149). Attention is also a key consideration, indicating the level of focus and cognitive engagement that learners invest in the process of acquiring vocabulary through extensive reading. On the other hand, engagement plays a crucial role, measuring the active involvement and attentiveness of learners in the incidental learning process. Laufer and Rozovski-Roitblat (2011) suggest that the more effort and time a learner invests in a word, the greater the likelihood of acquiring it. Lastly, the necessity for repetition is emphasized, as it is crucial for reinforcing learning and enhancing vocabulary learning, while it is acknowledged that ensuring an adequate amount of repetition is not always guaranteed.

Qasim (2021) highlights the importance of learner-initiated activities in informal settings, both within and outside the classroom, for language development. These activities, such as engaging in digital gaming (Sundqvist, 2009), have been shown to positively affect learners' vocabulary size and English language proficiency (Sylvén & Sundqvist, 2012). This underscores the significant contribution of learner-driven engagement in non-instructional contexts to language learning. Additionally, Qasim (2021) points out the positive impact of video games on incidental vocabulary learning. Video games provide a

stress-free environment that enhances attention and engagement, facilitating the transition from unintentional to self-directed learning.

On the other hand, intentional vocabulary acquisition, as the term implies, entails a deliberate effort to learn new vocabulary. In intentional vocabulary instruction, words are introduced to students with a specific focus on their meaning and usage, and there is explicit instruction involved. According to Robinson (2001), intentional vocabulary learning encompasses any activity aimed at consciously memorizing lexical information. It is a method of vocabulary acquisition that requires a conscious and purposeful endeavour to commit these words to memory. In intentional or explicit vocabulary instruction, the initial step involves identifying the key words that are crucial for the learners, followed by their presentation to the learners for the first time. According to Schmitt (2010), intentional or explicit vocabulary learning consistently leads to quicker and more substantial progress, with a higher likelihood of retaining and achieving proficiency in productive usage. Moreover, Schmitt (2008) argued that intentional learning consistently results in greater and quicker progress, with a higher likelihood of remembering and achieving proficiency levels compared to incidental learning.

Numerous scholars have examined the contrast between incidental and intentional learning in English as a Foreign Language (EFL). While scholars such as Ellis (2006), Nation (2001), and Skehan and Foster (2000) highlight the limitations of relying solely on incidental learning, they also stress the importance of integrating both learning approaches for more effective vocabulary acquisition (Atar, 2018). Similarly, prominent figures like Dörnyei (2009) and Nation and Webb (2011) also argue that the cooperation between incidental and intentional learning methods is essential for achieving proficiency in a second language.

As a result, in recent years, scholars like Hill and Laufer (2003), Nation (2001), Read (2004), and Schmitt (2008) have contended that while incidental learning is a crucial aspect of vocabulary acquisition, it is not adequate as an independent method and should be complemented by intentional learning. This viewpoint suggests that incidental and intentional learning are interdependent, and each possesses its own strengths and weaknesses. Therefore, in the context of this study, incidental learning involves

spontaneously picking up new vocabulary during engaging digital game-based exercises like bingo, picture matching, and so on. On the other hand, intentional learning involves actively acquiring vocabulary through definitions and visual aids provided by the applications.

2.1.2. Significance of vocabulary learning in English language learning

Mastering vocabulary in a foreign language presents a formidable challenge, necessitating considerable dedication and effort. Many people seek the most effective methods for acquiring vocabulary (Ghanbaran & Ketabi, 2014; Kılıçkaya & Krajka, 2010). According to Kayaoğlu, Akbaş, and Öztürk (2011), vocabulary knowledge is closely linked to essential language skills including reading, writing, speaking. Putting a spotlight on the significance of vocabulary, Wilkins (1972) argued for its precedence over grammar in achieving effective communication. According to Nation (2001), the cornerstone of thoroughly understanding and utilizing a language lies in the robustness of one's vocabulary. Further emphasizing this point, Gough (2001) notes the deep interconnection between vocabulary competence and communication skills. The more words you know, the more proficient you will be in a language (Bakar & Nosratirad, 2013 as cited in Uyar, 2019). Inadequate vocabulary knowledge hinders or makes it impossible for a person to communicate effectively. Irrespective of the proficiency in grammatical competence, the expression of one's feelings and reflections in a manner that aligns with their goals remains beyond reach in the absence of a well-developed vocabulary (Kayacı, 2023).

Furthermore, Wilkins (1972) presents a compelling argument, suggesting that while the essence of a message can be partially communicated without extensive knowledge of grammar, the absence of vocabulary makes this transmission virtually impossible. This insight underscores the essential importance of vocabulary in the realm of language: it acts as the foundation upon which the structure of communication is built. Expanding one's vocabulary is more than just learning words; it is unlocking the potential for more effective and detailed expression. For second language learners, this is particularly crucial. Enhancing vocabulary is not just an exercise in memorization but a transformative process

that can significantly elevate their linguistic competence. By developing a richer vocabulary, learners are not only able to understand and convey basic ideas more effectively, but they also gain the ability to express complex thoughts and engage in more profound and meaningful communication. As such, a strong vocabulary is a key stimulus in strengthening overall language ability, opening doors to a deeper understanding and more sophisticated use of the language.

According to Chen and Chung (2008), vocabulary acquisition is a leading topic in English education because words are the fundamental building blocks of English sentences. From this point of view, it can be said that there is a significant connection between success in the fundamental skills of language learning, such as reading, listening, speaking, and writing, and vocabulary knowledge. Kayaoğlu et al., (2011), also, underlines the significant impact of vocabulary learning on various English skills, including grammar, reading, writing, speaking, and listening. Although often considered as a secondary skill, vocabulary stands out as a crucial and defining component of any language. Possessing an adequate vocabulary is essential for comprehension. Without it, deciphering the intended meaning of a message becomes a daunting task (Ghazal, 2007). Coxhead (2000) and, Adolphs and Schmitt (2003) have undertaken efforts to discover the essential vocabulary of the English language, with the goal of determining the number of individual words required for effective language use. After analysing the British National Corpus, Adolphs and Schmitt (2003) concluded that a vocabulary of around 3,000-word family level (equivalent to 6,000-7,000 individual words) is needed to encompass the ideal amount for comprehensive coverage (Atar, 2018).

Some English language learners may find the process of learning vocabulary to be uninteresting and challenging (Anyaegebu, Ting & Li, 2012). Learning a second language does not happen naturally, so picking up new words in a different language can be hard and exhausting (Bozavli, 2017). Given all the reasons regarding the significance of vocabulary learning, it is now crucial for educators and students to prioritize vocabulary learning. Understanding how crucial it is for EFL students to learn vocabulary, teachers dedicate significant effort to teaching new words and context-specific vocabulary in their classes, but often encounter difficulties in achieving good results. Therefore, teachers often

explore different modern techniques to maintain student interest in learning and to enhance the materials used in their classrooms (Alqahtani, 2015).

Richards (2006) suggests that a good approach to include new words in language classes is through games. This method has proven to be both fun and successful for teaching and learning in class. In the game context, vocabulary can be learned in a stress-free manner, and a diverse range of game formats, such as text, audio, video, animations, or interactive elements, along with features that stimulate challenge, imagination, curiosity, control, competition, or recognition (Malone & Lepper, 1987), are effective in capturing the learner's interest and keeping them engaged (Gorjian et al., 2011). Additionally, Squire (2011) points out that games do more than just build critical thinking skills. They also encourage problem-solving, organized thinking, taking risks, and making decisions. As games can be fun and effective for learning, they can also serve as a motivation for students. This study intends to provide some insight into the quest of educators to shed light on the use of games in vocabulary learning.

2.1.3. Vocabulary learning through technology

With technology now being a fundamental aspect of daily life, educational institutions have begun incorporating technology into their curriculum due to its cost-effectiveness and practicality. Redd (2011) states that using technology in the classroom is increasingly essential to interest modern students. Nowadays, many classrooms have computers, or teachers use laptops for displaying visuals and information or giving presentations. Additionally, it is rare to find a university student without a smartphone.

Research has shown that technology is effective in improving students' vocabulary learning and retention skills (Huang, 2015). Laufer (2009) emphasized the importance of identifying sources of L2 vocabulary acquisition and suggested that technology can be a useful resource. Using technology as a tool for vocabulary instruction has been found to be beneficial, particularly when auditory and interactive applications are used (Watts-Taffe & Gwinn, 2003). Additionally, studies have suggested that the use of interactive whiteboards in vocabulary instruction makes learning more engaging by promoting

interactivity among students and better communication of words (Ting, Tai, & Lin, 2015). As a result, teachers are now more frequently using slides, interactive boards, and visuals in vocabulary teaching to help make new words more memorable.

The rise of digital tools and networked resources has spurred the emergence of internet-driven language learning platforms, such as virtual flashcards. These are akin to their physical counterparts but feature digital imagery. These tools can be used both in and out of a traditional learning setting. (Baleghizade & Ashoori, 2011; Basoglu & Akdemir, 2010). A web-based flash card program Easy Notecards can be given as an example, which offers learners online vocabulary flashcards including related digital game-based exercises. The use of such web-based vocabulary education tools, also, offers entertainment for the learners. Ciaramella's (2017) study investigated sixth grade special education students, aged eleven to twelve, who attended an upper elementary school. These students practiced vocabulary using a web-based tool, which they found engaging and enjoyable. Furthermore, they expressed a desire to continue using the tool in the future and showed interest in applying it to other subjects as well.

As the Internet has become faster and mobile applications more common, using web-based tools and apps for education has become more popular. Technology, including vocabulary learning apps, has significantly impacted how we learn and teach vocabulary. (Goodfellow, 2006). Furthermore, as mobile technology continues to advance, mobile devices with larger screens, higher resolution, and more powerful processing speeds are creating a more convenient, context-sensitive, social interactive, and personalized learning environment for language learners. This is due to the advance of mobile technologies and the capabilities of the devices (Klopfer, Squire, & Jenkins, 2002; Kukulska-Hulme, 2006).

The extensive use of smartphones has opened up fresh educational opportunities for learners, and the integration of mobile devices into learning settings has shown beneficial results (Basoglu & Akdemir, 2010). Smart phones offer many advantages for vocabulary learning, including the ability to learn without time or space constraints, immediate feedback, internet access for examining pertinent examples, and enhanced interaction between students and teachers. These advantages are viewed as crucial (Azabdaftari & Mozaheb, 2012). Moreover, the advancement of mobile phones into smartphones turned

them into mini classrooms, allowing students to learn whenever and wherever they choose (Schachter, 2009). Wahyuningsih and Putra (2022) suggest that employing such strategies has the potential to enhance students' overall vocabulary acquisition. Moreover, utilizing technology in the classroom offers benefits for educators in facilitating simpler and more effective teaching practices, a factor of particular significance. Abrams and Walsh (2014) found that incorporating technology-driven games into vocabulary instruction can lead to noticeable improvements in students' performance on vocabulary assessments.

In the study conducted by Basoglu & Akdemir (2010), the impact of employing vocabulary learning programs on mobile phones was examined among sixty students enrolled in the Undergraduate Compulsory Preparatory Program at a public university. The findings revealed that utilizing mobile phones as a tool for vocabulary learning yielded greater effectiveness compared to traditional methods such as studying new words on paper. Similarly, Azabdaftari and Mozaheb, (2012) investigated the effectiveness of two vocabulary learning strategies—flashcards and mobile learning (m-learning)—was compared among 80 students. The results indicated that using mobile phones for language and vocabulary learning was a superior approach compared to traditional methods like flashcards. In another study by Redd (2011), the focus was on examining the educational benefits of using a mobile app for vocabulary learning. The study involved twenty-five high school students who used a vocabulary gaming app on a mobile device for three weeks. Pre-test and post-test scores were compared to assess vocabulary mastery. Despite no significant difference in performance between the tests, the study underscored the importance of the duration of app usage.

2.1.4. Vocabulary retention

Vocabulary retention is crucial in language learning as it enables learners to effectively communicate and understand spoken and written language. Retention of vocabulary is defined as the ability to recall or remember words after a period of time. The retention of taught elements, such as grammar rules and vocabulary, in language teaching can be influenced by various factors, such as the effectiveness of instruction, the students' level of

engagement, and the significance of the materials (Longman, 2013). Factors that impact retention of vocabulary include the quality of teaching, the learners' interest, and the relevance of the materials. The challenge in vocabulary learning is not just in learning new words, but in remembering them. According to Bahrick (1984), the more deeply a word is processed, the better it is remembered by people. For the aim of facilitating vocabulary retention, various techniques have been suggested.

Research on vocabulary retention has identified key concepts related to the process of remembering new words. Klatzky (1975) explains how memory works by describing how information is first stored in a sensory register for a brief period of time, then transferred to short-term memory (STM) if attention is given to it. If practiced regularly, information can be retained in short-term memory (STM) indefinitely. Over time, this information then transitions to long-term memory (LTM), resulting in more permanent storage. Both memories are subject to forgetting, but it happens more frequently in STM. According to Hulstijn and Laufer (2001), the crucial factor in moving new vocabulary to LTM is not how long it stays in STM, but rather the depth of processing it undergoes at the beginning.

However, Tulving (1975) (as cited in Hulstijn & Laufer, 2001) argues that retention of vocabulary is not just about in-depth semantic processing but also requires elaboration on the word. Schmitt (2010) highlights that forgetting words is a natural aspect of learning vocabulary. This process of learning and forgetting keeps happening until the word is completely learned. It is also highlighted that individuals have the capacity to learn, recall, and effectively use thousands of words (McCarthy, O'Keeffe, & Walsh, 2010). This ability shows how well the human brain can adapt and learn languages. With good learning methods and enough practice, a person can learn and use a wide range of words. This helps in making communication more detailed and advanced.

Another idea is that information is kept in memory based on how it is processed is the Levels-of-Processing Model (Craik & Lockhart, 1972). They believe that the way information is handled can affect whether it is remembered. The Information Processing Model looks at how information is stored and retrieved in memory. Craik and Lockhart (1972) argue that learners use different levels of elaboration when processing information and add that how well information is remembered depends on the quality of the encoding

process. They also suggest that a basic semantic analysis is better than a detailed structural analysis. Moreover, a consistent environment leads to better memory performance because it allows for a more detailed trace to be created and it makes it easier to retrieve stored information when needed.

Many studies show that some key factors have an influence on vocabulary retention. One major determinant of vocabulary retention is the number of times a learner is exposed to new words. Studies have demonstrated that repeated exposure to new words increases the chance of retaining them in memory long-term. Sze Lui (2014) concurs with the idea that mastering a new word in another language thoroughly demands exposure between five to sixteen times. Additionally, Schmitt (2008) notes that it takes about seven to ten exposures to establish the initial connection between a word's form and its meaning.

Additionally, active participation in vocabulary learning through techniques like flashcards, quizzes, and writing practices can improve retention. Ebrahimzadeh and Alavi (2017) found that using visuals and words together enhances word retention, and the more focus given to a word, the higher the chance of learning and recall. Schmitt (2008) also emphasizes the relationship between engagement and retention. Engaging activities or methods that boost engagement, focus, and motivation enhance vocabulary retention. Self-testing and spreading out study sessions have also proven to be helpful in boosting vocabulary retention.

According to Nation (2001), the stages of keeping vocabulary in memory are identified as noticing, retrieving, and creatively using the words. The initial stage is crucial for processing new information. The second stage involves elaboration to prepare new words for the final stage, where learners utilize them in various contexts. Learners who experience new words in meaningful sentences and conversations are more likely to retain them than those who only encounter lists of words to memorize.

Numerous research studies have highlighted the favourable outcomes of utilizing technology and gamified approaches for enhancing vocabulary retention in English as a Foreign Language (EFL) contexts (Ciaramella, 2018; Ebrahimzadeh & Alavi, 2017; Huang, 2015; Özyaşar, 2021; Sharma & Unger, 2016). Technology has demonstrated effectiveness in improving students' abilities to acquire and retain vocabulary knowledge

(Ciaramella, 2018). Moreover, technology offers personalized learning opportunities that complement traditional teaching methods (Sharma & Unger, 2016).

A study conducted by Özyaşar (2021) aimed to assess the impact of a gamified application on vocabulary retention in foreign language learning, involving two groups of secondary school students with a control group and an experimental group. Analysis of the retention test results indicated that the experimental group achieved better scores.

Similarly, in a study by Huang (2015), the impact of technology on the vocabulary acquisition of forty second-grade students was examined. The findings suggest that integrating technology into vocabulary instruction may contribute to enhanced acquisition and retention of vocabulary among students (Huang, 2015). Likewise, Ebrahimzadeh and Alavi (2017) conducted a study with 241 Iranian male high school students, aged 12 to 18, to explore the effects of a digital video game on short- and long-term vocabulary retention. Their findings suggest that digital video games can contribute to prolonged vocabulary retention among students.

2.1.5. Teaching vocabulary in EFL

As mentioned in the preceding section, learning vocabulary plays a crucial role in the field of language teaching. The methods and processes of acquiring vocabulary in a foreign language setting remain an area that requires further research (Folse, 2004; Hunt & Beglar, 2005; Hukom, 2021). Consequently, the teaching of vocabulary has gained prominence among English as a Foreign Language (EFL) educators worldwide (Cheung & Slavin, 2005; Folse, 2004; Lee & Muncie, 2006).

Learners may need to employ a variety of strategies and methods to effectively address their language-related challenges (Zhelyazova, 2011). Furthermore, it is the responsibility of teachers to ensure the successful acquisition of language skills by their students in a specific educational context. According to Barcroft (2004), the reason is that learners are constantly seeking effective approaches to receive instruction in vocabulary. In numerous instances, the acquisition of vocabulary is influenced not only by how learners personally

approach learning but also by the methods employed by educators (Akramy et al., 2022). Consequently, many instructors are actively searching for the most appropriate methods and techniques for teaching vocabulary effectively.

According to Soltanpour, Ganji, and Mohammadian (2021), educators hold a pivotal role in facilitating students' vocabulary acquisition through a variety of effective methodologies. These strategies encompass employing short texts, illustrations, flashcards, visuals, wall charts, and worksheets. Worksheets, a prevalent form of printed instructional material utilized by instructors, serve as valuable tools in equipping learners with essential knowledge, skills, and values. Through worksheets, educators can furnish pertinent insights regarding lesson objectives, thereby fostering active participation among students, which is cultivated through hands-on learning experiences both within and outside the classroom setting. Recognized for their ability to enhance students' proficiency and comprehension, worksheets aid learners in honing skills and understanding various concepts, including data recording, data interpretation, experimental processes, and more (Soltanpour et al., 2021).

According to Nation (2013), effective vocabulary teaching to learners can be guided by six key principles. First, simplicity and clarity in explanations are paramount, avoiding the use of complicated language. Secondly, it is essential to create relatable examples that connect the current teaching material with the learners' prior knowledge, emphasizing patterns in the language. Third, both oral and written approaches should be employed, including writing new words on the whiteboard while explaining them verbally. Fourth, special attention should be given to words that learners struggle with or have limited familiarity with. Fifth, instructors should inform students about the significance and future utility of the vocabulary being taught. Finally, it is advisable to avoid introducing unrelated unknown words, synonyms, or antonyms during vocabulary instruction. These principles can significantly enhance the effectiveness of teaching vocabulary to learners.

Baker (2003) states that the process of vocabulary teaching involves three distinct phases. Initially, the instructor imparts both the pronunciation and the definition of the word to the students. Subsequently, the teacher assesses the students to ensure their comprehension.

Lastly, the educator reinforces the word's understanding by encouraging students to connect it with their own experiences and apply it in context.

According to Bayram (2009), various techniques can be employed during the vocabulary teaching process. In the initial phase, the introduction of a new word to the learner offers several options. One technique involves providing a concise definition of the word, while another involves offering a detailed description of the new word. If the learner is already familiar with synonyms or antonyms of the word, it can facilitate the teaching process. When no direct method is apparent, translation may serve as an alternative means of conveying the word's meaning. Furthermore, associated ideas and collocations can be utilized to introduce and instruct the learner on the new vocabulary (Bayram, 2009).

Another valuable technique in vocabulary teaching pertains to the use of visual aids. Visual aids serve as a powerful tool for explicitly teaching vocabulary to students. The Multiple Intelligence Theories have proposed various forms of intelligences, one of which is visual or spatial intelligence. Individuals with this type of intelligence excel in visualizing and possess the mental aptitude for comprehending objects. Furthermore, they exhibit a heightened capacity for associating visual elements with words (Faraj, 2015; Zheng, 2012). Such students can effectively engage in thinking, observing, and mentally grasping concepts, including those related to the global community, through the use of pictures, images, and charts. Besides visual aids, the use of flashcards is also a valuable technique for teaching vocabulary for acquiring new vocabulary. A flashcard typically consists of a piece of cardboard bearing a word, sentence, or a basic image (Baleghizadeh & Ashoori, 2011). On one side of the flashcards, the specific words being learned are displayed, and on the reverse side, their meanings and translations are usually provided (Azabdaftari & Mozaheb, 2012). This dual-sided approach helps learners associate the new vocabulary with its definition and translation, enhancing their understanding and retention of the words.

An additional successful technique for instructing students in vocabulary is the utilization of lexical inferences. When students come across unfamiliar words, they can potentially draw on their existing knowledge and employ various techniques such as interlingual, grammatical, morphological, rhetorical and semantic tips to deduce the meanings of these

new words (Schmitt, 2010; Schmitt, Jiang, & Grabe, 2011). According to Wessels (2011), acquiring new vocabulary through lexical items represents the most effective path for learners to achieve success.

As previously discussed, incidental and intentional learning are two primary vocabulary acquisition types, and Schmitt (2008) underlines the significance of involving practice as a key method in the latter part. Therefore, in addition to formal instruction, to optimize vocabulary acquisition, it is crucial to repeatedly encounter words more than ten times following the initial exposure, incorporating a variety of contexts like gap-filling exercises, assignments, and games (Lorenzutti, 2016). Min and Hsu (2008) emphasize that focusing on a particular word through vocabulary exercises helps learners gain a deeper understanding of the word's meaning and its practical usage.

In conclusion, it is essential to explore supplementary aids that enhance vocabulary acquisition by combining worksheet-based teaching methods with digital game-based approaches, both within and beyond the classroom. While gap-fill exercises and matching activities have proven effective and appealing to students (Hashemzadeh, 2012), the inclusion of games and other innovative tools has gained prominence in educational settings. As the educational requirements of a new generation of learners are addressed, the adoption of fresh strategies, such as the integration of games, is seen as a promising approach for success enhancement and the enrichment of the vocabulary learning process (Açıkgöz, 2019). The changing terrain of vocabulary teaching in EFL classrooms highlight the significance of modifying and broadening methods and techniques to address the varied requirements of students of new generation.

2.2. Gamification

Gamification is a controversial and growing concept. Defining gamification has been a persistent challenge (Buckley & Doyle, 2016; Chou, 2023; Deterding et al., 2011; Huotari & Hamari, 2012; Kapp, 2012; Werbach, 2014; Zicherman & Cunningham, 2011). As a result, there have been a great number of attempts to define the term. Deterding et al., (2011) simply describe the term gamification as the use of game design elements in a non-

gaming context. On the other hand, Werbach (2014, p.266) proffers the definition: “Specifically, it is the process of making activities more game-like.” Similarly, Chou (2023) points out that activities resembling games are at the heart of gamification. Incorporating elements typically found in games, such as challenges, rewards, and interactive engagement, into non-game environments, is what fundamentally defines gamification. Zicherman and Cunningham (2011) offers a widely accepted definition, stating that gamification involves applying game-like thinking and mechanics to non-game situations to engage users and motivate problem-solving. Kapp (2012) defines gamification as incorporating game-like elements such as mechanics, aesthetics, and thinking in order to motivate and encourage users and help them overcome challenges. It is a structured and goal-oriented approach, not just a form of play (Çakır, 2019).

Gamification is a fairly recent idea, first introduced to digital media in the early 2000s. Soon after, it was adopted across various fields. Domínguez et al., (2013) indicate that gamification was initially utilized in the marketing sector because it possessed the characteristics necessary for attracting customers. Over time, it has spread into diverse areas like education, wellness, business, marketing, advertising, and government because of its potential for success. It is proposed that gamification has the ability to greatly enhance engagement and offer numerous benefits in the realm of education.

Squire (2003) emphasizes that gamification should not be mistaken as the use of computer games in education. It does not necessarily mean incorporating video games, but rather taking the engaging and motivating aspects of games and applying them to non-gaming contexts. Games are typically composed of rules, shared objectives, and feedback (McGonigal, 2011; Salen & Zimmerman, 2004), making them interactive, goal-oriented activities that involve solving problems with the guidance of rules (Wouters et al., 2013). Gamification incorporates these game elements, including game-like challenges, rules, interaction, feedback, and emotions, into non-gaming contexts (Deterding et al., 2011). Furthermore, Francisco-Aparicio et al., (2013) state that the game elements utilized in the gamification process are related to games that have clear and defined rules, rather than unstructured or improvised actions.

Kapp (2012) posits that game-based practices are utilized for acquiring skills, knowledge, and automating strategies. This approach is effective as students engage in games and work towards overcoming challenges, thereby gradually mastering the required knowledge, skills, and strategies. Furthermore, games offer feedback to players which enables them to track their progress (Van Eck, 2006).

Zichermann and Cunningham (2011) highlight the core game mechanics such as points, levels, leaderboards, badges, challenges, onboarding, and customization. On the other hand, Hamari et al., (2014) argue that leaderboards, badges, and points are the most efficient and practical game mechanics. Bicen and Kocakoyun (2018) define game dynamics as achievement, rewards, status, competition, self-expression, and altruism, and list game mechanics as levels, points, badges, trophies, achievements, leaderboards, virtual presents, and virtual goods. Bicen and Kocakoyun (2018) also emphasize that while gamification elements contribute to making a game entertaining, it is crucial to recognize that these elements alone do not guarantee success. Understanding users' motivations and behaviours necessitates looking beyond mere game design components like mechanics and dynamics. For gamification to effectively enhance educational results, the learning environment must integrate dynamics, mechanics, and suitable components. In essence, a gamification application incorporating all these elements could foster a learning process adapted to individual needs in the classroom.

Gamification has multiple applications in the classroom, such as delivering lessons, reviewing subjects, and conducting formative assessments. Implementing leaderboards and progress bars can foster friendly competition among students. Additionally, gamification encourages collaboration and problem-solving, making it a useful tool for enhancing student motivation, particularly for less appealing tasks and activities. The current study utilized mechanics such as points and leaderboards to enhance learners' intrinsic motivation.

2.2.1. Gamification and vocabulary learning

The advancement of technology has spurred the growth of language education games, resulting in innovative learning models and environments, including gamified language learning. The educational potential of gamification has recently gained significant attention in the field of English as a Foreign Language education (Fithriani, 2021). Kapp (2012) notes that the use of games in the classroom is not a new concept, but the use of digital gamified activities in the classroom is a more recent trend. The use of gamified tools to teach vocabulary has become increasingly popular in recent times. This trend may have arisen for it is easier to implement and assess vocabulary learning through gamification, compared to other language skills (Thompson & Gillern, 2020).

It has been observed that students of all ages are becoming more comfortable with technology and 21st-century skills. As technology becomes more common in everyday life and in education, students of various ages get more chances to learn and improve these skills. Students of today's world are named as 'digital natives' of digital technology by Prensky (2001). Due to their exposure to computer games and virtual worlds, 'digital natives' are accustomed to being highly engaged and actively participating in activities, compared to earlier generations. If they do not get chances to be actively involved, students can quickly become bored and frustrated (McGonigal, 2011 as cited in Uyar, 2019). Kapp (2012) also emphasizes the importance of incorporating gamification in teaching settings, given that traditional methods may prove uninteresting for 'digital natives' who have grown up playing computer games. Thus, it has become imperative for educators to stay up to date with new trends in EFL and vocabulary learning, since the new generation of students can benefit from using mobile technology and online gamified applications in their learning. Considering this, incorporating digital gamified tools into vocabulary learning may be seen as essential and unavoidable.

Gamifying vocabulary can enhance the learning process by creating a social environment for students (Wells & Norken, 2011) and making learning more engaging in a fun atmosphere (Kingsley & Hagen, 2018). Perry (2015) expresses that digital gamified activities are often seen as enjoyable, entertaining, motivating, and encouraging by

learners. Sze Lui (2014) indicates that students often enjoy learning vocabulary with gamification more, as online games offer elements not found in traditional textbook methods, like a faster pace and immediate feedback. Additionally, Sze Lui (2014) notes that students can effectively learn specific vocabulary through digital gamified activities in the classroom. Results from a survey aimed at gauging learners' attitudes and perceptions about the influence of gamified activities and games on vocabulary acquisition show that students generally find these methods enjoyable and competitively stimulating in a good way. Guichon and McLornan (2008) also suggest that providing vocabulary in a variety of contexts helps in understanding and improving knowledge of vocabulary. The use of online gamified tools, which enable students to review and encounter vocabulary in diverse texts, is beneficial for enhancing vocabulary knowledge (Yip & Kwan, 2006).

Açıkgöz (2019) conducted a study with A2 (pre-intermediate) level students learning EFL at a preparatory school. This study involved two experimental groups: EG1 and EG2. EG 1 underwent vocabulary education using game-based methods, which included the use of a Game-Based Student Response System (GSRS) known as Kahoot!. Conversely, EG 2 received more traditional forms of instruction and practice, but this was complemented by the use of GSRS QuizGame, both in and out of class. The results from this study were enlightening, demonstrating significant improvements in vocabulary learning for students in both groups. However, a comparison of their post-test outcomes revealed no notable differences in their academic progress. These findings emphasize the positive impact of integrating game-based learning into vocabulary education and suggest that various GSRS tools can provide educational advantages for students.

Integrating gamification in vocabulary learning can be considered as a valuable process that enhances learners' cognitive development, engagement, and motivation by providing opportunities for training, practice, self-assessment, learner autonomy, and building their own knowledge through the process of engagement. Using a gamified tool for vocabulary learning can be a beneficial approach for learners. Gamified tools can create an interesting and engaging learning environment that motivates students (Derakhshan & Khatir, 2015; Lee & Hammer, 2011; Lorenzutti, 2016). Additionally, these tools focus on actions rather than just explanations, keeping students' motivation and attention sustained (Schifter,

2013). A well-designed gamified tool also plays a crucial role in stimulating players' imagination and concentration, encouraging them to make more effort and reduce mistakes to achieve their goals (Garris, Ahlers, & Driskell, 2002). Furthermore, a well-designed gamified tool offers contextualized information, promoting critical thinking and helping students connect new information to the context of the game (Sardone, 2010). Gamification can also enhance the learning process by providing a challenging, yet fun and cooperative experience for students, whether they are working in pairs or groups (Sweetser & Wyeth, 2018). Additionally, it has been reported that using online gamification tools improves vocabulary knowledge by allowing students to revise vocabulary and encounter it in different texts (Yip & Kwan, 2006) and gamifying vocabulary can enhance the learning process by promoting socialization among students and making learning more enjoyable and engaging (Kingsley & Hagen, 2018; Wells & Norcken, 2011).

A study by Łuczak, (2017) investigated the use of Memrise by university students studying law for learning English vocabulary and its impact on test grades. It explored whether Memrise users scored better than non-users and whether co-authors of Memrise courses performed better. The research also gathered students' opinions on Memrise, identifying strengths like effective vocabulary memorization and weaknesses such as technical issues and lack of synonym recognition. The research results indicated that using the Memrise tool positively impacted students' test scores. Among the students who didn't use Memrise, one-third failed the test, whereas only one-sixth of those who used Memrise failed. All students who helped create Memrise courses passed their tests, with half of them achieving good grades. Overall, the use of Memrise has proven to be highly beneficial for both users and course creators.

A study by Taebenu and Katemba (2021) investigated the notable difference in vocabulary improvement between females and males utilizing Google Classroom and Memrise. The results demonstrated a significant difference in vocabulary enhancement among students taught using Memrise through Google Classroom in both female and male groups, highlighting Memrise's effectiveness in enriching students' vocabulary.

Another study, conducted by Wahyuningsih and Putra (2022), utilized both Google Classroom and the Memrise application. The study aimed to assess whether there exists a

noticeable discrepancy in vocabulary enhancement between male and female users of these platforms. Similar to the current study, the participant pool consisted of 40 university students, with an equal split of 20 male and 20 female participants. The results revealed that both genders demonstrated improvement in their vocabulary skills. However, in comparison to male participants, females exhibited a significantly greater enhancement in their vocabulary proficiency. In summary, the research findings suggest that the Memrise application serves as an effective tool for aiding students in expanding and deepening their vocabulary knowledge.

In summary, research suggests that incorporating gamification into vocabulary learning in EFL classes has several benefits. It alters students' perceptions of vocabulary learning in a positive manner, improves vocabulary retention, assists students in learning from their errors, encourages and motivates them, and contributes to successful, enjoyable, and effective learning. Therefore, in this study, the aim is to investigate the impact of two digital gamified tools, namely Memrise and Easy Notecards, on the vocabulary retention of EFL learners. Another aim of the study is to shed light on the potential benefits and effectiveness of incorporating gamified tools into language learning environments. Exploring the impact of these tools was expected to reveal insights that will assist teachers and students in making better choices about including gamified technology in language education. Depending on the literature discussed above, these gamified tools have the potential to enhance EFL learners' vocabulary retention. It was expected that the group of learners utilizing Memrise and Easy Notecards will demonstrate improved vocabulary retention compared to a control group that relies solely on worksheet-based language learning methods. The results obtained from this study will contribute to the broader conversation on the effectiveness of digital gamification in EFL instruction, potentially providing insights that can guide educators and learners in optimizing their language learning strategies.

2.3. Motivation

This study also aimed to examine the intrinsic motivation of language learners after using two digital game-based tools, Memrise and Easy Notecards. Thus, this section will cover the main concepts and studies on motivation, with a particular focus on intrinsic motivation in language learning.

Motivation for language learning is described by Gardner (1985) as the drive to attain a specific language, with effort, eagerness, and a positive attitude being the means to this end. One of the ultimate goals for learners is to be motivated. The act of being motivated is synonymous with feeling compelled to take action (Ryan & Deci, 2000a). According to Martin and Briggs (1986), motivation encompasses all the internal and external factors that impact the initiation, continuation and regulation of behaviour. In another interpretation, motivation is viewed as the driving force behind doing or not doing something (Broussard & Garrison, 2004).

According to Mackey and Gass (2015), there are endless purposes for studying a foreign language. However, the key to success in language acquisition lies in motivation. Oxford and Shearin (1994) pointed out that the significance of motivation for learners becomes evident because it provides the essential drive to initiate the learning journey and the persistence needed to improve language skills. It is through motivation that the process of learning is set in motion, allowing learners to attain a level of active learning. Furthermore, when students are highly motivated, they exhibit a positive attitude toward language development and focus on mastering knowledge (Ametova, 2020). Therefore, it is imperative to delve deeper into the various types of motivation.

2.3.1. Integrative and instrumental motivation

Gardner and Lambert (1959) introduced the concepts of integrative motivation and instrumental motivation, which have significantly influenced research on language learning motivation. Integrative motivation involves having a positive view of the target language

culture, while instrumental motivation involves having practical reasons for learning the language. Crookes and Schmidt (1991) further elaborate on this, emphasizing the different roles these motivations play. It is also highlighted that while integrative motivation is often linked to a deeper engagement with the language and its cultural context, instrumental motivation is more focused on the pragmatic outcomes of language proficiency. In integrative motivation learners desire to connect with and integrate into the culture associated with the target language, or simply to engage with members of that community. In contrast, instrumental motivation is driven by more practical reasons, such as obtaining better job opportunities, passing exams, or enhancing one's education. Gardner and Lambert (1972) aimed to explore the relationship between these two types of motivation and the effective acquisition of a foreign language. Students driven by instrumental motivation learn a language for specific, practical reasons, while those motivated by integrative motivation seek to become closer to native speakers and engage with the culture associated with the language.

Early studies by Gardner (1979) proposed a link between integrative motivation and additive bilingualism, contrasting with instrumental motivation's association with subtractive bilingualism. Additive bilingualism refers to the acquisition of a second language that enhances linguistic and cultural competence without displacing the native language. In contrast, subtractive bilingualism occurs when learning a second language diminishes proficiency or usage of the native language and culture. Gardner's socio-educational model underscored the significance of attitudes towards the target language community in shaping language acquisition outcomes.

According to Gardner (1985), integrative motivation takes precedence over instrumental motivation because it encompasses cognitive factors and goal-oriented strategies that are vital for language learning. However, the perceived superiority of integrative motivation has been challenged by conflicting empirical findings. Various studies have shown positive, negative, or no correlation between integrative motivation and language proficiency (Crookes & Schmidt, 1991). Dörnyei (1998) contradicted this notion and asserted that both integrative and instrumental motivations are equally important and have a positive impact on the success of language learning.

Gardner (1985) highlighted the complexity of the relationship between motivation, attitudes, and language learning outcomes, emphasizing that motivation encompasses various factors beyond mere goal orientation. He suggests that while the integrative motive remains a key aspect, its definition may vary across studies, and its contribution to overall motivation may differ depending on the context (Crookes & Schmidt, 1991).

2.3.2. Other approaches to motivation and second language learning

Speech Accommodation Theory, as proposed by Giles and Byrne in 1982, underscores the centrality of motivation in L2 learning, aligning with the notion that identification with the target language community is vital for successful language acquisition (Crookes & Schmidt, 1991). This theory extends beyond educational settings to encompass linguistic performance in various social contexts, particularly focusing on members of subordinate groups. Emphasizing ethnolinguistic vitality, Speech Accommodation Theory suggests that learners' attitudes towards the target language community and their self-concept play crucial roles in language learning outcomes. However, while the theory offers theoretical scenarios for L2 learning success or failure based on in-group identification and group boundaries, empirical testing of its motivational component remains limited (Crookes & Schmidt, 1991).

In contrast, Schumann's Accultural Model (Schumann, 1978, 1986) specifically addresses L2 learning in naturalistic settings, highlighting the importance of integrative motivation in acculturating to the second language community. According to this model, learners acquire the second language to the extent that they acculturate to the target language community, with motivation being just one of several social and psychological factors contributing to acculturation. Although initially positing acculturation as the primary causal variable in L2 learning, Schumann later revised this view, acknowledging motivation as a factor that brings learners into contact with target language speakers, facilitating language acquisition through interaction and negotiation of input. However, both Speech Accommodation Theory and Schumann's Accultural Model encounter challenges in empirical validation,

raising questions about their applicability and theoretical adequacy in explaining the complex dynamics of L2 learning motivation (as cited in Crookes & Schmidt, 1991).

Another approach related to motivation is the 'Four-Drive Theory of Motivation'. The theory, firstly proposed by Lawrence, Nohria and Wilson (2002), was primarily developed to structure workplace relationships among employees. However, it has also offered a deeper insight into human motivation in various situations. According to the theory, humans have four core drives: acquiring, defending, bonding, and comprehending. As stated by Lawrence (2011), these four drives are fundamental to human nature. The drive to acquire is related to obtaining and possessing what we need and desire. It encompasses the desire to attain wealth, status, power, and recognition. Secondly, the drive to defend is related to protecting what we have and what we value. It encompasses the desire to preserve our identity, beliefs, values, and possessions. The urge to bond stems from the desire to create connections and relationships with other people "but are not limited to mutual benefit" (Lawrence, 2011, p.13). It encompasses the desire to feel accepted, appreciated, and loved. Lastly, the drive to comprehend is related to understanding the world and our place in it. It encompasses the desire to learn, invent, and discover. This drive motivates us to seek out new experiences, to challenge ourselves, and to develop our understanding of the world. Lawrence (2011) outlines the qualities that drive individuals with his theory, which sheds light on what motivates people and how these four drives interact and influence each other in complex ways, shaping people's motivations, choices, and behaviours.

In conclusion, in the context of second language learning, motivation holds a central position in propelling learners towards their language learning objectives. In this study, the aspects of intrinsic motivation, which is the focus of investigation among the participants, and extrinsic motivation will be discussed in the following sections with greater detail, emphasizing their significant influence on language learning and teaching. Henceforth, the discussion will commence with an exploration of motivation theories related to gamification in the next section.

2.3.3. Motivation theories related to gamification

There has been an extensive amount of research conducted on human motivation that sheds light on the connection between gamification and motivation. When considering the goal of gamification, which is to encourage the user, foster connections and drive behavioural change, it becomes necessary to delve deeper into the topic of motivation and related theories.

2.3.3.1. Maslow's hierarchy of needs theory

Human motivation is a crucial aspect of human resource management in fields like education. Maslow (1943) and more recently, Pink (2009), have discussed the needs that drive human actions. Maslow organized these needs into a logical hierarchy of five categories (Figure 4), starting with physiological needs and culminating in self-actualization (Lilienfeld et al., 2009). His model consists of five stages, starting with physiological needs like air, food, and shelter, and moving up to higher needs like safety, social belonging, esteem, and self-actualization. The first stage is focused on the basic needs required for survival, while the second stage includes needs related to security and stability. The third stage focuses on social needs, such as affection and relationships, while the fourth stage is centred around esteem needs like self-esteem and achievement. The final stage of the model is the self-actualization stage, which is focused on realizing personal potential and seeking personal growth and peak experiences.

Maslow's hierarchy of needs theory has significantly influenced the field of education and classroom management. This theory examines the comprehensive aspects of an individual, encompassing their physical, emotional, social, and intellectual attributes, and how these factors affect the learning process. The applications of Maslow's hierarchy theory in the context of classroom teaching are readily apparent. It emphasizes that, in order for students to address their cognitive needs effectively, they must initially satisfy their fundamental physiological requirements. For instance, a student who is tired and hungry will struggle to concentrate on learning. Therefore, it is crucial for students to experience emotional and

physical security and a sense of belonging within the classroom to make progress and unlock their full potential. As Maslow (1943) proposes, students need to be assured of their worth and respect in the classroom, and the teacher plays a pivotal role in creating a supportive and nurturing learning environment.



Figure 1. Maslow's hierarchy of needs pyramid (Uysal et al., 2017, p. 215)

Rogers (1969) and Maslow (2000) both highlighted the importance of needs in education and their big impact on learning. Rogers focused on the importance of free choice and always showing positive regard, while Maslow's hierarchy points out the need for safety, belonging, and esteem, especially in a humanistic language class. Shirkhani and Ardeshir (2013) underscore the importance of these needs in EFL classrooms because they are closely connected to how well students can communicate with each other, which is a key part of learning a language. Pavlenko (2013) also noted the need to understand how emotions and the need to communicate affect language learners' choices in her work on the emotional side of learning a second language.

According to Pink (2009), in today's society where basic needs are largely met, people are increasingly driven by three intrinsic motivators: autonomy, mastery, and purpose. Autonomy is the desire to have control over one's own life and to be self-directed. Mastery is the drive to learn and create new things, and to become proficient in them. Purpose relates to the need to have a sense of meaning and to contribute to something larger than oneself. These intrinsic motivators are becoming increasingly important in modern society, as people seek more fulfilment and satisfaction beyond basic needs. They can be seen as Maslow's meta-motivators, as they are fundamental drivers of human behaviour and can lead to greater well-being and personal growth (Dichev et al., 2014).

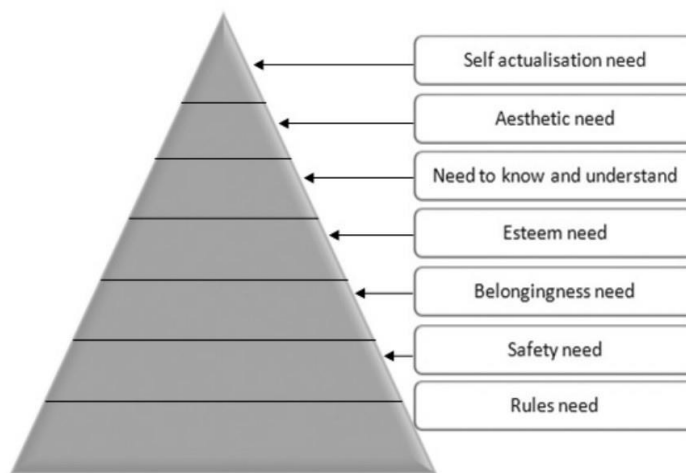


Figure 2. Hierarchy of the players' needs (Nygren et al., 2012, p.34).

Nygren, Sutinen, Blignaut, Laine, and Els (2012) adapted Maslow's hierarchy of needs to apply to gamers, using the illustration from Siang and Rao (2003), as shown in Figure 2. At the base, they placed the 'rules need.' Players first need to understand the basic rules to get motivated to play. Once they know the rules, they move to the 'safety need,' where they need enough information to stay in the game and have a chance to win. After that comes the 'belongingness need,' where players want to feel comfortable with the game and aim to achieve its goals. Players also look to boost their self-esteem by finding out how to

improve their skills in the game. They also want to learn more about the game, like different strategies and hidden elements. Higher up the hierarchy is the 'aesthetic need,' where players look for more challenging parts of the game, such as better graphics and visuals. At the top is the 'self-actualization need,' where players aim to empower themselves within the game world (Nygren et al., 2012).

A recent study conducted by Zhao (2021) sought to investigate the motivation of EFL learners using Maslow's hierarchy of needs as a conceptual framework. The study involved 100 undergraduate students as participants. The findings revealed a significant deficiency in self-esteem among Chinese EFL students. In order to address this issue and facilitate the attainment of self-esteem and self-actualization, the study suggests that teachers should foster a sense of love and belonging in the classroom to reinforce positive learner behaviours. Additionally, the findings indicate that teachers should enhance their own competencies to cultivate the motivation of Chinese students in learning their second language.

2.3.3.2. Self-determination theory

Self-Determination Theory (SDT) mentioned by Ryan and Deci (2000b) is a widely recognized explanation of why people choose to engage in certain tasks or activities. It assesses the extent to which people motivate themselves and control their own actions. The theory also shows that behaviours that are not driven by natural incentives are self-directed. Essentially, it explains how people can be motivated to do something voluntarily, even if they do not feel compelled to do so.

The SDT views motivation as a natural and inborn capability that helps to shape a person's character. According to Ryan and Deci (2000b), individuals possess an intrinsic motivation from birth, which prompts them to investigate their surroundings, foster their passions, and advance their mental frameworks. The theory suggests that an individual's actions are determined by how they internalize their circumstances, which are influenced by their surroundings (Kara, 2008). In accordance with the SDT, an individual's decisions are not

influenced by external pressures, rewards, or forces, but rather by their own behaviour (Çankaya, 2009).

There are undoubtedly various motivation theories, each adapted to different fields like education, healthcare, organizations, relationships, and psychotherapy, among others. SDT emerged as a macro-theory of human motivation and personality in the 1970s, gaining formal recognition as a well-supported empirical theory in the mid-1980s (Madasa, Darmi, & Baharun, 2017). Motivation stands out as a crucial factor in understanding individual differences in foreign language learning, and every language learning situation presents its unique framework (Zareian & Jodaei, 2015). Using this unique framework as an example, it is evident that SDT, like other theories, serves as a comprehensive motivational theory that explores the issue of motivating language learners to put in more effort to achieve their objectives.

Self-Determination Theory, according to Lee (2008), suggests that people have an inherent drive to conquer ongoing challenges and make sense of their experiences in a way that aligns with their identity. Students striving to pass the English test that is a crucial step toward graduation can be a good example. Successfully reaching this goal is made possible through feelings of friendship, competence, and camaraderie, which, in turn, promote self-driven motivation and call for social support. Within this social context, the theory encourages students to naturally participate in activities that enhance their motivation. Consequently, SDT plays a pivotal role in shaping students' behaviour, experiences, and development through a dynamic interplay between their innate tendencies and the surrounding social environment.

According to Ryan and Deci (2000b), the SDT encompasses various forms of motivation that reflect different levels of self-determination. The different forms of motivation are categorized based on the diverse causes and goals that drive an individual's behaviour. Thus, motivation is understood to encompass intrinsic motivation, extrinsic motivation, and amotivation. In the following sections these motivation types will be discussed in more detail.

2.3.3.2.1. Amotivation

According to Ryan and Deci (2000b), amotivation refers to the lack of motivation and disinterest in taking action (Figure 2). It involves being neither intrinsically nor extrinsically motivated. When individuals are amotivated, they either do not act at all or act without intention, merely going through the motions (Ryan & Deci, 2000b). Amotivation conflicts with intrinsic and extrinsic motivation as it is the lack of either intrinsic or extrinsic motivation (Dörnyei & Ushioda, 2009; Gagné & Deci, 2005). People experience amotivation when they perceive a mismatch between the results of their actions and their own goals. This can lead to a feeling of futility and the belief that their actions are controlled by external forces, rather than their own choices. As a result, individuals who are unmotivated may not be willing to participate in academic activities (Vallerand & Reid, 1984).

Deci and Ryan (2013, p.71) characterize amotivation as "helplessness". According to cognitive evaluation theory, situations that lack opportunities for both self-determination and competence regarding a specific behaviour can lead individuals to experience amotivation towards that behaviour. This state of amotivation may manifest through emotional and cognitive responses such as apathy, feelings of helplessness, despondency, and self-criticism. As previously mentioned, a situation becomes amotivating when it is perceived as unmanageable, indicating a sense of incompetence in achieving desired outcomes. This perception often arises when individuals receive consistent negative feedback on their performance, encounter repeated failures, or believe that outcomes are beyond their control.

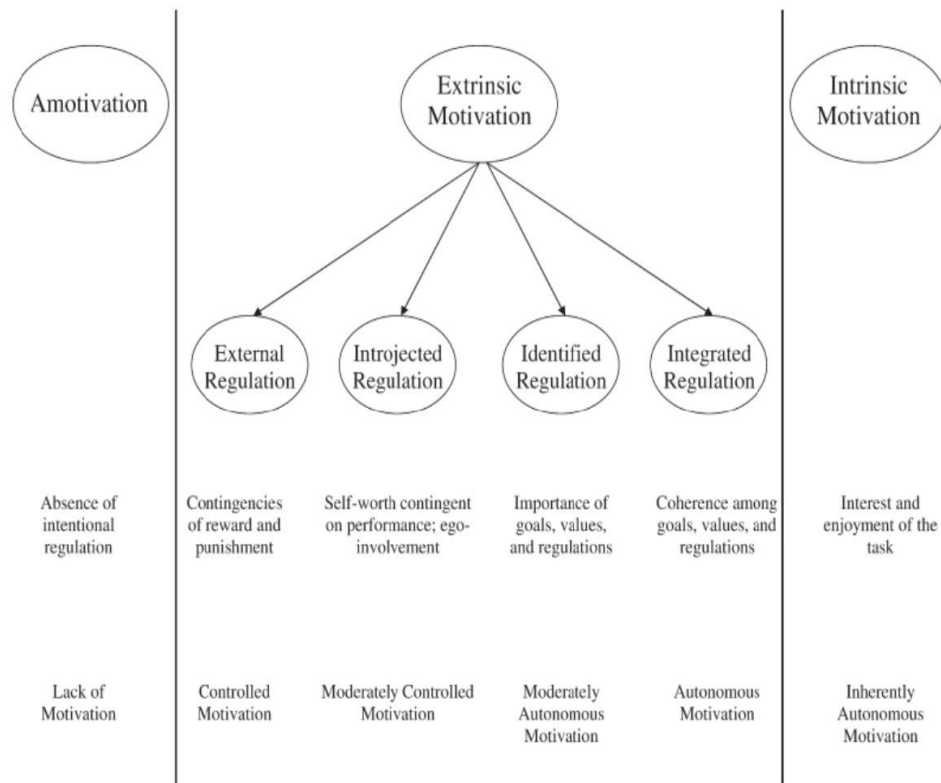


Figure 3. The self-determination continuum (Gagné & Deci, 2005, p.336)

2.3.3.2.2. Intrinsic and extrinsic motivation

Depending on its source, motivation is evaluated in two different ways: extrinsic and intrinsic. Intrinsic motivation means doing something for oneself. The need for intrinsic motivation is when the activity is done for its own sake because it is fun, exciting, and not driven by any external impulse or for any other reason. The important thing in intrinsic motivation is to do the activity without considering the results or benefits that will be obtained from the activity. Extrinsic motivation, on the other hand, means that the activity is done for some other reason besides itself. These can be rewards, money, fame, wealth, or request. The reason for the activity is dependent on the reward that is gained as a result of the action (Yalçın, 2017).

The goal of both intrinsic and extrinsic motivation is to build a relationship between the person and the task at hand. When it comes to intrinsic motivation, the bond is formed

through one's personal enjoyment or satisfaction, while in the case of extrinsic motivation, it is achieved through an external factor (Choy, 2005). In the case of intrinsic motivation, the only reason for doing the activity is to have fun or enjoy it. Hobbies like singing, reading, or painting are activities that are driven by intrinsic motivation. Extrinsic motivation, on the other hand, is driven by other factors such as receiving compensation, winning prizes, achieving status, receiving praise, or avoiding punishment (Wu, 2014).

Chen and Zhao (2022) define extrinsic motivation as individuals engaging in certain activities for outcomes that are separate from the activity itself. These outcomes include integrated regulation, identified regulation, introjected regulation, and external regulation, each varying in degrees of behaviour autonomy (Figure 5). Integrated regulation is the most autonomous form of extrinsic motivation, followed by identified, introjected, and external regulation. Autonomous motivation encompasses identified and integrated regulation of extrinsic motivation, alongside intrinsic motivation. In contrast, controlled motivation comprises introjected and external regulation of extrinsic motivation. Within educational settings, autonomous motivation involves students voluntarily engaging in learning activities. Specifically, students exhibit autonomous motivation when they consciously accept or value these behaviours (identified regulation), find them consistent with their personal values and needs (integrated regulation), or perceive them as inherently interesting, enjoyable, or challenging (intrinsic motivation). Conversely, controlled motivation refers to learning behaviours driven by internal or external pressure. Students engage in controlled motivated learning behaviours to enhance self-esteem or avoid negative emotions (introjected regulation), or to attain rewards or evade negative consequences (external regulation).

In a recent study, Chen and Zhao (2022) combined the self-determination theory and the technology, examining its relevance with data from 272 college students. Notable findings from statistical analyses indicated that students commonly choose language learning apps due to self-motivation rather than external influences. Furthermore, self-motivation positively impacts perceived usefulness and ease of use, while external motivation only affects perceived usefulness. Additionally, external motivation does not influence the adoption of apps driven by self-motivation. This research offers theoretical insights into

how motivation influences the acceptance of learning technologies in language education and provides practical recommendations for utilizing the benefits of gamification and mobile learning in foreign language education.

The main difference between intrinsic and extrinsic motivation is that intrinsic motivation comes from doing something because it is naturally interesting and fun, whereas extrinsic motivation is about doing something to achieve a specific outcome. In intrinsic motivation, the individual is naturally motivated by their own interests and challenges, rather than external stimuli, pressure, or rewards (Ryan & Deci, 2000a).

The driving force behind an individual's actions can either be intrinsic or extrinsic in nature. Extrinsic motivators often include rewards, penalties, social pressure, and requests. Conversely, intrinsic motivation comes from the individual's own passion and interest for the activities they engage in (Brophy, 2004). In the gamification process, it is sought to boost motivation through external incentives such as recognition and rewards for completed tasks. However, some rewards may discourage users who already have strong intrinsic motivation (Groh, 2012). This highlights the importance of examining and understanding intrinsic motivation more deeply. Furthermore, this study aims to uncover the intrinsic motivational factors affecting the participants, making it essential to delve deeply into this subject matter.

According to recent studies, intrinsic motivation can be reduced by factors like threats, surveillance, time limitations, and competition. These circumstances go against individuals' need for independence. This means that when individuals are offered rewards or face coercion in their demands, or when they feel oppressed or under control, they tend to lose their enthusiasm for the task at hand (Sheldon & Filak, 2008).

Based on the research he conducted on the effects of external rewards on intrinsic motivation, Deci (1972) found that the type of external reward could either increase or decrease intrinsic motivation. Essentially, Deci (1971) claims that external sources of motivation will decrease intrinsic motivation. Encouraging people in certain situations is a more powerful and effective way to motivate them using intrinsic motivation. Behaviours motivated by external factors can be internalized and integrated (Kara, 2008). Motivating people based solely on external factors without having intrinsic motivation in place can

create a significant obstacle to the continuity of the action. In order to make intrinsic motivation a constant, some psychological needs must be met.

Schell (2011) and Deterding (2011) critique the prevailing approach to gamification, which often involves indiscriminately applying elements like points, badges, and leaderboards to various contexts (Groh, 2012). However, they argue that simply adding these rewards may not necessarily enhance enjoyment, as pleasure does not always increase in a linear fashion with the addition of rewards. The book "Punished by Rewards" (Kohn, 1993, as cited in Groh, 2012 p.41) provides insight into this phenomenon, demonstrating through studies that incentivizing activities, such as paying children to draw pictures, can lead to a decrease in the quality of output and a reduction in intrinsic motivation once the external rewards are removed. This phenomenon, known as "Overjustification," has been validated by Lepper et al., (1973) which found a shift in intrinsic motivation towards extrinsic incentives (as cited in Groh, 2012 p.41).

In response to these critiques, Schell (2011) and Deterding (2011) propose three fundamental principles drawn from Deci and Ryan's self-determination theory. This theory outlines three inherent needs crucial for fostering intrinsic motivation: autonomy, competence, and relatedness (Figure 3). Rigby and Ryan (2011) maintain that in order to be fully intrinsically motivated, these three basic principles of SDT must be met. Autonomy is the sense of control over one's behaviour and the right to make choices. Therefore, in educational settings, it is more effective to facilitate rather than restrict students in the decision-making process (Kim, Song, Lockee, & Burton, 2018). Competence involves the purpose for a challenging and skilled experience (Kapp, 2012). To be more specific, challenges should be engaging, and feedback should be given as soon as possible for goals that are clearly defined (Groh, 2012). According to Kapp (2012), relatedness pertains to the desire for connection with others, and is regarded as a universal human need. In simpler terms, relatedness refers to the basic human need to interact, form connections, and experience a feeling of caring for others (Deci & Ryan, 2000b; Rigby & Ryan, 2011).

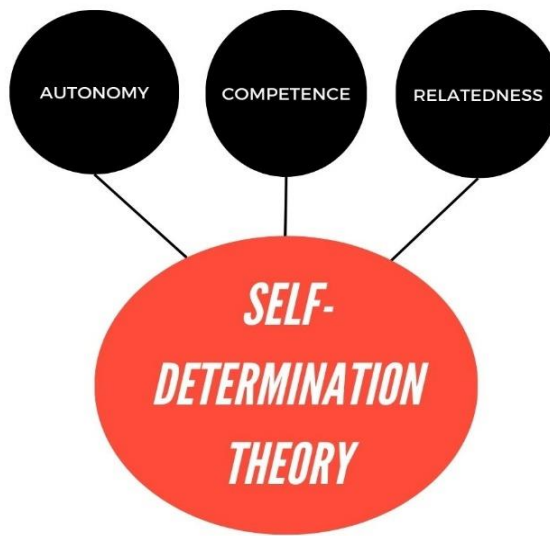


Figure 4. Self-determination theory and intrinsic needs.

Werbach and Hunter (2012) state that the presence of even a single element of the SDT in a task can trigger intrinsic motivation. This is because a sense of confidence, freedom, and independence fosters intrinsic motivation. As a result, people are more likely to voluntarily engage in an activity driven by an internal drive (Ryan & Deci, 2000b). Gamification offers individuals the opportunity to showcase their abilities and compete with others, beyond just rewards. Because each game dynamic contributes different needs, gamification effectively satisfies emotional needs as well (Liu, Suh, & Wagner, 2016).

Numerous studies in the realm of L2 acquisition have explored the relationship between intrinsic motivation and language proficiency (Zhang et al., 2017). This collective body of research consistently suggests a positive impact of intrinsic motivation on language learning achievements. For instance, Noels and colleagues conducted a series of inquiries within Canadian educational contexts, revealing intrinsic motivation as a significant predictor of students' dedication, persistence, and final academic grades, with a moderate effect size (Noels, Clement, & Pelletier, 2001; Noels, Pelletier, & Vallerand, 2000). Conversely, individuals lacking intrinsic motivation may experience frustration and disappointment when learning vocabulary independently, thus impeding their ability to

grasp vocabulary learning strategies and effectively complete associated tasks (Ahmed & Khabeiry, 2020).

According to Dörnyei (2003), intrinsic motivation, characterized by an individual's inherent drive rooted in personal enjoyment and curiosity, stands in contrast to extrinsic motivation, which is motivated by external rewards or the avoidance of punishment. This distinction highlights the importance of finding pleasure in learning for its inherent value, as emphasized in EFL contexts (Ning & Hornby, 2014). Research in education has consistently shown that intrinsic motivation is associated with various positive outcomes in language learning, including perceived proficiency, future achievements, sustained effort, reduced anxiety, deeper comprehension, positive attitudes, and psychological health (Dörnyei, 2014; Dörnyei & Ushioda, 2009; Noels et al., 2000). Therefore, fostering intrinsic motivation appears to be crucial for successful language acquisition.

A study conducted by Ahmed and Khabeiry (2020) sought to investigate the connection between vocabulary attainment and intrinsic motivation among EFL young learners. The research involved fifty-six second-year preparatory school students, aged thirteen to fifteen. Assessments of vocabulary acquisition were conducted through standardized vocabulary tests, while the participants' intrinsic motivation levels were explored using a 5-point Likert scale. The results unveiled a notable positive correlation between the scores attained in the vocabulary assessments and the ratings on the intrinsic motivation scale among the participants in the study group.

Zhang et al., (2017) investigated the dynamics of L2 vocabulary acquisition among EFL learners, focusing on the combined impact of various motivational factors and learning strategies. Analysing data from a sample of 107 tenth-grade participants, the study found that learning strategies served as a partial mediator in the relationship between motivation (comprising intrinsic and extrinsic components) and vocabulary breadth. Specifically, analyses for intrinsic and extrinsic motivation revealed that intrinsic motivation exerted significant direct and indirect positive effects on vocabulary knowledge, while extrinsic motivation showed a significant indirect effect mediated by learning strategies. These findings imply that vocabulary-learning strategies play a mediating role in the association

between motivation and vocabulary acquisition, with intrinsic motivation potentially wielding a stronger influence in foreign-language learning contexts.

2.3.4. Motivation and gamification

Zicherman and Cunningham (2011) state that gamification involves incorporating game elements and strategies into non-gaming scenarios to increase user engagement and motivation. According to Lee and Hammer (2011) and Muntean (2011), gamification can provide positive feedback to learners, boosting their motivation. Jovanovic and Matejevic (2014) associate the success of gamification with motivation, as they believe it can positively impact people's motivation and lead to successful learning.

Kapp (2012) views gamification as a tool to motivate and inspire users, assisting them in overcoming obstacles. Flores (2015) adds that when teachers bring game-based learning strategies into the classroom through gamification, it gives students a sense of involvement, immediate feedback, accomplishment feeling, and the pleasure of facing and overcoming challenges. This approach helps make learning more interactive and rewarding. To provide these engaging experiences, gamified activities need to be organized in a way that includes progressive levels. This structure allows players, or learners, to move forward at their own pace (Boudadi & Gutiérrez-Colón, 2020).

According to Malone (1981), games have three motivating elements: challenge, fantasy, and curiosity. The challenge which means uncertainty of the outcome makes the game more attractive and motivational for the players whereas the use of fantasy helps the learning process by providing mental images for the players to remember. Finally, feedback should be given at unpredictable times, generating curiosity in the learning process. Dörnyei and Ushiada (2009) suggest that if students believe they can attain their goals through effort, they are more motivated to achieve as the outcome lies in their hands. Additionally, gamification leverages the entertaining aspect, along with game elements, to boost motivation (Flores, 2015).

Gardner (1985) suggests that motivation can be influenced by various elements, including factors like attitude, effort, determination, and enjoyment of the task. Furthermore, according to Gardner (2010), a motivated individual is characterized by being goal-driven and willing to apply the required effort, often displaying attributes like decisiveness, attentiveness, enthusiasm, self-confidence, and optimism. While language educators may not have direct control over all these factors, they can employ strategies to boost motivation, such as integrating gamification into their teaching methods.

Muntean (2011) proposes that gamification successfully merges and encourages both intrinsic and extrinsic types of motivation. Some components of gamification like teamwork, rivalry, feeling of belonging promote intrinsic motivation while elements like scores, levels, awards foster extrinsic motivation (Muntean, 2011). In the view of Sigurdardottir (2016), intrinsic and extrinsic motivation are central to the concept of gamification. The act of playing digital games is intrinsically motivating while the findings of these games are motivated extrinsically. Nevertheless, it is noted that there are some academics who dispute the idea that digital games are capable of intrinsically motivating learners, instead holding the view that employing digital games to foster extrinsic motivation is similar to traditional methods (Sigurdardottir, 2016). Crookes and Schmidt (1991), also, state that using games with extrinsic rewards and badges may have a negative impact on long-term motivation and can potentially do more harm than good. Deci, Koestner, and Ryan (1999) underscore that using tangible, extrinsic rewards may diminish intrinsic motivation, so it is important to use these rewards with caution.

Another characteristic of a gaming experience is that it occurs willingly and with intrinsic motivation. Games give students control over their knowledge and accomplishments, resulting in intrinsically motivated students. However, if the designer interferes with the player's decision-making and reduces their freedom of choice, the design will be distanced from the core of the gaming experience (Huotari & Hamari, 2012). The elements added by the designer to motivate the user must be chosen with care, so as not to disrupt the enchantment of the intended experience through gamification. As Dwight D. Eisenhower said, "Motivation is the art of getting people to do what you want them to do because they want to do it" (as cited in Yalçın, 2016, p.32).

Werbach and Hunter (2012) introduced a model outlining how gamification activates motivation through a three-level structure they referred to as 'elements.' These elements consist of Dynamics, which are derived from Mechanics, which, in turn, are constructed from Components. In Figure 1 adapted from the book 'For the Win' by Werbach and Hunter (2012) provides a visual representation along with explanations and examples for each of these elements within an abstract hierarchy (Figure 1).

Many gamification systems commonly incorporate reinforcement components, such as leaderboard, badges, levels, and points to stimulate user motivation and engagement (Dichev et al., 2014; Subhash & Cudney, 2018). In this regard, this approach resembles behaviourism because it influences people's actions through rewards, timely feedback and reinforcement, akin to the principles of 'Programmed Instruction' by Skinner (1958), which was designed to enhance second language learning (Boudadi & Gutiérrez-Colón, 2020).

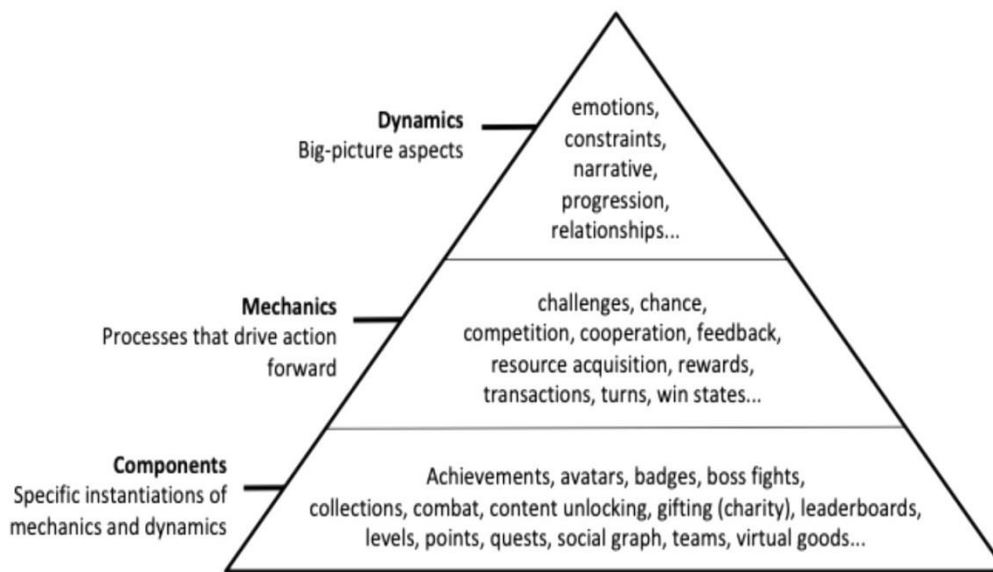


Figure 5. Game elements hierarchy (adapted from Werbach & Hunter, 2012, p.82)

Werbach and Hunter (2012) highlight the importance of recognizing that not all gamification elements are necessary for every project. Using all items within one category

is unlikely, but considering a wide range of options during the design process is essential to avoid challenges. While integration of these elements is explored in the process, it is crucial to note that having a list of elements is a starting point, but it is not enough. Developing a successful gamified service goes beyond ticking boxes; it requires aligning elements with specific needs and effective implementation. That's why it is crucial for language educators to explore a wide range of options when implementing gamification elements in the EFL classroom.

In recent times, the adoption of gamification in language education and the realm of foreign language acquisition has emerged as a novel pedagogical approach (Sağlık, 2017). Lee and Hammer (2011) elucidate that while educational systems incorporate certain elements akin to those found in games, such as awarding badges in the form of grades, captivating students' attention presents a notable challenge. This challenge persists within the context of second language acquisition endeavours as well. In a study, it was found that students who were given feedback on their course progress in the form of a competitive game enjoyed the experience more, learned more, and had lower rates of failure than previous classes (Hanus & Fox, 2015). Dominguez et al., (2013) implemented gamification elements such as competition, trophies, rewards, and leaderboards in an e-learning platform. They discovered that students in the gamified class achieved higher overall scores and displayed greater motivation. However, these students tended to participate less in class activities and performed less effectively on writing assignments.

On the other hand, Segura-Robles et al., (2020) aimed to evaluate the impact of a flipped and gamified approach on students' autonomy, competence, relationships, satisfaction, intrinsic and extrinsic motivation, and boredom in Physical Education. The study involved 64 third-grade secondary school students. The results showed an increase in intrinsic motivation levels in both the control group, which used traditional learning, and the experimental group, which engaged in gamified flipped learning.

Bicen and Kocakoyun (2018), also, employed a GSRS in the educational setting and sought feedback from participants regarding their perceptions of the game play, game elements, and the overall effectiveness of the game. The study involved a cohort of 65 undergraduate students, with an average age of 22, who participated in the research. Their

findings suggested that students demonstrated improved learning outcomes while simultaneously enjoying the learning process. The use of gamified applications was noted to foster an increased enjoyment of lessons that may have been less engaging previously. Therefore, it can be stated that integrating GSRS alters the educational setting, making it more enjoyable and improving learning through the addition of fun elements.

In second language learning, intrinsic and extrinsic motivations play significant roles, as previously discussed in detail. Regarding their application within gamification, both intrinsic and extrinsic motivational factors are utilized to engage L2 learners. Extrinsic rewards such as levels, points, and badges are integrated into gamified activities to incentivize learners, while intrinsic motivational aspects like achievement, a sense of belonging, and autonomy are also emphasized (Muntean, 2011). However, it is important to note, that gamified activities need to be carefully designed with distinct challenges presented gradually and under appropriate conditions (Kapp, 2012).

To conclude, the integration of gamification into education, particularly in the field of English Language Teaching (ELT), is heavily influenced by various motivation theories. To reiterate, in the current study, the focus is on examining the intrinsic motivation levels of language learners utilizing digital game-based tools or worksheets. Gamification is a tool for inspiring learners, enhancing their engagement, and offering a rewarding learning experience in EFL classrooms. By incorporating elements like challenge, fantasy, curiosity, and both intrinsic and extrinsic motivation, gamification fosters a conducive learning environment. However, it is crucial for gamification to maintain intrinsic motivation while adding relevant elements.

CHAPTER III

METHODOLOGY

In this chapter, information about the research method, study group, data collection tools used in the research, and details related to data collection and analysis are provided.

3.1. Research design

The purpose of this study was to investigate the potential impact of digital game-based vocabulary exercises, focusing on whether and how they affect vocabulary retention and intrinsic motivation. To this end, the study compared the effectiveness of digital game-based vocabulary exercises with worksheet-based exercises on vocabulary retention and intrinsic motivation of students learning English as a foreign language. For this aim, a pre-and post-test, quasi-experimental method with a control group (CG) was used. Experimental research gives clear results among scientific research, and it reveals the effect of the procedure performed by allowing comparison as a result of the applied procedure (Büyüköztürk, 2001). Additionally, in an experimental design, the researcher attempts to determine the effectiveness of a specific intervention on the group in which the researcher conducts a particular procedure to assess whether it is effective or not (Johnson & Christensen, 2014). In a quasi-experimental design, similar groups with comparable characteristics are compared. It is often preferred in situations where random assignment is not feasible, such as in school and classroom settings. While the independent variable is manipulated, participants are not randomly allocated to different conditions or sequences of conditions (Cook & Campbell, 1979). In this study, random assignment of the students was not feasible due to constraints like time, resources, or the unavailability of a sufficiently large pool of participants. Additionally, in a quasi-experimental design, individuals are grouped based on pre-existing shared characteristics, such as their age, gender, or prior exposure to a specific stimulus (White & Sabarwal, 2014). Accordingly,

the participants of the study were in the same age range, and their ages ranged between 18-20. Additionally, all the students in these classes had a similar CEFR proficiency level, which was B2. Throughout the academic year, the sequenced module progresses through A1, A2, B1, and concludes with B2 levels. At the end of the fourth module, students who successfully complete the B1 level but do not meet the required B2 English proficiency can choose to apply for the summer school. This allows them to complete a one-year introductory English course before advancing to their major. By incorporating these conditions, the researcher aimed to ensure the utmost similarity between the two groups. The method of the quasi-experimental design, featuring both control and experimental groups, is shown in Figure 6.

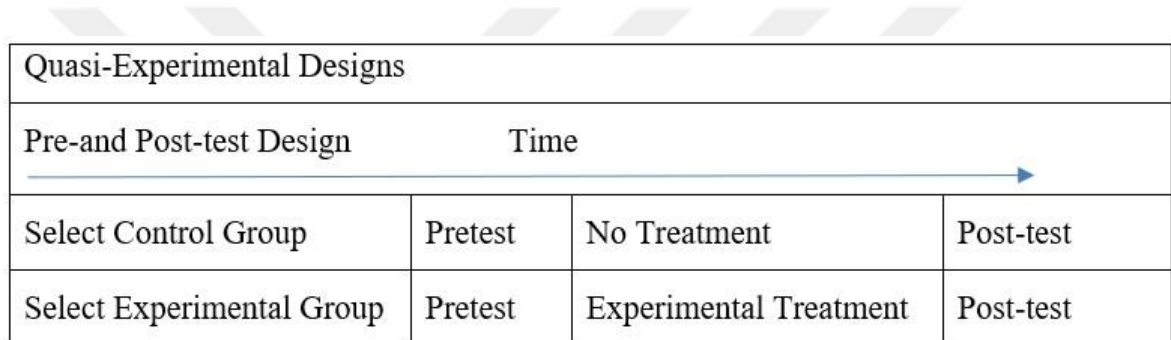


Figure 6. Quasi-experimental design with control and experimental group (Creswell, 2012 p. 310)

As seen in Figure 6, within the framework of a quasi-experimental design, a researcher deliberately selects two groups. It is worth noting that the selection of these groups is based on the rationale proposed by Creswell (2012), who suggests that unlike in an experimental setup, the researcher in quasi-experiments cannot artificially manipulate or assign participants randomly into specific research groups. Therefore, among the groups intentionally chosen in a non-random manner, one was designated as the experimental group (EG), while the other group assumes the role of the control group (CG). Before any interventions or treatments are introduced, a preliminary assessment in the form of a pre-test is administered to both groups, thereby establishing a baseline for understanding their initial conditions. Subsequently, the researcher undertakes a series of precisely designed

experimental activities exclusively with the members of the EG. It is crucial to emphasize that no interventions or treatments are implemented with the CG, which serves as a reference point for comparison. Following the completion of the treatment process, a post-test is administered to both groups to analyse any disparities or changes that may have occurred due to the implemented treatments (Creswell, 2012). However, no delayed post-test was conducted because the students were in a summer school program that ended with coursework and exams. After the summer session, students were no longer available for follow-up assessments. The study focused on evaluating their learning within the summer program, making a delayed post-test impractical due to time constraints and scheduling.

Due to practical constraints, the researcher designated his own class as the EG. This approach ensured a more manageable study and simplified data collection. Another class was chosen as the CG to maintain neutrality and avoid bias, with a teacher who voluntarily agreed to participate. This division allowed for an effective comparison between the two groups and assessment of the interventions' impact. This approach ensured that the students started on an equal footing in terms of their language abilities, making it easier to attribute any observed differences to the teaching methods. The quasi-experimental design process of the research is presented in Table 1.

Table 1

Quasi-Experimental Design Process of the Research

Groups	Application of Pre-Tests	Treatment/No Treatment	Application of Post-Tests
Control	Week 1 Vocabulary Retention Test	B2 Level Vocabulary Worksheet Exercises Aligned with School of Foreign Languages Curriculum	Week 6 Without Treatment Vocabulary Retention Test and IMI
Experiment	Week 1 Vocabulary Retention Test	Vocabulary Instruction (for 4 weeks) Based on Digital Game- Based Exercises	Week 6 After the Treatment Vocabulary Retention Test and IMI

In the study group, English vocabulary teaching processes and activities for the students in the CG were conducted based on the existing summer school curriculum at School of Foreign Languages at the B2 level. While the CG received the teacher's book extra vocabulary exercises as worksheets, the EG engaged in vocabulary teaching and activities through digital game-based methods. The identical vocabulary used in the CG was also introduced to the EG. Both groups were administered a pre-test and a post-test before and after the treatment/nontreatment process. At the end of a four-week process, a seven-Likert scale intrinsic motivation inventory regarding doing exercises was applied to both groups. The aim to apply the intrinsic motivation inventory was to support the pre-test and a post-test by seeing the intrinsic motivation levels of the participants.

3.2. Setting and participants

The study was carried out at the School of Foreign Languages of a state university, located in Türkiye. English language education is given considerable emphasis within the Turkish education system. This focus stems from the recognition of English as a key global language, essential for international communication and various academic and professional fields. The attention given to curriculum studies in Türkiye resulted in the introduction of a new curriculum in 2005, aiming for comprehensive changes across all subject areas. This curriculum emphasized a student-centred approach, active learner participation, and a learning environment highlighting research, discovery, and cooperation (Akınoğlu, 2008). The subsequent impact on English language teaching in Türkiye was profound, leading to the integration of English language lessons in 4th and 5th grades during the 2005-2006 academic year (Alkan & Arslan, 2015). The implementation of the 4+4+4 education system in the 2012-2013 academic year further elevated the role of English language, introducing it in 2nd grade with allocated hours of two per week for the first three years and four hours per week for the last four years (Ocak & Karafil 2021). Moreover, in the Turkish education system, all students receive English language education until they graduate from high school which is the 12th grade. Additionally, when embarking on

university education, students may continue to learn English, commencing with their first year at the preparatory school.

The university where the study was conducted offers programs in English at either 30% or 100% proficiency across several departments. These departments receive English language education during the preparatory year, provided by the School of Foreign Languages. 30% of departments are Computer Engineering, Industrial Engineering, Energy System Engineering and Economics. On the other hand, International Relations and Business Administration are departments with 100%. Regardless of the specified percentages, be it 30% or 100%, all departments get the same level of English language instruction. This underscores the university's commitment to ensuring that students across disciplines develop a standardized proficiency in English during their preparatory year. That's why, all students who do not meet the required B2 level in English are required to successfully complete a one-year preparatory English program before they can proceed to their chosen major departments. At the beginning of each academic year, students are applied a placement test and divided into different levels of classes. The classes in the program start at the A1 level for beginners, then go to A2 for pre-intermediate learners. After that, they move to the B1 intermediate level and finish at the B2 upper-intermediate level. Each student has a second chance to complete the module they failed in a repeat class. In this modular system, an academic year is completed in four quarters instead of two semesters. During the year, students that can only complete three modules which is B1 (intermediate) have the right to complete their preparatory education in a six-week summer school (School of Foreign Languages Student Handbook, 2023).

In the School of Foreign Languages, summer school education is not mandatory, but optional. Students who apply for the summer school, do a six-week intensive course. According to the summer school curriculum participants receive instruction for 28 hours per week, covering two subjects: Main Course (20 hours) and Writing (8 hours). To emphasize, the study was conducted with students who were enrolled in Main Course classes in both groups. According to the syllabus, Main Course classes were required to cover a total of 10 units from the Language Hub Intermediate Student Book (Figure 7). Also, teacher's book extra vocabulary exercises are completed during Main Course classes.

On the other hand, the criteria for success evaluation and attendance in the summer semester are the same as those in the fall and spring semesters in which students must have a module success grade of 60 or above out of 100 to progress to the next module. Students who complete module B2 have completed preparatory training. The module success grade consists of 30% for module mid-term exams, 30% for assignments (portfolio), and 40% for the module final exam. Students must score at least 60 out of 100 in the module final exam. In each module, students are required to complete portfolio content. This content includes presentations, paragraph or essay writing, vocabulary quizzes, and online assignment evaluations of course textbooks (School of Foreign Languages Student Handbook, 2023).

COURSE	WEEKS					
	1ST WEEK 18.07.2022 22.07.2022	2ND WEEK 25.07.2022 29.07.2022	3RD WEEK 01.08.2022 05.08.2022	4TH WEEK 08.08.2022 12.08.2022	5TH WEEK 15.08.2022 19.08.2022	6TH WEEK 22.08.2022 26.08.2022
MAIN COURSE (20 hours)	UNIT 1 COMMUNICATION • 1.1 Communication Today • 1.2 Who owns English • 'Café Hub' 1.3 Welcome Back	UNIT 3 ON THE MOVE • 3.1 Travel Experiences • 3.2 Travel Smart • 'Café Hub' 3.3 Getting There	UNIT 5 WORK AND BUSINESS • 5.1 At work • 5.2 In business • 'Café Hub' 5.3 Major Presentation	UNIT 7 FOOD • 7.1 Eating Out • 7.2 Food Fads • 'Café Hub' 7.3 Comfort Eating	UNIT 8 INNOVATION • 8.2 Must-have gadgets • 'Café Hub' 8.3 Flat-Packed	UNIT 10 PSYCHOLOGY • 10.1 Making up your mind • 10.2 Wish lists • 'Café Hub' 10.3 Come home
	UNIT 2 EXPERIENCES • 2.1 Important Decisions • 2.2 You can do it • 'Café Hub' 2.3 Picture this	UNIT 4 CHANGE • 4.1 Personal Change • 4.2 Social Change • 'Café Hub' 4.3 Part time	UNIT 6 SPORTS AND HOBBIES • 6.1 Take Part! • 6.2 Hobbies • 'Café Hub' 6.3 You got served	UNIT 8 INNOVATION • 8.1 Making a difference	UNIT 9 THE ARTS • 9.1 Art for everybody • 9.2 Tell me a story • 'Café Hub' 9.3 Leaving London	

COURSE	1ST WEEK	2ND WEEK	3RD WEEK	4TH WEEK	5TH WEEK	6TH WEEK
WRITING (8 HOURS)	Chapter 1 From Paragraph to Essay	Chapter 2 Opinion Essays	Chapter 3 Cause & Effect Essays	Chapter 4 Comparison / Contrast Essays	Chapter 5 Comparison / Contrast Essays	Chapter 6 Problem Solution Essays

Figure 7. 2021-2022 Academic year summer school B2 module syllabus

In the study, all students participating in the summer school program were required to attend 20 hours of main course classes, along with an additional 8 hours of writing classes, which were taught online. Due to the ongoing pandemic and the transition from online to face-to-face classes, the decision was made by the School of Foreign Languages committee to conduct the 8 hours of weekly writing classes online. In main course classes all students practiced grammar, reading and listening skills including vocabulary parts in their student books. The vocabulary items utilized in the study were chosen from the vocabulary worksheets in the teachers' book of the main course, which is be elaborated below in

detail. The 20-hour-a-week main course classes were shared by two instructors to decrease the face-to-face lecture time with the same students and instructor which motivates learners. Letterman and Dugan (2004) mention that team teaching may foster students' enthusiasm and has also other benefits. As well as its benefits to students, team teaching gave the chance to face more participants in numbers, and to collect more data for this study.

As mentioned before, the study included 44 students, aged 18-20, all at a B2 English proficiency level. They were part of the same English preparatory program progressing from A1 to B2 levels. Students who completed B1 but lacked B2 proficiency could attend the summer school. Therefore, it was presumed that the students in both classes were homogeneous. To ensure group equality, the researcher designated his class as the experimental group due to practical constraints. Of them, 25 were in the experimental group (EG) and 19 were in the control group (CG). The EG was instructed and treated by the researcher himself whereas the CG students completed the process with no treatment in control of a different instructor. The distribution of participants by gender is provided in Table 2.

Table 2

The Distribution of Participants by Gender

Groups	Female		Male		Total	
	n	%	n	%	n	%
Control	8	42.1%	11	57.9%	19	100%
Experimental	13	52%	12	48%	25	100%

As seen in Table 2, while 23 of the participants were male, 21 of them were female. The age statistics of the participants ranged from 18 to 20 (Mode: 20, SD: 1.86).

Table 3

The Distribution of Experimental and Control Groups by their Departments

Department	EG	CG	Total
Computer Engineering	6	6	12
Industrial Engineering	3	2	5
Energy System Engineering	2	0	2
Economics	0	1	1
International Relations	8	5	13
Business Administration	5	6	11

Table 3 shows participant numbers by department. Both experimental and control groups in Computer Engineering have equal participants. Business Administration has 5 in the experimental group and 6 in the control group. Industrial Engineering has 3 in the experimental group and 2 in the control group. International Relations has 8 in the experimental group and 5 in the control group. Energy System Engineering and Economics have the fewest participants, with 2 and 1 in the experimental groups, respectively. Lastly, even though the preparatory school includes a considerable number of international students, all participants in this study were Turkish, except one student from Azerbaijan.

3.3. Data collection tools

In the study, to see the differences in vocabulary retention and intrinsic motivation level of the participants, two quantitative data collection tools were utilized. The first one was the vocabulary retention test, and the second one was the intrinsic motivation inventory regarding doing exercises. Information about these tools is given in the following sections.

3.3.1. Vocabulary retention test

This study utilized the 'Vocabulary Retention Test,' specifically developed to assess the impact of digital game-based vocabulary exercises on students' vocabulary skills. The test played a crucial role in evaluating how effective this teaching method was in enhancing the students' ability to learn new vocabulary (Appendix 2). According to Webb (1997), the development of this retention test involved four fundamental stages: generating test items, presenting them to experts, confirming the structural validity of the test based on expert opinions, and testing the alignment of the items with the learning objectives. The test was prepared for pre-test and post-test applications for students in both the experimental and control groups.

In the initial phase, the questions for the retention test were prepared by adapting content from the Language Hub B2 level teachers' book worksheets. The vocabulary selected for the preparation of retention test questions covers units 3.1 to 8.2, which correspond to the weeks following the pre-test and preceding the post-test. This chosen vocabulary encompasses various topics, including travel, business collocations, gradable and ungradable adjectives, prefixes, and phrasal verbs. Accordingly, 43 questions were prepared. These questions were adapted from the vocabulary exercises in the teacher's book. To achieve this, the Macmillan Education Everywhere (MEE) Teacher App was employed, as illustrated in Figure 8. The vocabulary utilized during the application process for both control and experimental groups was incorporated into the test development.

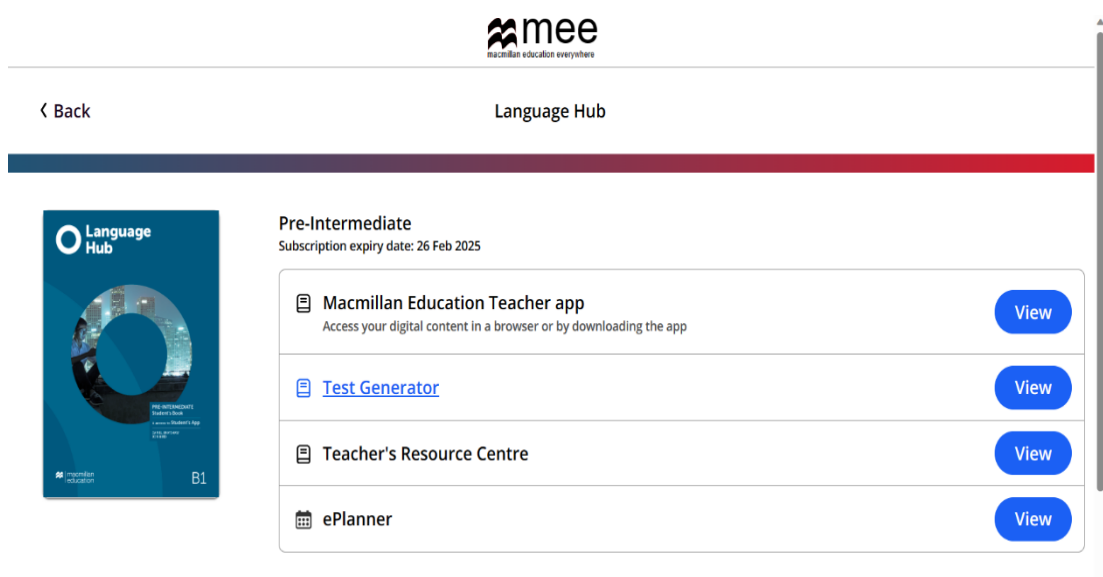


Figure 8. Macmillan education everywhere teacher app (Fung, 2017)

Then, expert opinion was obtained for the prepared questions. For this purpose, the opinions of the three experts were taken. To achieve this, the opinions of a Dr. Lecturer at Yalova University, an Assistant Prof. Dr. from the Yalova University School of Foreign Languages, and an Assistant-Professor Dr. at Izmir Katip Çelebi University, School of Foreign Languages were consulted. Demographic characteristics of the experts are given in Table 4.

Table 4

Demographic Characteristics of the Expert Group

Expert	Field
E1- Dr. Lecturer	Curriculum and Instruction
E2 - Assistant-Professor Dr.	Supervising Teacher-Researchers
E3 - Assistant-Professor Dr.	Faculty of Education, ELT Department

In the expert opinions, it was mentioned that some items encompass multiple expressions, there were items with some mistakes, certain question stems need to be reorganized, and the paper design was improper. Based on the expert opinions, items 7, 12, 15, 18 and 19 were excluded (Appendix 2). Following the revisions, the question items were administered to 13 EFL students at B2 level to determine if they were understandable by the students. While students were taking the test, the researcher remained present to inquire and verify if there were any unclear or problematic questions. It was observed that the students completed the test in 30 minutes. At the end of the inquiry, the students provided feedback, indicating that all questions were clear.

As a next step, item analyses were conducted. For this, the trial form of the vocabulary retention test in paper form consisting of 38 questions was administered to 73 preparatory students who had completed the third module at the B2 level during the 2020-2021 academic year. These students were chosen because they represented the target population for whom the vocabulary retention test is intended. After administering the trial form of the vocabulary retention test, item analysis was conducted to evaluate the quality of the test items. Item analysis involved examining statistical indicators such as item difficulty and item discrimination. By conducting item analysis on the trial form of the vocabulary retention test, it was aimed to evaluate the difficulty and discrimination of the test items, ultimately ensuring that the final version of the test was valid, reliable, and appropriate for assessing vocabulary achievement at the B2 level. The item analysis results of the data obtained from the pilot application of the vocabulary retention test trial form are presented in Table 5.

Table 5

Vocabulary Retention Test Item Analysis Results

Item No	Item Difficulty(p)	Item Difficulty Level	Item Discrimination(r)	Item Discrimination Level
1	.50	Moderate	.33	Good
2	.54	Moderate	.31	Good
3	.56	Moderate	.39	Good
4	.61	Moderate	.33	Good

5	.71	Moderate	.31	Good
6	.68	Moderate	.47	Very Good
7	.53	Moderate	.17	Weak
8	.64	Moderate	.39	Good
9	.76	Moderate	.31	Good
10	.40	Moderate	.42	Very Good
11	.69	Moderate	.44	Very Good
12	.78	Moderate	.33	Good
13	.76	Moderate	.36	Good
14	.65	Moderate	.19	Weak
15	.69	Moderate	.50	Very Good
16	.54	Moderate	.42	Very Good
17	.65	Moderate	.36	Good
18	.82	Easy	.19	Weak
19	.36	Moderate	.44	Very Good
20	.65	Moderate	.31	Good
21	.68	Moderate	.42	Very Good
22	.67	Moderate	.33	Good
23	.42	Moderate	.44	Very Good
24	.68	Moderate	.47	Very Good
25	.75	Easy	.39	Good
26	.47	Moderate	.50	Very Good
27	.38	Moderate	.36	Good
28	.61	Moderate	.50	Very Good
29	.53	Moderate	.33	Good
30	.83	Easy	.28	Good
31	.54	Easy	.36	Good
32	.60	Moderate	.36	Good
33	.74	Moderate	.42	Very Good
34	.61	Moderate	.39	Good
35	.44	Moderate	.39	Good
36	.43	Moderate	.31	Good
37	.65	Moderate	.36	Good
38	.49	Easy	.31	Good

Item difficulty ranges were based on $0 < p < 0.24$ difficult, $0.25 < p < 0.75$ moderate, $0.75 < p < 1.00$ easy (Tekin, 1996). The ranges stated below were taken as basis in interpreting the items according to their discrimination index (Tekin, 1996):

- Values equal to or greater than 0.40: Very good item
- Values between 0.30 and 0.39: Quite good item

- Values between 0.20 and 0.29: Items that need improvement (usable as a moderate item in their current state)
- Values equal to or less than 0.19: Weak items (should be removed from the test if they cannot be improved)

When Table 5 is examined, it can be observed that 5 items are easy, and 33 items are of moderate difficulty. Of these items, 12 have very good discrimination, 22 have quite good discrimination, one item has moderate discrimination, and three items have weak discrimination. Accordingly, items 7, 14, and 18 were removed from the retention test due to their discrimination index being 0.19 or lower. The retention test, which includes 35 items, has its descriptive statistics displayed in Table 6. This table provides a detailed breakdown of the test results.

Table 6.

Descriptive Statistics of Vocabulary Retention Test

Number of Items	35
Number of Examinees	73
Score of the Highest Scoring Student	35
Score of the Lowest Scoring Student	2
Mean Score	23.53
Standard Deviation	13.20
KR-20 Reliability Coefficient	.902
Mean of Item Difficulty	.60
Mean of Item Discrimination	.38

When Table 6 is examined, it is seen that the item difficulty of the retention test is at a medium level ($p = .60$) and its discrimination is at a good level ($r = .38$). In addition, the KR-20 reliability coefficient value of the retention test was calculated as .902. Based on these values, it can be said that the retention test is a medium difficulty scale with high reliability and discrimination (Tekin, 1996). In conclusion, after conducting the analyses, a vocabulary retention test consisting of 35 questions was developed. The test included 15 multiple-choice questions, 5 matching questions, and 10 sentence completion questions, all related to the relevant vocabulary (Appendix 2).

3.3.2. Intrinsic motivation inventory regarding doing exercises

In order to assess the effects of the digital game-based and worksheet-based exercises on intrinsic motivation, both groups of students completed an ‘intrinsic motivation inventory’ (IMI) developed by Çalışkur and Demirhan (2013). The intrinsic motivation inventory was used to assess motivation of participants after completing exercises over a four-week period, whether they were digital game-based for the experimental group (EG) or worksheet-based for the control group (CG). The inventory consisted of 32 questions that asked students to rate their feelings about the implementation and four-week application period on a scale from 1 (not true) to 7 (very true). The questions covered topics such as enjoyment of the application, effort put into the implementation, and the importance of being successful at the method applied. A total of 44 participants, encompassing all individuals who underwent both the pre-test and post-test (25 in the experimental group and 19 in the control group), actively took part in the inventory response session. This session, facilitated by the researcher, required approximately 15 minutes for completion.

In the conducted study, the intrinsic motivation inventory regarding doing exercises was employed to assess students' motivation towards the task. Some of the items included statements such as ‘I really enjoyed doing this task’ and ‘Doing this task was fun.’ The decision to administer the inventory solely as a post-test, without an accompanying pre-test, was made with a specific aim in mind. The primary objective of utilizing the intrinsic motivation inventory regarding doing exercises in this research was to gauge students' motivation towards the process after its completion. The emphasis was placed on capturing their intrinsic motivation at the conclusion of the activity, aiming to measure the enjoyment and perceived entertainment derived from the task. Consequently, the inventory was intentionally administered only as a post-test, postulating that students' reflections on the overall experience would be more accurate and reflective of their intrinsic motivation at the endpoint of the process. By focusing on post-test data, the study sought to capture the immediate and authentic impact of the task on students' intrinsic motivation, providing valuable insights into their perceptions of the task's enjoyability and entertainment value.

The inventory that is utilized in this study was firstly developed by Ryan (1982). According to Monteiro, Mata & Peixoto (2015), it serves as a means for researchers to assess participants' experiences of an intervention from multiple perspectives. The initial version of this inventory includes 45 items, evaluating user experience across categories like perceived competence, interest/enjoyment, effort preference, tension, and value. Tsigilis and Theodosiou (2003) noted that this inventory is particularly effective for assessing and gaining insight into how users perceive and respond to a study. It is a useful tool for understanding their views and experiences.

The inventory was adapted for Turkish use by Çalışkur and Demirhan (2013). They did this as part of their study called 'Intrinsic Motivation Inventory Linguistic Equivalence, Reliability, and Validity Study' (Appendix 3). The research entailed a thorough examination of the inventory's linguistic appropriateness for Turkish, its reliability, and its validity in measuring the intended constructs. This adaptation process enabled the effective application of the intrinsic motivation inventory regarding doing exercises in Turkish research settings, ensuring its suitability and accuracy for local contexts.

In the reliability study of the inventory, according to the statistical analysis results conducted on the collected data, the test-retest reliability value was obtained as $p > 0.05$, indicating that there was no significant difference between the application of the scale at two different times, and that the scale demonstrates test-retest reliability. In the analyses, Cronbach's Alpha for the overall scale was found to be $\alpha = 0.86$, and the Pearson correlation was $p < 0.01$. The α values for the sub-dimensions were as follows: 0.91 for the 'Interest/Liking' dimension, 0.86 for the 'Perceived Competence' dimension, 0.82 for the 'Perceived Autonomy' dimension, 0.67 for the 'Value/Benefit' dimension, 0.80 for the 'Effort/Importance' dimension, 0.73 for the 'Pressure/Stress' dimension, and 0.76 for the 'Job Perception' dimension. In the final stage of the validity study, criterion validity was examined, and a significant relationship between the 'Internal Motivation Questionnaire', consisting of 9 items and prepared by Mottaz (1985) and revised by Dündar, Özutku, and Taşpınar (2007). Consequently, intrinsic motivation inventory regarding doing exercises was found. As a result of the detailed linguistic equivalence, reliability, and validity studies of IMI, it is demonstrated that intrinsic motivation inventory regarding doing exercises is a

reliable and valid scale that can be applied to individuals aged between 18 and 29 under Turkish conditions (Çalışkur & Demirhan, 2013).

In the current study, the Cronbach alpha value was calculated based on the post-test application of intrinsic motivation inventory regarding doing exercises. The Cronbach alpha value was found as .91 from the data obtained from the control group, and as .88 from the data obtained from the experimental group. Therefore, the instrument was found to be a reliable data collection tool.

3.4. Application process

In the following sections, details regarding the pilot study and the data collection procedure used in both the experimental and control groups will be provided.

3.4.1. The pilot study

The purpose of this pilot study was to test the data collection instruments, feasibility of the study and to gather preliminary data. A study's validity can be threatened if the research methods or measurement tools used are not appropriate or do not accurately capture the concept being studied. That's why, this study was used to test the validity of the research methods and measurement tools by collecting preliminary data and assessing whether the results are consistent with what is expected. On the other hand, this pilot study was used to test the reliability, as well, by collecting data from a small sample group of students and assessing whether the results were consistent. This procedure was helpful to identify any potential issues with the reliability of the study and to make necessary adjustments before proceeding with the full study.

The pilot study was conducted during the 4th quarter of the 2021-2022 academic year at the same state university. After the successful completion of the preceding three modules, the participants were assigned to their B2 level classes, which aligned with the levels of both the experimental and control groups in the full study. The research was conducted

with a group of 11 participants, consisting of 7 females and 4 males, over a duration of four weeks. The primary focus was to assess whether any unforeseen issues or challenges arose during the process of teaching and practicing the essential vocabulary adapted from the main course book 'Language Hub' and Macmillan Education Everywhere Software Programme (MEE) (Fung, 2017). This teaching and practice were facilitated through the use of two specific digital tools: the mobile application Memrise and the web site Easy Notecards. Memrise is a language learning platform that employs spaced repetition and mnemonic techniques to aid users in memorizing vocabulary, while Easy Notecards serves as a platform for creating, sharing, and studying flashcards, which will be further elaborated upon in following sections.

Throughout the study, various possible difficulties and obstacles related to using Memrise and Easy Notecards became apparent. These challenges primarily revolved around technical issues like logging in and signing up problems or joining the classroom, which created hurdles in smoothly accessing and using these platforms. Additional potential problems were identified aside from these technical issues. These involved concerns about the user interface, such as the complexity of navigating the platforms, which could make it difficult for participants to find and access the specific vocabulary exercises they required. It is recognized that more comprehensive and detailed explanations about the platforms used by students are necessary. To address this, plans were implemented, such as organizing extended training sessions or creating informative materials, ensuring that the identified needs are adequately met. Moreover, matters related to the level of engagement and motivation experienced by different participants in the digital learning environment were considered, recognizing that it may not be equally captivating or inspiring for everyone. Lastly, these various challenges were recognized and cautions that would positively impact the full study were taken into consideration. For instance, during full study process, to prevent potential technical issues such as low battery or a lack of internet connection, measures were taken, including the provision of additional electricity cables, and the researcher's mobile phone was employed as a hotspot for internet delivery. Moreover, pair work activities were implemented to not only ensure a thorough understanding of instructions among students but also to enable them to assist their peers in gaining complete comprehension about usage of digital-game based exercises.

On the other hand, the retention test questions were administered to the group after the four-week treatment. No issues were detected in connection with the vocabulary retention test. In the final step, the photocopies were allocated, and the group filled out the intrinsic motivation inventory regarding doing exercises using a seven-point Likert scale. As mentioned before, the study employed the intrinsic motivation inventory regarding doing exercises to assess students' motivation toward a task, using statements like 'I really enjoyed doing this task' and 'Doing this task was fun'. Significantly, the inventory was administered only as a post-test, aiming to capture students' intrinsic motivation after completing the activity. This deliberate choice sought to measure the enjoyment and perceived entertainment derived from the task, emphasizing post-test data to obtain immediate and authentic insights into students' intrinsic motivation regarding doing exercises at the endpoint of the process. The results of the intrinsic motivation inventory regarding doing exercises indicated that participants predominantly selected options 5, 6, and 7 on the Likert scale, suggesting a high level of enjoyment in engaging with the activities.

In summary, the results of this pilot study suggest that the proposed study examining the comparison of worksheet-based exercises and digital game-based exercises in terms of vocabulary retention and intrinsic motivation regarding doing exercises is feasible and worth pursuing on a larger scale. Further research on a large scale is needed to confirm these findings and to determine the long-term effects of worksheet-based exercises and digital game-based exercises in terms of vocabulary retention.

3.4.2. Instruction of digital game-based vocabulary exercises

In the study, the vocabulary instruction for the students in the experimental group were conducted based on digital game-based approach. For this, prior to the application process (Week 1), students were informed in detail about the purpose and scope of the research. It was explained to the students how the application process would be carried out, which educational platforms would be used, for what purposes and how. Additionally, it was clarified that the test scores were not related to the grades and had no effect on passing the

summer school. In the first week of the summer school, a pre-test in paper form consisting of multiple choice, matching, and sentence completion questions about vocabulary was administered to the experimental group by the researcher. The pre-test was based on vocabulary worksheets from the Language Hub Teachers' book that had been adapted to align with the preparatory school's curriculum. The participants had 30 minutes to complete the pre-test.

In the following four weeks, the experimental group received instruction using digital game-based teaching, with each lesson lasting 45 minutes. In this process, two different platforms (Easy Notecards & Memrise) were utilized. Therefore, the students in the experimental group were introduced to the use of the applications. Each week began with the introduction of new vocabulary items related to the weekly-assigned curriculum of the main course book, provided through 4 hours of input during the main course book activities. In addition, the instructor allocated 2 hours per week for level-coordinator designed vocabulary exercises.

Practice and game play sessions were held on Fridays each week. They were also informed that the activities related to the vocabulary worksheets from their main course book. The experimental group was further informed that their scores would be rewarded with small edible prizes based on their ranking in the game each week, with the participant with the highest score at the end of the 4 weeks being declared the 'Champion of the Summer' in the class.

The researcher employed a tailored approach to enhance vocabulary acquisition among the experimental group. Digital vocabulary cards, visuals, and exercises were developed to align with the weekly learning objectives and vocabulary items. To foster vocabulary acquisition through a digital game-based approach, participants engaged in various activities, such as matching exercises, quizzes, and sentence typing exercises, (Appendix 4) following the introduction of new vocabulary. During these activities, the researcher provided oral feedback and explanations to address common errors. At the end of each class session, participants utilized their portable devices like tablets or smartphones to play the Bingo! game, which was specifically designed to reinforce the vocabulary introduced

each week. The session concluded with the recognition of the ‘Leader of the Week’ and the Bingo! game winner, with weekly updates to the leaderboard throughout the program.

The effectiveness of the digital game-based methods was assessed through a post-test administered after four weeks of treatment. Additionally, participants completed an intrinsic motivation inventory regarding doing exercises to gather insights into the impact of these treatment on their motivation.

3.4.3. Digital game-based exercises implemented in the study

In the study, two different platforms, namely Easy Notecards and Memrise, were utilized in the experimental group. Detailed information about these platforms is provided in the following sections.

3.4.3.1. Memrise

Memrise, a platform co-founded by Ed Cooke and Greg Detre, stands as a free online resource for language acquisition. It adopts a vocabulary-centric approach and boasts an impressive array of over 150 language courses available in 25 different languages. As Łuczak (2017) underscores, Memrise is not limited to language learning alone; it is a versatile digital tool compatible with mobile devices, offering comprehensive educational support for a wide spectrum of subjects.

For language learners, Memrise proves to be a valuable resource, granting them the ability to focus on particular language elements, whether it is vocabulary or grammar. According to Wahyuningsih and Putra (2022), researchers have determined that employing the Memrise program represents the most modern approach to instructing students in vocabulary. Widely recognized as an efficient method for achieving this goal, the Memrise program has demonstrated the potential to enhance students' overall vocabulary knowledge. Memrise excels in facilitating memorization-based language learning, primarily in the realm of vocabulary. Karjo (2018) states that Memrise functions as an

online learning platform designed to assist users in expanding their vocabulary. Furthermore, it introduces unique features, including a memory-training exercise system and seamless integration of flashcards and engaging games. According to Wahyuningsih (2020), Memrise is a learning platform that allows users to explore a diverse array of subjects across various devices, including mobile phones and tablets. In the study conducted by Widyaningrum and Putro (2020), Memrise was utilized to enhance students' listening and speaking skills. The results of the research indicated that Memrise played a crucial role in facilitating the improvement of students' abilities in listening and speaking. These attributes make the journey of language improvement not only effective but also enjoyable, cultivating a sense of community among learners.

Memrise provides various ways to help learners understand words and phrases. One simple activity is where users see a word and choose its meaning from four to six options. If they get it right, a big alert shows up. Another tool is "Word Flashcards," which lets users review words they've learned before. After trying to translate a word, they can make a flashcard with any note that helps them remember. Sometimes, users need to make their own flashcards to memorize new words, as Memrise does not always provide them. There's also an "Audio Choices Challenge" where three audio clips are played, and the user picks the one that matches the given word. The right choice turns green, and the wrong one turns red. The "Word Typing Test" aims to enhance listening skills by having users type a word they hear. Finally, in the "Translation of Phrases" activity, users get a phrase as a question and choose the right translation from five-word options. After this, they are encouraged to create a flashcard for the phrase (Memrise, 2023).

In this study, Memrise was employed to assess students' vocabulary by presenting them with related vocabulary items taught in the same week. Before commencing the six-week process with the experimental group, the initial week was dedicated to providing essential information, including instructions on how to log in, join a class, and complete various types of question formats within the application. The application featured a variety of exercise types, such as Word Flashcards, Audio Choices Challenge, and Word Typing Test. Notably, translation exercises were not chosen, as the provided word explanations were in English. The vocabulary covered various topics, including travel, business

collocations, gradable and ungradable adjectives, prefixes, and phrasal verbs adapted from Language Hub course book. Screen images related to Memrise platforms are presented in Figure 9.

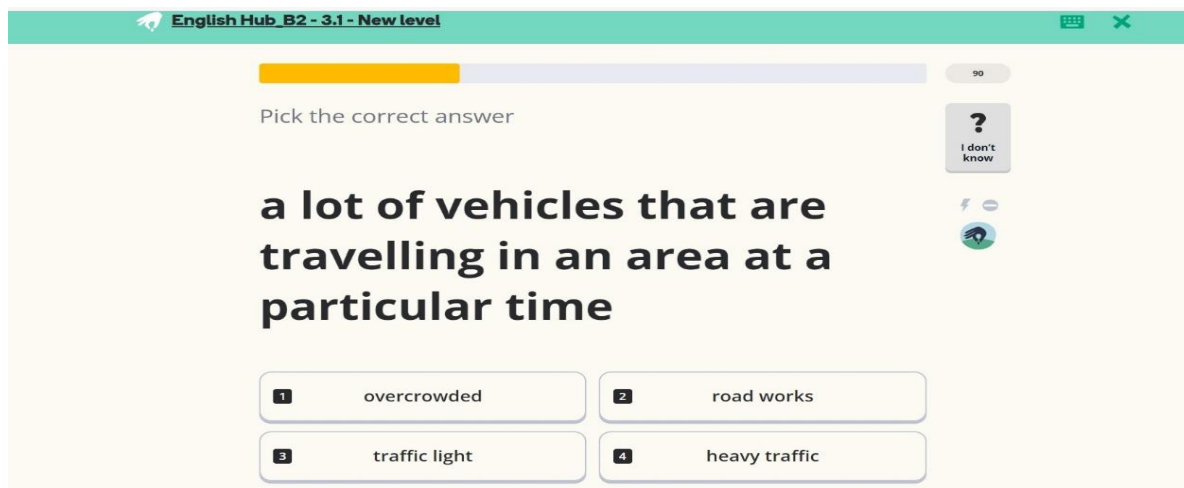


Figure 9. Multiple-choice exercises

As seen in Figure 9, multiple-choice exercises were implemented following a comprehensive explanation of each word. In the event of students making mistakes, the application presented the same questions repeatedly until they achieved the correct answer.

In the "Translation of Words" task, which is a fundamental feature of the app, users see four to six choices and have to pick the one that means the same as the given word. When they choose the right answer, Memrise shows a big notification to let them know they got it correct.

The "Word Typing Test" is designed to improve listening skills, where users hear an audio voice and must type the word they hear. Learners can also use the "hint" button if they cannot remember the word (Figure 10).

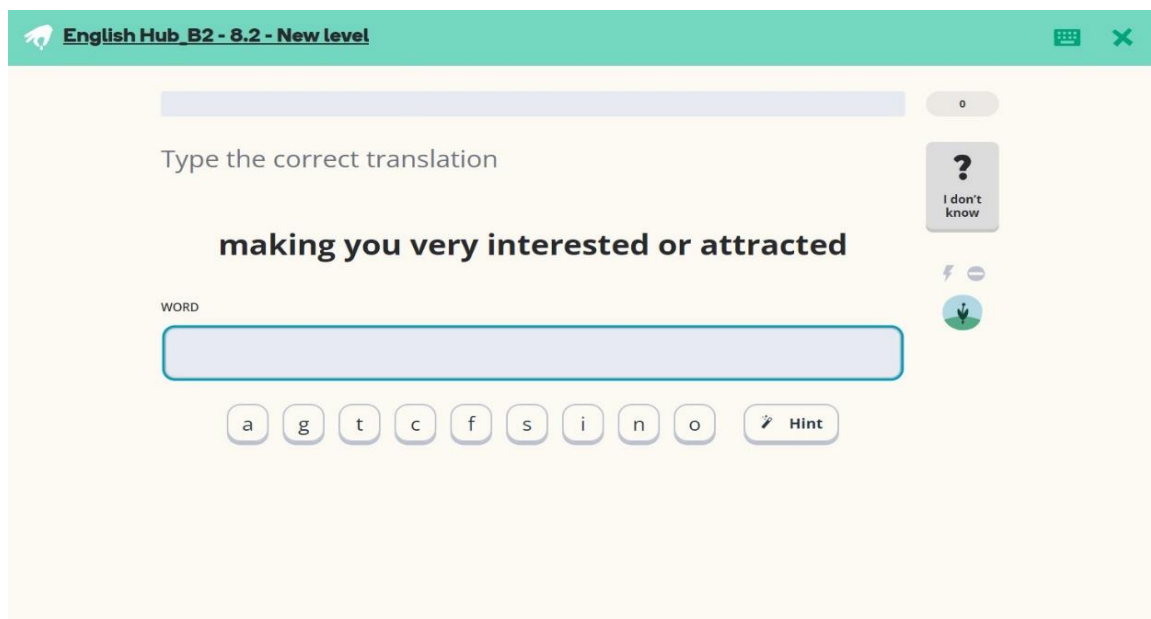


Figure 10. Typing questions exercises

The app's simplest feature is the "Translation of Words" challenge, where users are shown several answer boxes and need to choose the one matching the word's meaning. A big alert pops up for a correct response. Another tool, "Word Flashcards," aids in remembering words learned earlier. Following the translation challenge, a flashcard shows up for users to note down memory aids for the word. However, since Memrise does not always provide flashcards, users might have to make their own for new vocabulary.

Additionally, the "Translation of Phrases" task involves selecting the right translation for a given phrase, which is presented as a question with multiple word options. Post this task, Memrise prompts users to create a flashcard for the phrase, aiding in retention.

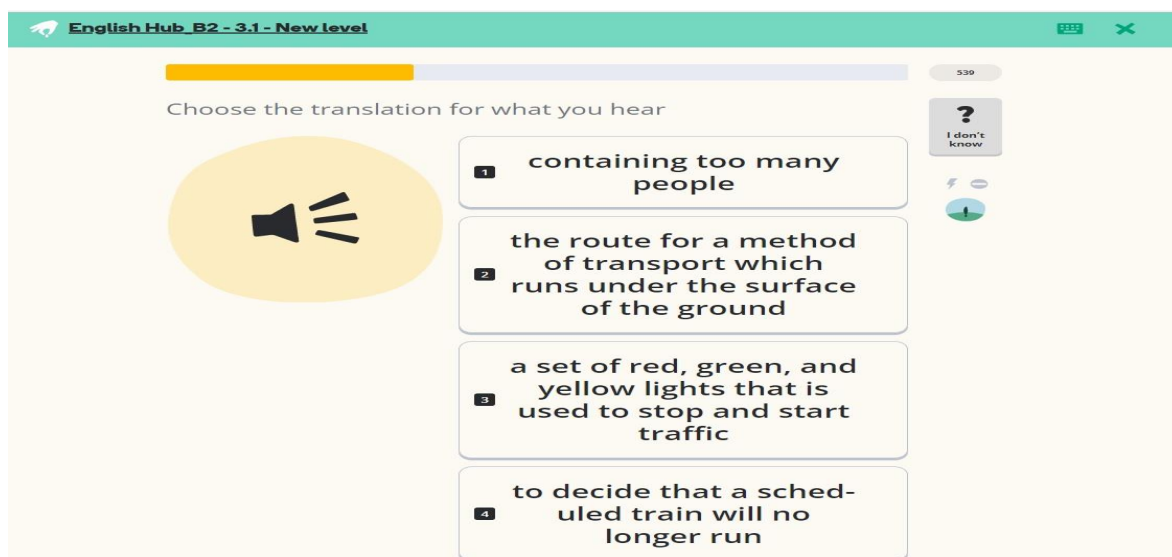


Figure 11. Audio choices challenge

Figure 11 shows the "Audio Choices Challenge" on Memrise, where users listen to three audio clips and choose the one that matches the word in the question. The app shows the right answer in green and the wrong ones in red.

3.4.3.2. Easy notecards

Easy Notecards is an online platform that allows both teachers and students to create interactive notecards for various educational needs. These include studying vocabulary, checking pre-existing knowledge, reading comprehension, and even for quick assessments at the end of classes. Additionally, teachers can utilize these notecards and flashcards as part of formative assessments to pinpoint areas where students struggle and need more support. The tool is user-friendly and does not require any specialized technical or coding abilities. Some of its key features include responsive web design, the ability to add images (Figure 12), and formatting options for customizing notecards. Additionally, users can edit a single note card without having to go through the entire set (Easy Notecards, 2023). In this study, Easy Notecards was employed as an additional tool to facilitate the teaching and evaluation of students' vocabulary retention and comprehension of words introduced

during the same week. The website was used in tandem with Memrise, with the two platforms alternating on a weekly basis. When using the Memrise application, the initial week was dedicated to providing essential guidance on how to access and effectively utilize the Easy Notecards platform, too. The application provided several engaging services to enhance vocabulary acquisition. The first service, known as "The Quiz," allowed students to test their knowledge. The second service, the "Matching" feature, facilitated the association of terms with their definitions. The third service, the game "Bingo," added an element of fun and competition to the learning process (Easy Notecards, 2023). Notably, the vocabulary selected for these exercises corresponded with the unit topics that were not included in the Memrise application. This allowed students to review the vocabulary through different types of digital game-based exercises, contributing to a comprehensive learning experience.

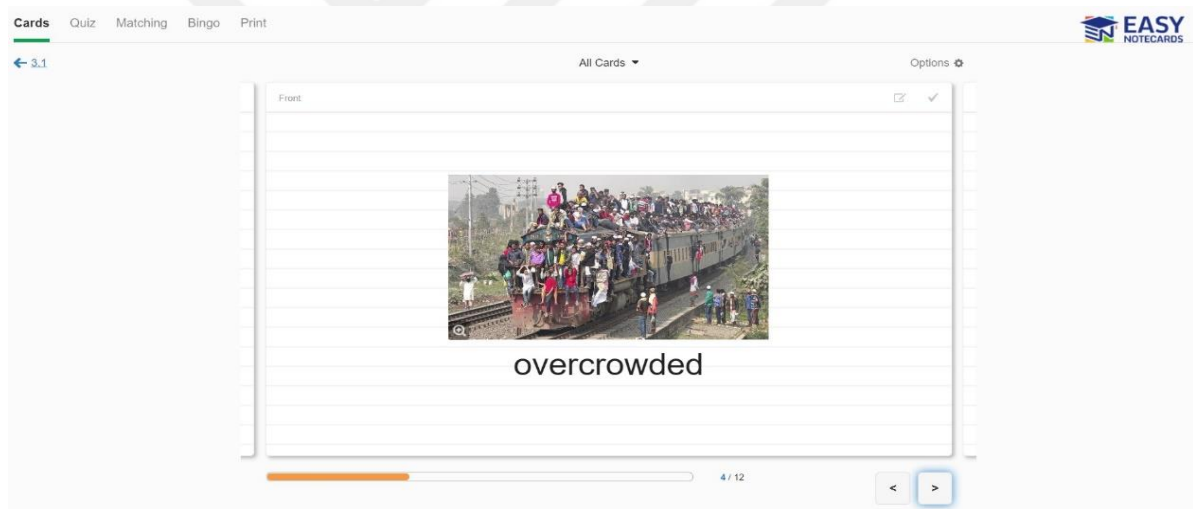
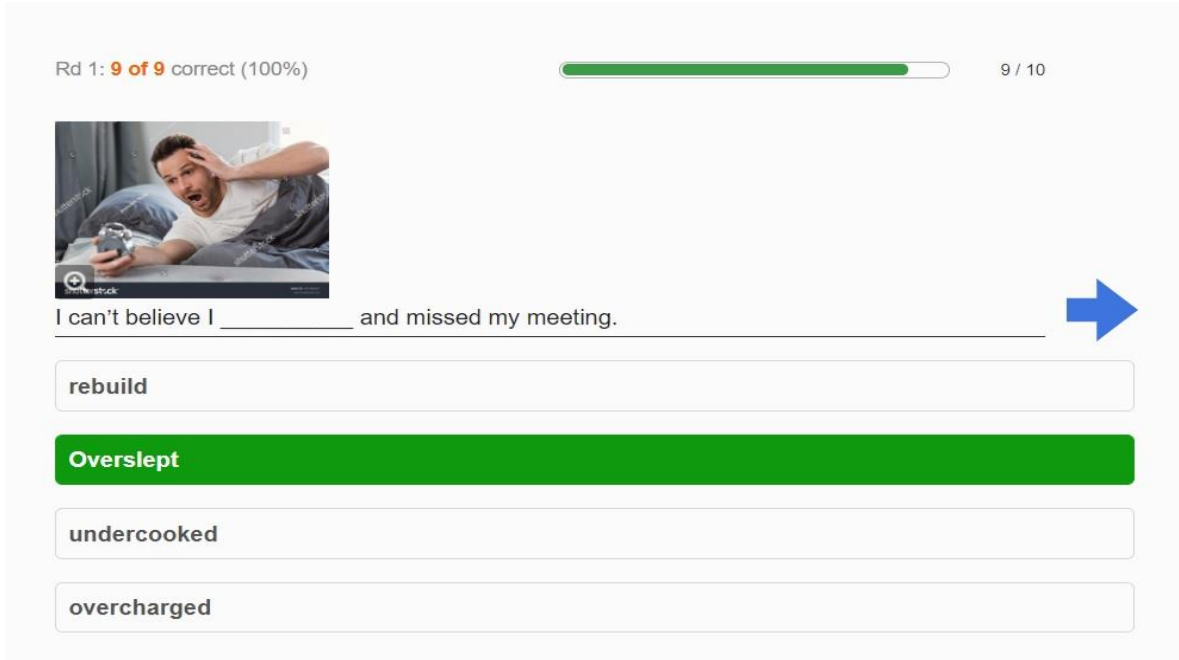


Figure 12. The feature to add and customize images

As seen in Figure 12, Easy Notecards provide learners with the opportunity to employ visual learning and memory retention techniques.

Easy Notecards allows users to control who can view or edit their notecard sets by giving them the option to make them public or password protect them. The tool also includes three game-based services that enhance the process of creating and interacting with

notecards. The first service is "The Quiz" feature, which offers students the opportunity to take multiple-choice quizzes for every notecard set and test their knowledge by featuring questions that were missed in previous rounds (Figure 13).



Rd 1: 9 of 9 correct (100%) 9 / 10



I can't believe I _____ and missed my meeting.

Overslept

Figure 13. The quiz feature

The second service is the "Matching" feature, which incorporates game-based learning by allowing users to drag the front of each notecard to its corresponding back, with scoring based on speed and accuracy (Figure 14).

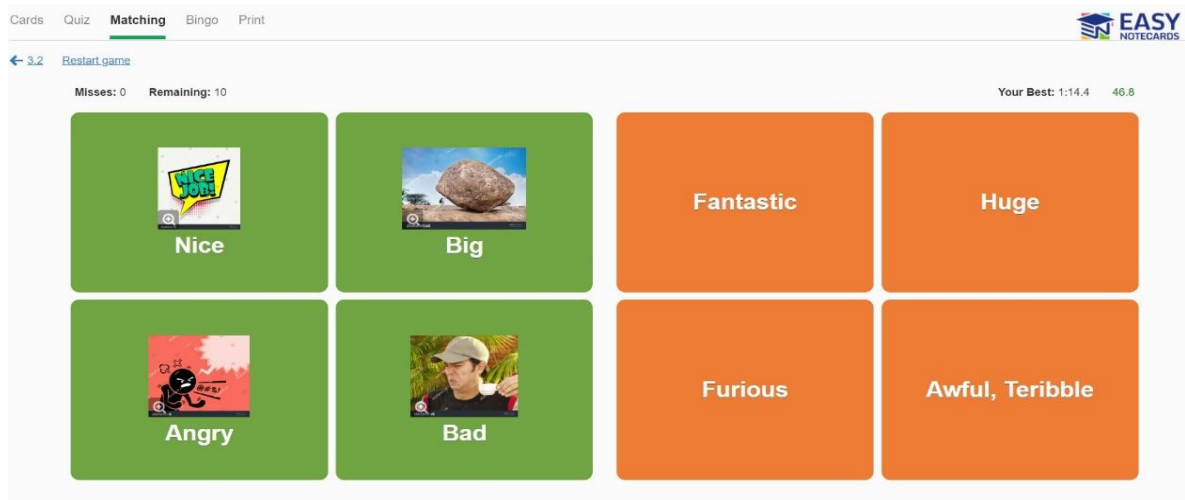


Figure 14. Matching service

The third service is the game "Bingo", which boosts engagement and enhances learning by utilizing the information in the notecards and allowing students to play individually or against peers in multiplayer mode, with access to chat and bingo points (Figure 15).

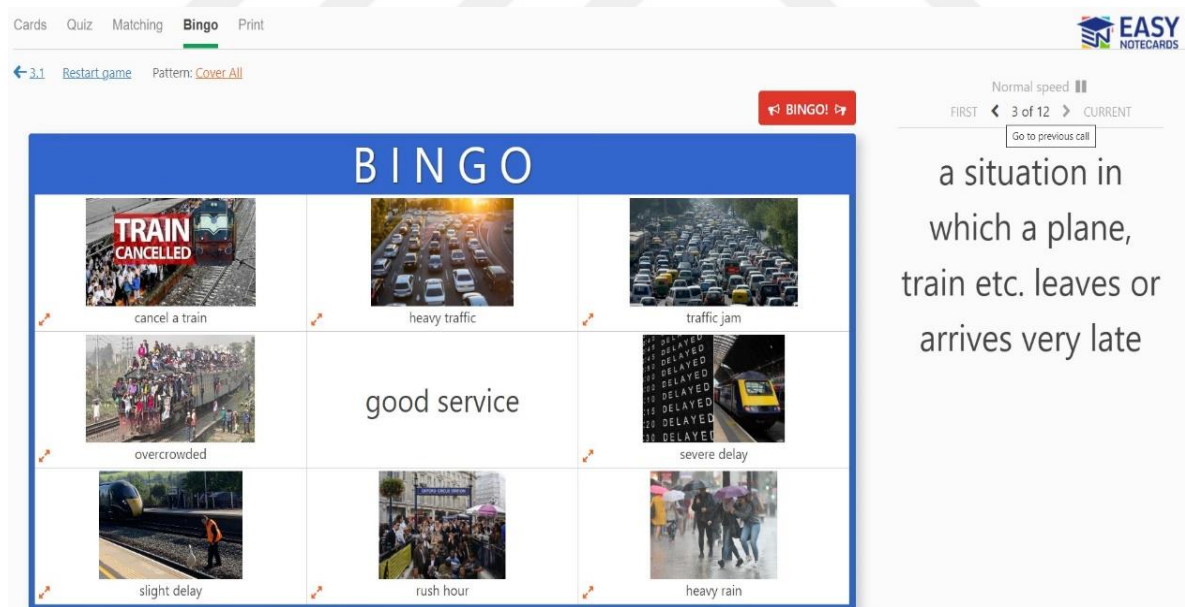


Figure 15. Bingo game service

3.4.4. Instruction in the control group

This study employed a control group, in which the participants received vocabulary instruction based on the existing curriculum of the preparatory school at B2 level. The instruction process included target vocabulary given on a weekly basis, same as the experimental group. However, in this group, instead of digital game-based exercises, the students were given worksheet-based exercises (Appendix 5) for independent practice, and their answers were checked during class. Each week began with the introduction of new vocabulary items related to the weekly-assigned curriculum of the main course book, provided through 4 hours of input during the main course book activities. In addition, the instructor dedicated two hours weekly to carry out vocabulary practice activities developed by the level coordinator. In contrast to the experimental group, the control group engaged in worksheet-based activities. These worksheets were predominantly completed in the classroom, with some sections assigned as homework, and their answers were subsequently reviewed during the lesson.

After the four-week application process, post-tests were administered to the students. Additionally, IMI was applied to the students to reveal their motivation towards the application process. These procedures were applied during the six weeks.

3.5. Data analysis

In order to determine the appropriate analysis method for comparing the pre- and post-test scores obtained by the students, whether the data obtained showed a normal distribution was investigated. For this purpose, the Shapiro-Wilk Normality Test was performed. The Shapiro-Wilk test was preferred because it gives more meaningful results in study groups with a sample size of 50 or less. According to Büyüköztürk (2010), the significance of a p-value exceeding .05 in the Shapiro-Wilk tests is noteworthy. It suggests that the data aligns well with a normal distribution. This interpretation is crucial for statistical analysis, as it implies that the dataset follows the typical bell-shaped curve, making it appropriate for various statistical procedures that assume normality.

Table 7

Shapiro Wilk Normal Distribution Test Results

Variables	Shapiro-Wilk		
	Statistics	Sd	p
Experimental Group-Pre-test	.951	25	.26
Experimental Group-Post-test	.966	25	.53
Control Group-Pre-test	.913	19	.083
Control Group-Post-test	.955	19	.475

When Table 7 is examined, it was determined that the students' pre-test and the post-test scores of both control and experimental groups showed a normal distribution ($p > .05$). In this case, paired sample t-test (Kalaycı, 2014) was applied to compare the mean scores on the same sample group in cases where the data were normally distributed. Therefore, it was aimed to understand whether there were significant differences in the experimental group students' pre-test and post-test scores obtained from the vocabulary retention test. Similarly, paired sample t-test was used to understand whether there were significant differences in the control group students' pre-test and post-test scores obtained from the vocabulary retention test. Additionally, independent group t-test was applied to compare the post-test scores of the experimental and control group students obtained from the vocabulary retention test. To determine the intrinsic motivation level of the students regarding doing exercises in the experimental and the control group, descriptive statistics such as frequency and percentages for each item in the inventory are calculated and given in tables.

In the study, the effect size of the differences between the means was determined using Cohen's d and eta squared (η^2) values. The interpretation of the obtained effect size was based on the following ranges for Cohen's d: $0 \leq \text{Effect Size} \leq 0.20$ (Small Effect), $0.21 \leq \text{Effect Size} \leq 0.50$ (Medium Effect), $0.51 \leq \text{Effect Size} \leq 1.00$ (Large Effect), $\text{Effect Size} > 1.00$ (Very Large Effect) (Dinçer, 2014). For interpreting eta squared (η^2) values, small = 0.01, medium = 0.06, and large = 0.14 were used as reference points (Büyüköztürk, 2010).

CHAPTER IV

FINDINGS

This section presents the findings obtained from the Vocabulary Retention Test, including pre- and post-test scores, as well as the results from the Intrinsic Motivation Inventory regarding doing exercises in accordance with the study's sub-problems.

4.1. Findings obtained from pre- and post-test scores of vocabulary retention test

This study aimed to investigate and compare the impact of digital game-based vocabulary exercises, specifically through the applications Memrise and Easy Notecards, with that of worksheet-based exercises. The study focused on examining how these different methods influence vocabulary retention and intrinsic motivation of the participants in both groups. The pre-tests and post-test scores of both the control group and the experimental group are analysed, and the findings obtained in this study are given below.

In the study, paired samples t-test analysis was conducted to determine whether there were significant differences in the experimental group students' pre-test and post-test scores obtained from the vocabulary retention test, and the findings are shown in Table 8.

Table 8

Comparison of Pre-test and Post-test Scores of Experimental Group Students

Group	Test	N	$\bar{X}$	Sd	SE	T-test			η^2	d
Experimental Group	Pre-test	25	.38	.11	.02	df	t	p		
	Post-test	25	.56	.15	.03	24	-6.97	.00	0.576	1.368
test										

As a result of the paired samples t-test analysis, a significant difference between students' pre-test and post-test scores was determined ($p < .05$), affirming the impact of the experimental treatment. Cohen's d further supports this, revealing a substantial effect size ($d = 1.368$). The Eta squared (η^2) value of 0.576 indicates that 57.6% of the variance in the dependent variable can be attributed to the independent variable. The average score of the pre-test stood at 0.38, while the mean score of the post-test rose to 0.56, signifying a positive increase. The paired samples t-test, coupled with the substantial Cohen's d and Eta squared values, reinforces the statistical significance of this shift, as evidenced by the p -value of 0.00.

In the study, paired samples t-test analysis was conducted to assess the significance of differences in the control group students' pre-test and post-test scores obtained from the vocabulary retention test. The findings are shown in Table 9. The results from the paired samples t-test showed a statistically significant difference in the students' scores between the pre-test and post-test ($p < 0.05$). This significance is further emphasized by a sizable effect size, with Cohen's d at 1.480. The Eta squared (η^2) value of 0.879 indicates that an 87.9% of the variance in the dependent variable can be attributed to the independent variable. When examining mean scores, it was evident that post-test mean scores (0.53) were higher than pre-test mean scores (0.33), signifying a positive shift. The standard deviations of the pre-test (0.13) and post-test (0.14) provide insight into the variability of scores within each set.

Table 9

Comparison of Pre-test and Post-test Scores of Control Group Students

Group	Test	N	$\bar{X}$	Sd	SE	T-test			η^2	d
Control Group	Pre-test	19	.33	.13	.03	df	t	p		
	Post-test	19	.53	.14	.03	18	-6.61	.00	0.879	1.480

To see if there was a notable difference, post-test scores of the students in both the experimental and control groups were compared, specifically focusing on their retention test post-test scores. The results of this comparison are presented in Table 10.

Table 10

Analysis Results for Comparison of Students' Post-Test Retention Scores

Test	Group	N	$\bar{X}$	Sd	SE	T-test		
Post-tests	Experimental	25	.56	.15	.03	Sf	t	p
	Control	19	.53	.14	.04	42	.720	.47

The results, as presented in Table 10, indicate that when mean scores are considered, there is no statistically significant difference between the post-test scores of students in the experimental and control groups ($p > 0.05$). The comparable post-test mean scores suggest a similarity in the retention levels of both groups following the intervention, indicating that the experimental treatment did not lead to a significant difference in the assessed findings between the two groups.

The t-test findings ($p = 0.47$) demonstrate that there was no significant variance, implying that any alterations in mean post-test scores among the groups were most likely a result of random fluctuations rather than inherent disparities in the treatments. The experimental group had a mean post-test score of 0.56, while the control group showed a slightly lower mean score of 0.53. However, this small difference lacked statistical significance, suggesting that both intervention methods were similarly effective in impacting post-test retention scores.

4.2. Findings obtained from intrinsic motivation inventory regarding doing exercises

After engaging in vocabulary exercises on worksheets for a duration of four weeks within their respective classes, participants both in the control group and experimental group were administered an intrinsic motivation inventory regarding doing exercises. This inventory involved a seven-point Likert-type questionnaire, prompting students to articulate their levels of intrinsic motivation throughout the process. On the seven-point Likert scale, where 1 signifies "not true at all," 4 corresponds to "somewhat true," and 7 denotes "very true" (Table 13). The questionnaire encompassed six categories (Table 11), and the researcher analysed response frequencies and percentages to interpret the data.

The descriptive statistics for the intrinsic motivation inventory regarding doing exercises in the control group is given in Table 11. The control group demonstrated a moderate level of interest and enjoyment (Mean = 4.73, SD = .77) and perceived competency (Mean = 4.31, SD = 1.15), with similar scores indicating a balanced motivational environment. Participants reported a notable emphasis on effort and importance (Mean = 4.38, SD = 1.09) while experiencing a manageable level of pressure and tension (Mean = 3.90, SD = 1.43). Additionally, perceived choice (Mean = 3.86, SD = 1.49) and perceived value/usefulness (Mean = 5.60, SD = 1.47) highlight distinctive aspects of the motivational landscape. The overall IMI score for the control group is 4.46 with a standard deviation of 0.90, suggesting a consistent level of intrinsic motivation within the group. These findings provide a nuanced understanding of participants' motivational experiences, forming a foundation for further analysis and interpretation.

Table 11

Descriptive Statistics of IMI in Control Group

IMI	$\bar{X}$	SS
Interest-Enjoyment	4.73	.77
Perceived Competency	4.31	1.15
Effort-Importance	4.38	1.09
Pressure/Tension	3.90	1.43

Perceived Choice	3.86	1.49
Value/Usefulness	5.60	1.47
Total	4.46	.90

The descriptive data on the responses of the EG students for the items is given in Table 12. The group displayed a consistent level of interest and enjoyment (Mean = 4.55, SD = .75) and perceived competency (Mean = 4.43, SD = 1.09), indicating a positive engagement with the experimental conditions. Participants expressed a similar emphasis on effort and importance (Mean = 4.29, SD = 1.03), suggesting a parallel motivational orientation to the control group. Notably, the group reported lower levels of pressure and tension (Mean = 3.28, SD = 1.05), indicating a potentially less stressful environment. Perceived choice (Mean = 3.36, SD = 1.08) and perceived value/usefulness (Mean = 5.69, SD = 1.39) demonstrated unique aspects of motivation within the experimental context. The overall IMI score for the experimental group is 4.25 with a standard deviation of 0.76, suggesting a cohesive and moderately positive intrinsic motivational experience. These findings provide a nuanced understanding of participants' motivational experiences, forming a foundation for further analysis and interpretation.

Table 12

Descriptive Statistics of IMI in Experimental Group

IMI	$\bar{X}$	SS
Interest-Enjoyment	4.55	.75
Perceived Competency	4.43	1.09
Effort-Importance	4.29	1.03
Pressure/Tension	3.28	1.05
Perceived Choice	3.36	1.08
Value/Usefulness	5.69	1.39
Total	4.25	.76

As shown in Table 13, the first seven items, assessing students' levels of interest and enjoyment in connection with the instruction process based on the existing curriculum,

were administered to both the experimental and control groups. The experimental group (EG) had a vocabulary learning experience through digital game-based activities while the control group (CG) had the same experience through worksheet-based activities. In the inventory regarding doing exercises, questions 1, 2, 5, 6, and 7 are designed to capture positive feelings or reactions, while questions 3 and 4 are aimed at eliciting negative sentiments. This distinction in the inventory helps in understanding the range of emotions or attitudes students have towards the subject matter, allowing for a more nuanced analysis of their overall response and engagement with the material.

Based on the provided responses to item 1, it is observed that 84.2% of students within the control group found notable enjoyment in the activity, while 5.3% did not find it particularly enjoyable. In the experimental group, an impressive 88% of the students reported that they found the activity to be highly enjoyable, indicating a strong positive response. On the other hand, a small fraction, representing only 4% of the students, expressed that they did not enjoy the activity. This contrast highlights the overall success of the activity in engaging most of the students while also pointing out that there's a minority who didn't share the same level of enthusiasm.

As per the responses to item 2, it is noted that 79% of the students perceived the process as enjoyable in CG, while only 10.6% considered it not enjoyable. Similarly, a substantial majority of students in EG, specifically 80%, found the activity to be fun. Also, only 4% of them found the activity not enjoyable.

In relation to item 3, a reverse statement, 26.3% of the control group, a total of five students, conveyed that the activity was entirely boring. This proportion is almost identical to the experimental group, where four students shared the same sentiment.

Examining the data from Item 4, which assessed students' attention during the activity, it is evident that in control group, 73.7% of students affirmed that the activity held their attention, while 26.3% reported otherwise. In contrast, in experimental group, a higher percentage, specifically 88% of students, indicated that the activity captured their attention, with only 8% stating otherwise.

When examining Item 7, which focuses on the extent of enjoyment, in control group, 15.8% of students did not enjoy the activity, a larger proportion (89%) found it enjoyable.

However, within the experimental group, 16% of students reported lower levels of enjoyment, while 68% expressed enjoyment of the activity. The variation in responses can be attributed to 16% of the participants who remained neutral, selecting the answer “somewhat true”. It is also seen in the Table 13 that the highest mean score was obtained from item 1 indicating that students enjoyed the activity.

Table 13

Descriptive Data for Interest and Enjoyment Sub-Dimension

Items			1	2	3	4	5	6	7	X
1-I enjoyed doing this activity very much.	CG	f	1	0	0	2	3	7	6	5.68
		%	5.3	0	0	10.5	15.8	36.8	31.6	
	EG	f	0	0	1	2	4	10	8	5.88
		%	0	0	4	8	16	40	32	
2-This activity was fun to do.	CG	f	0	1	1	2	4	5	6	5.53
		%	0	5.3	5.3	10.5	21.1	26.3	31.6	
	EG	f	0	1	1	3	3	8	9	5.72
		%	0	4	4	12	12	32	36	
3-I thought this was a boring activity.	CG	f	5	2	5	2	3	0	2	3.21
		%	26.3	10.5	26.3	10.5	15.8	0	10.5	
	EG	f	7	6	6	2	2	1	1	2.72
		%	28	24	24	8	8	4	4	
4-This activity did not hold my attention at all.	CG	f	5	6	3	0	2	1	2	2.95
		%	26.3	31.6	15.8	0	10.5	5.3	10.5	
	EG	f	8	10	4	1	1	1	0	2.20
		%	32	40	16	4	4	4	0	
5-I would describe this activity as very interesting.	CG	f	0	0	1	4	6	5	3	5.26
		%	0	0	5.3	21.1	31.6	26.3	15.8	
	EG	f	1	1	2	6	7	5	3	4.76
		%	4	4	8	24	28	20	12	

6-I thought this activity was quite enjoyable.	CG	f	0	1	2	1	8	3	4	5.16
		%	0	5.3	10.5	5.3	42.1	15.8	21.1	
	EG	f	0	2	2	5	4	4	8	5.20
		%	0	8	8	20	16	16	32	
7-I really enjoyed this activity.	CG	f	0	0	3	1	6	4	5	5.37
		%	0	0	15.8	5.3	31.6	21.1	26.3	
	EG	f	0	1	3	4	4	3	10	5.40
		%	0	4	12	16	16	12	40	
Total	CG									4.73
	EG									4.55

In Table 14, the questions from 8 to 13 focus on the participants' views concerning their perceived competencies acquired over a four-week period of doing the worksheet-based vocabulary exercises or digital game-based activities. Questions 8 through 12 are formulated as positive statements, whereas question 13 is presented in a reverse format.

When reflecting on their capabilities in the activity, in the control group, 68.4% of students believed they were proficient at the activity, while 15.8% considered themselves not very skilled. The experimental group had 56% asserting proficiency and 16% feeling less skilled. According to item 9, 15.8% of the control group felt they outperformed other students, compared to 32% in the experimental group. Conversely, 47.4% of the control group expressed uncertainty or felt they did not do well, while 36% in the experimental group felt the same. In the control group, 73.6% felt competent after working on the activity, whereas 64% in the experimental group shared the same sentiment. Item 11 shows that 31.7% of the control group expressed satisfaction, with 57.9% feeling unsure or dissatisfied. In the experimental group, 60% were satisfied, and 20% were not. Item 12 42.2% of the control group considered themselves skilled, while 36.9% did not. In the experimental group, 40% felt skilled, and 36% did not. Regarding Question 13, a reverse statement, in the control group, 57.9% felt they couldn't do well, while 26.3% believed they could. In the experimental group, 56% felt unsure about their abilities, and 24% believed they couldn't do well.

Between 14 and 18, the items explore the level of dedication shown by students in the task and their understanding of its significance. In the inventory outlined in Table 15, questions 14, 16, and 17 are framed as positive statements, affirming certain attitudes or beliefs. In contrast, questions 15 and 18 are phrased oppositely, representing a reverse viewpoint. This mix of positive and opposite-positioned questions is intended to provide a balanced view of the respondents' opinions and attitudes, allowing for a comprehensive analysis of their perspectives.

Table 14

Descriptive Data for Perceived Competency Sub-Dimension

Items			1	2	3	4	5	6	7	X
8-I think I am pretty good at this activity.	CG	f	0	1	2	3	7	3	3	4,95
		%	0	5,3	10,5	15,8	36,8	15,8	15,8	
	EG	f	1	0	3	6	7	4	4	4.84
		%	4	0	12	24	28	14	14	
9-I think I did pretty well at this activity compared to other students	CG	f	0	1	2	7	5	4	0	4.47
		%	0	5,3	10,5	36,8	26,3	21,1	0	
	EG	f	0	3	5	8	3	3	3	4.28
		%	0	12	20	32	12	12	12	
10-After working at this activity for a while I felt pretty competent.	CG	f	0	1	1	3	10	2	2	4.89
		%	0	5,3	5,3	15,8	52,6	10,5	10,5	
	EG	f	0	1	1	7	9	3	4	4.96
		%	0	4	4	28	36	12	16	
11- I am satisfied with my performance at this task.	CG	f	1	1	4	2	5	4	2	4.53
		%	5,3	5,3	21,1	10,5	26,3	21,1	10,5	
	EG	f	0	0	5	5	7	3	5	4.92
		%	0	0	20	20	28	12	20	
12-I was pretty skilled at this activity.	CG	f	1	1	6	4	4	2	1	4.00
		%	5,3	5,3	31,6	21,1	21,1	10,5	5,3	

13-This was an activity that I couldn't do very well.	EG	f	1	2	6	6	5	2	3	4.20
		%	4	8	24	24	20	8	12	
	CG	f	1	3	7	3	2	1	2	3.68
		%	5,3	15,8	36,8	15,8	10,5	5,3	10,5	
	EG	f	4	4	6	5	3	1	2	3.40
		%	16	16	24	20	12	4	8	
Total	CG									4.31
	EG									4.43

Concerning item 14, as shown in Table 15, it was discovered that 42.1% of the control group did not put a considerable effort on the task, while 47.4% did. In the experimental group, 36% indicated a little effort, and 48% confirmed that tried to do better in the process.

In response to statement 15, a reverse statement, 42.1% of the control group admitted to not putting in much effort, and 36.8% shared the opposite sentiment. Conversely, in the experimental group, 40% acknowledged a lack of intense effort, while a slightly higher 44% expressed a similar view. In a similar vein, item 18 elicited varied responses in the control group, where a notable majority (57.9%) indicated that they did not invest much energy into the process. In contrast, in the experimental group, only 40% reported a similar sentiment.

Analysing item 16 regarding effort, 31.6% of the control group indicated a lack of effort, while 36.8% expressed the opposite. In the experimental group, there was a notable shift, with an increase to 54% of responses indicating that they tried very hard on this activity. Transitioning to the perceived importance of the task, item 17 revealed that only 10.6% of the control group viewed it as important, while a majority, 57.9%, considered it significant. In contrast, the experimental group displayed similar results, with 48% highlighting the importance of the task.

Table 15

Descriptive Data for Effort / Importance Sub-Dimension

Items			1	2	3	4	5	6	7	X
14- I put a lot of effort into this.	CG	f	1	2	5	2	3	3	3	4,32
		%	5,3	10,5	26,3	10,5	15,8	15,8	15,8	
	EG	f	2	3	4	4	5	7	0	4,12
		%	8	12	16	16	20	28	0	
15- I didn't try very hard to do well at this activity.	CG	f	3	2	2	4	3	3	2	4.00
		%	15,8	10,5	10,5	21,1	15,8	15,8	10,5	
	EG	f	3	4	4	4	3	4	3	3.96
		%	12	16	16	16	12	16	12	
16- I tried very hard on this activity.	CG	f	1	0	5	6	0	5	2	4.42
		%	5,3	0	26,3	31,6	0	26,3	10,5	
	EG	f	3	1	3	5	6	7	0	4.24
		%	12	4	12	20	26	28	0	
17- It was important to me to do well at this task.	CG	f	1	0	1	6	3	5	3	4.95
		%	5,3	0	5,3	31,6	15,8	26,3	15,8	
	EG	f	1	0	2	5	5	7	5	5.16
		%	4	0	8	20	20	28	20	
18-I didn't put much energy into this.	CG	f	3	1	3	1	5	4	2	4.26
		%	15,8	5,3	15,8	5,3	26,3	21,1	10,5	
	EG	f	4	1	5	6	2	4	3	4.00
		%	16	4	20	24	8	16	12	
Total	CG									4.38
	EG									4.29

As seen in Table 16, statements 19-22 centre around the pressure experienced by students during the activity and their levels of tension throughout the treatment. Questions 19, 21, and 22 are presented as positive assertions, whereas statement 20 is framed as a negative statement.

When asked about their level of tension during the activity, it was found that 52.7% of the CG and only 28% of the EG reported feeling tense. Notably, 64% of the control group did not feel tense, while a lower percentage of 42.1% reported the same in the experimental group.

Considering item 20, which assesses the participants' sense of relaxation during the task, results indicated that 63.3% of the CG and 60% of the EG felt very relaxed. Conversely, 20% of the experimental group reported not being very relaxed, while 26.3% expressed this feeling in the control group.

Examining item 21, focusing on participants' anxiety levels while working on the task, it was revealed that 47.5% of the CG and only 24% of the EG experienced anxiety. In the EG, a higher percentage of 68% reported feeling not anxious, while a lower 47.4% expressed the same sentiment in the CG.

Finally, item 22 explored participants' feelings of pressure during the activity. The control group reported 68.5% not feeling pressured, while 21.1% expressed that they felt pressure. In the experimental group, a more significant proportion of 80% did not feel pressured, while only 4% experienced pressure.

Table 16

Descriptive Data for Pressure / Tension Sub-Dimension

Items			1	2	3	4	5	6	7	X
19-I felt very tense while doing this activity.	CG	f	3	3	2	1	6	3	1	3,89
		%	15,8	15,8	10,5	5,3	31,6	15,8	5,3	
	EG	f	5	7	4	2	4	2	1	3,12
		%	20	28	16	8	16	8	4	
20-I was very relaxed in doing these.	CG	f	0	2	2	3	4	4	4	4.95
		%	0	10,5	15,8	10,5	21,1	21,1	21,1	
	EG	f	0	4	1	5	7	3	5	4.76
		%	0	16	4	20	28	12	20	

21-I was anxious while working on this task.	CG	f	4	2	3	1	4	4	1	3,79
		%	21,1	10,5	15,8	5,3	21,1	21,1	5,3	
	EG	f	7	5	5	2	4	1	1	2,92
		%	28	20	20	8	16	4	4	
22-I felt pressured while doing these.	CG	f	6	4	3	1	1	3	1	3,00
		%	31,6	21,1	15,8	5,3	5,3	10,5	5,3	
	EG	f	10	5	5	4	0	0	1	2,32
		%	40	20	20	16	0	0	4	
Total	CG									3,90
	EG									3,28

Table 17 shows the statements from 23 to 28 that revolve around the personal preferences of students regarding whether they preferred engaging in the treatment or not. In the intrinsic motivation inventory regarding doing exercises, questions 23, 24, 25, 26, and 28 are written in a way that sounds negative, while question 27 is the only one that's worded in a positive way. This mix of both negative and positive questions helps to get a clearer picture of what people think and feel about the topic being asked about.

When questioned about their autonomy in choosing to participate in this activity, 26.4% of the CG and 12% of the EG expressed that it did not feel like a choice they made on their own. This response sheds light on the differences in perception of choice between the two groups, indicating varying degrees of perceived voluntariness in engaging with the activity. In contrast, the EG showed a higher percentage, with 72%, while a lower 63.2% expressed the same sentiment in the CG.

Moving to item 24, exploring participants' feelings about having a choice in doing the task, results indicated that 21% of the CG and only 4% of the EG felt they didn't really have a choice. In the EG 80% and CG 73.7% reported that it was their decision to do the task.

Considering item 25, which evaluates participants' sense of obligation in performing the task, it was found that 52.6% of the CG and 44% of the EG felt a sense of obligation. Notably, in the EG, a higher percentage of 36% reported feeling obliged, while it was 21.1% in the CG. A similar item, which explores participants' reasons for engaging in the

activity, revealed that a majority of 63.1% in the CG and 84% in the EG denied doing it because they felt they had no choice, indicating that their participation was based on their own decision. When students were asked about their motivation for engaging in the activity, 68.4% of the CG and 68% of the EG reported the same motivation expressing that they participated because they wanted to.

Finally, for item 28, examining participants' motivation influenced by necessity, 63.2% of the control group did the activity because they had to. Conversely, a lower 44% expressed the same sentiment in the experimental group.

Table 17

Descriptive Data for Perceived Choice Sub-Dimension

Items			1	2	3	4	5	6	7	X
23-I felt like it was not my own choice to do this task.	CG	f	9	2	1	2	1	3	1	2,84
		%	47,4	10,5	5,3	10,5	5,3	15,8	5,3	
	EG	f	13	4	1	4	0	2	1	2,36
		%	52	16	4	16	0	8	4	
24-I didn't really have a choice about doing this task	CG	f	6	3	5	1	0	2	2	3,00
		%	31,6	15,8	26,3	5,3	0	10,5	10,5	
	EG	f	12	4	4	4	0	0	1	2,20
		%	48	16	16	16	0	0	4	
25-I felt like I had to do this.	CG	f	4	0	0	5	2	6	2	4.42
		%	21,1	0	0	26,3	10,5	31,6	10,5	
	EG	f	3	2	4	5	4	6	1	4.08
		%	12	8	16	20	16	24	4	
26-I did this activity because I had no choice.	CG	f	8	2	2	3	1	2	1	2,84
		%	42,1	10,5	10,5	15,8	5,3	10,5	5,3	
	EG	f	13	4	4	2	0	1	1	2,16
		%	52	16	16	8	0	4	4	

27-I chose this activity because I wanted to.	CG	f	1	1	2	2	3	7	3	5.00
		%	5,3	5,3	10,5	10,5	15,8	36,8	15,8	
	EG	f	0	1	4	3	6	6	5	5.08
		%	0	4	16	12	24	24	20	
28-I did this activity because I had to.	CG	f	0	2	2	3	1	7	4	5.11
		%	0	10,5	10,5	15,8	5,3	36,8	21,1	
	EG	f	2	3	3	6	2	7	2	4.28
		%	8	12	12	24	8	28	8	
Total	CG									3,86
	EG									3,36

Statements from 29 to 32 are about students' assessments of the value of the activity for both the present and the future, as well as their willingness to use the activity again. Notably, all the questions in this part are presented in a positive manner (Table 18).

Table 18

Descriptive Data for Value/Usefulness Sub-Dimension

Items			1	2	3	4	5	6	7	X
29-I believe this activity could be of some value to me.	CG	f	0	2	1	1	2	7	6	5,53
		%	0	10,5	5,3	5,3	10,5	36,8	31,6	
	EG	f	0	2	1	2	3	8	9	5,64
		%	0	8	4	8	12	32	36	
30-I would be willing to do this again, because it has some value to me.	CG	f	1	1	1	0	2	6	8	5,68
		%	5,3	5,3	5,3	0	10,5	31,6	42,1	
	EG	f	1	1	3	0	4	6	10	5,52
		%	4	4	12	0	12	24	40	
31-I believe doing this activity could be beneficial to me.	CG	f	0	2	0	1	4	6	6	5,58
		%	21,1	10,5	0	5,3	21,1	31,6	31,6	

32-I think this is an important activity.	EG	f	0	1	1	1	4	8	10	5,88
		%	0	4	4	4	16	32	40	
	CG	f	0	0	2	1	4	7	5	5,63
		%	0	0	10,5	5,3	21,1	36,8	26,3	
	EG	f	0	0	3	2	3	8	9	5,72
		%	0	0	12	8	12	32	36	
Total	CG									5,60
	EG									5,69

In terms of the perceived value of the activity, it was found that 78.9% of the CG and 80% of the EG believed the activity could be of some value to them. Moving to item 30, which assesses participants' willingness to repeat the activity due to its perceived value, results indicated that 84.2% of the CG and 76% of the EG were willing to do it again. According to item 31 that explores participants' beliefs about the potential benefits of the activity, it was revealed that 84.3% of the CG and 88% of the EG believed the activity could be beneficial to them. Finally, for item 32, which assesses participants' perception of the importance of the activity, 84.2% of the CG and 80% of the EG considered it an important activity.

CHAPTER V

CONCLUSION, DISCUSSION AND SUGGESTIONS

5.1. Conclusion and discussion

The objective of this study was to explore and compare the effect of digital game-based vocabulary exercises, using the applications Memrise and Easy Notecards, against worksheet-based exercises. The focus was on how these methods affect vocabulary retention and intrinsic motivation among Turkish students learning English as a foreign language at a state university's preparatory school. The study involved two distinct groups of preparatory school students: a control group and an experimental group. Additionally, the study sought to examine whether the incorporation of game elements in digital game-based vocabulary exercises and worksheet-based exercises positively or negatively influenced students' intrinsic motivation levels. To assess the differences in vocabulary retention and intrinsic motivation, two quantitative data collection tools were employed: the vocabulary retention test as a pre-test and post-test, and the intrinsic motivation inventory regarding doing exercises. The study aimed to find answers to the following questions:

- 1) Is there a significant difference in vocabulary retention between the pre-test and post-test scores of the experimental group, which used digital game-based exercises, and the control group, which used worksheet-based exercises?
- 2) Do the post-test scores indicate a significant difference in vocabulary retention between the control group, which used worksheet-based exercises, and the experimental group, which used digital game-based exercises?
- 3) To what extent do digital game-based exercises and worksheet-based exercises influence the intrinsic motivation levels towards vocabulary learning among preparatory school students in the experimental and control groups, respectively, and is there a significant difference in intrinsic motivation levels between the experimental group

exposed to digital game-based exercises and the control group exposed to worksheet-based exercises?

5.1.1. The discussion of pre-test and post-test of the experimental group

The first research question aimed to investigate whether there was a significant difference between the pre-test and post-test scores of the EG concerning vocabulary retention when exposed to digital game-based exercises. The investigation into the effects of digital game-based exercises on vocabulary retention in the EG yielded noteworthy results. The examination of the pre-test and post-test scores of students in the experimental group offered valuable insights into the efficacy of the digital game-based intervention.

Previous studies on the digital game-based app Memrise, which was also used in this study, have also affirmed positive enhancements in vocabulary retention. A study conducted by Taebenu and Katemba (2021) examined the significant difference in vocabulary improvement between female and male participants using Google Classroom and Memrise. The findings of their study align with those of the current research, demonstrating a significant increase in post-test scores among participants in the experimental group.

Another study, conducted by Wahyuningsih and Putra (2022), employed both Google Classroom and the Memrise application. Similar to the present study, their research involved 40 university students, mirroring the gender distribution observed in this study. However, unlike the current study, their study examined improvements in vocabulary skills across genders. The findings, which align with this study, indicate that the Memrise application effectively supports students in enhancing and enriching their vocabulary knowledge.

A study conducted by Özyaşar (2021) also yielded comparable results in the EG. Alike to the current study, analysis of the retention test results indicated that the experimental group achieved better scores. Also, in another similar study, Çakır (2019) aimed to explore the impact of gamified student response applications on vocabulary gain and development in

the EG compared to the CG, which were taught vocabulary using conventional methods. The statistical analysis of the pre-test and post-test data showed a significant difference in vocabulary improvement between the pre and post-tests for the EG.

In summary, the pre-test and post-test scores provide strong evidence of the effectiveness of digital game-based exercises in positively influencing vocabulary retention among the EG students. It can be interpreted that participants in the EG benefited from the two digital game-based applications, Memrise and Easy Notecards. These findings contribute valuable insights to the understanding of the role of digital game-based approaches in EFL learning contexts. The results of this study offer practical implications for educators and curriculum developers, proposing the use of digital game-based tools as one of the methods for enhancing students' vocabulary acquisition. Future research could explore the long-term effects, engagement levels, and generalizability of these findings across diverse student populations and educational contexts.

5.1.2. The discussion of pre-test and post-test of the control group

The second sub-problem of the study aimed to investigate if there was a notable difference between the pre-test and post-test scores of the control group in terms of vocabulary retention after using worksheet-based exercises. The pre-test and post-test scores of both groups indicate a significant impact of the worksheets on enhancing vocabulary retention within the CG.

Uyar (2019) conducted a similar study to examine the impact of gamification on students' vocabulary knowledge and motivation in learning English vocabulary. The study extended over a period of 8 weeks and included 48 university students at the B2 level. Employing a quasi-experimental research design, the study divided participants into experimental and control groups. Analysis of pre-test and post-test results revealed a significant difference in vocabulary knowledge between the control group's pre-test and post-test scores, with a substantial effect size. This suggests that the traditional teaching method notably enhanced students' English vocabulary knowledge and contributed to their academic achievement.

Similarly, in a study by Soltanpour, Ganji, and Mohammadian (2021), two groups were compared during the treatment: the 'Paper Worksheet Group' and the 'Online Worksheet Group'. The group using paper worksheets studied new words in the traditional way, with physical worksheets, whereas the group with online worksheets used digital ones for their vocabulary studies. The research showed that using paper worksheets was quite effective in improving vocabulary learning for young students of English as a Foreign Language (EFL). It indicates that when teachers use worksheets, they can create a learning environment that is both calm and engaging. This method supports active and diverse learning, helping young EFL students to understand complicated vocabulary more easily.

Another study supporting the effectiveness of worksheet-based learning was conducted by Grosso and Téllez (2017). The study's findings revealed that the design of worksheets incorporating vocabulary strategies not only motivated students to learn new words but also helped them understand the strategies necessary for initiating the writing process. Furthermore, the use of writing strategies proved successful for students, as they gained the ability to compose simple sentences.

In conclusion, these findings strongly suggest that using worksheet-based exercises is an effective way to boost vocabulary retention. Teachers and curriculum planners might want to consider incorporating such exercises into their teaching methods, especially when they want to improve students' vocabulary skills. The high effect size and the substantial amount of improvement explained by the exercises emphasize the practical importance of these results. While numerous studies advocate for the superior efficacy of gamification-based exercises (Sze Lui, 2014; Wells & Norken, 2011; Yip & Kwan, 2006), these findings suggest that worksheet-based vocabulary exercises can also apply significant influence in enhancing vocabulary retention levels among EFL preparatory school students at the university level. For future research, it could be interesting to see if these positive effects last over time and if similar methods work well in different learning settings.

5.1.3. The discussion of post-tests of experimental and control group

The second research question aimed to determine if the post-test scores indicate a significant difference in vocabulary retention between the control group, which used worksheet-based exercises, and the experimental group, which used digital game-based exercises. The study found no statistically significant difference in post-test scores between the experimental and control groups ($p > 0.05$). This indicates that digital game-based exercises and worksheet-based exercises yielded similar results for university-level EFL preparatory students. Several factors might explain the lack of difference in outcomes between the two groups.

One reason for the similar post-test scores could be the comparable instructional effectiveness of the two methods. Both the digital game-based exercises used for the experimental group and the worksheet-based exercises used for the control group may have been equally effective in achieving the study's objectives. The instruction provided by two different instructors to two different groups over a four-week period may have successfully facilitated vocabulary retention, resulting in similar post-test scores for both groups. Like the current study, Açıkgöz (2019) also found no significant difference between the two groups. Similarly, it included two experimental groups (EG1 and EG2) with two different instructors. The results highlight the positive impact of integrating game-based learning into vocabulary education and suggest that gamified tools can offer comparable educational benefits for students.

On the other hand, the findings could be partly because students in the EG paid more attention to the gaming aspect than just learning new words. They might have chosen to develop their own strategies to get ahead on the scoreboard. This focus on the game could have influenced how they approached the learning process. It is important to highlight that, given the absence of a significant difference between the experimental and control groups, the use of game mechanics, such as points and leaderboards in this study, may not had a positive impact on vocabulary development. As suggested by Werbach and Hunter (2012), points can be seen as an indicator of insufficient knowledge, and in the case of

leaderboards, quantity may be prioritized over quality, potentially resulting in less successful findings.

Hanus and Fox (2015) conducted a study assessing students' motivation and academic performance over a 16-week semester. The participants, university students comprising 57 males and 23 females, voluntarily enrolled in two groups of courses. One course incorporated gamification elements such as leaderboards and badges, while the other course followed the same curriculum but lacked gamified features. The findings revealed that students in the gamified course exhibited diminishing levels of motivation over time compared to their counterparts in the non-gamified class. Additionally, the impact of the course type on students' final exam scores was influenced by their intrinsic motivation levels. Specifically, students in the gamified course demonstrated lower motivation levels and achieved lower final exam scores than those in the non-gamified class. These results underscore the importance of exercising caution when implementing certain gamification techniques in educational environments.

Another reason could be the homogeneity of learner characteristics. The study involved a relatively homogeneous group of learners in terms of learning styles, language proficiency, or prior experience with digital tools. This homogeneity in learner characteristics could lead to similar responses to different instructional methods, minimizing the observed differences in post-test scores.

Furthermore, all participants received the same level of English language instruction. This underscores the university's commitment to ensuring that students across disciplines develop a standardized proficiency in English during their preparatory year. In the study, all students who took part in the summer school program were given the same number of instructional hours. While 23 of the participants were male, 21 were female. The age statistics of the participants ranged from 18 to 20 (Mode: 20, SD: 1.86). This demographic consistency further supports the possibility of a homogenous participant group in terms of various characteristics.

Similar instructional effectiveness and the quality of instructional materials could be additional factors contributing to the observed results. Both digital game-based exercises and worksheet-based exercises had demonstrated equal effectiveness in the study. The

instructional methods were meticulously administered to participants in both groups, potentially contributing to the successful facilitation of vocabulary retention and resulting in comparable post-test scores in both groups.

Moreover, the comparable quality of the digital game-based exercises and worksheet-based exercises is another aspect to consider. Both sets of instructional materials were well-designed, relevant, and aligned with the learning objectives. Furthermore, although both groups were assigned to different instructors, participants had the opportunity to meet and receive instruction from both educators. Given that there are four quarters in the academic year, each class had the chance to be instructed by nearly eight different teachers over the course of the year. As a result, this might have contributed to similar findings in terms of vocabulary retention. Ensuring a consistent level of instructional excellence for both methods could potentially result in similar post-test scores, emphasizing the crucial role of effective instructional materials in shaping student retention.

Lastly, motivation and engagement levels represent another potential factor influencing the observed findings. It is possible that students in both groups exhibited similar levels of engagement and motivation. If the digital game-based exercises were engaging and motivating, aligning with their intended design, and if worksheet-based exercises were well-designed and stimulating, students in both groups may have approached the learning tasks with comparable enthusiasm, consequently impacting their performance. The data related to intrinsic motivation levels will be discussed in the next section, drawing insights from the intrinsic motivation inventory regarding doing exercises results. This additional information will provide a more comprehensive understanding of how the motivation level may have contributed to the observed similarities in performance across both instructional methods.

The results of the present study align with previous research conducted by Domínguez et al., (2013), Hanus and Fox (2015), and Sağlık (2017). These studies similarly concluded that gamification had an impact on students' success. However, the post-test scores of the two groups revealed no significant difference. Similar to the current study, Sağlık (2017) employed gamified instructions involving taboo cards (non-digital) for vocabulary teaching in the experimental group and traditional paper practices for the control group.

The study involved Turkish participants learning English as a Foreign Language (EFL) at a private university's language preparatory school. Notably, the research comprised a group of thirty-two students who were at an intermediate level. The results showed a similar increase in performance in both groups.

Karatekin (2017) conducted a study using five different digital game-based applications, one of which was Memrise, and found results that align with those of the current study. His research involved ninth-grade students in a public-school setting. To evaluate the effectiveness of the educational methods used, he administered pre-tests and post-tests. These tests were crucial in measuring the shift in the students' comprehension of certain subjects both before and after they were exposed to the digital game-based learning approach. The results of the post-test revealed that there was no noteworthy distinction in the students' ability to recall factual knowledge.

In conclusion, this study provides insights into the Turkish EFL educational landscape, underscoring the efficacy of both digital game-based exercises and worksheet-based exercises in enhancing post-test retention scores. As language education continually evolves, these findings advocate for educators to embrace a diverse range of instructional methods, addressing the dynamic needs of English language learners in Türkiye. In Turkish EFL settings, where learners have different preferences and abilities, using a mix of teaching methods—both technology-based and worksheet-based—can effectively meet their diverse needs. The similar post-test scores for both digital game-based exercises and worksheet-based exercises highlight the importance of using diverse teaching methods in Turkish EFL classrooms. This underscores the crucial role of instructional diversity in ensuring successful learning outcomes.

5.1.4. The discussion of intrinsic motivation inventory regarding doing exercises results of experimental and control group

After being engaged in digital game-based and worksheet-based exercises for four weeks, students from the experimental and control groups completed the 32-item intrinsic

motivation inventory regarding doing exercises, using a 7-point Likert scale. The analysis covered responses in a range of six distinct categories. These categories were 'interest and enjoyment', 'perceived competency', 'effort and importance', 'pressure and tension', 'perceived choice', and 'value and usefulness'. The examination of intrinsic motivation levels in vocabulary exercises, employing different instructional methods, reveals interesting differences between the control group, involved in worksheet-based exercises, and the experimental group, engaged in digital game-based exercises.

In the control group, participants consistently showed intrinsic motivation regarding doing exercises across various dimensions. Particularly, a moderate level of interest and enjoyment, along with a perceived sense of competence, indicates a positive motivational atmosphere. The emphasis on effort and importance further highlights the group's dedication to the task. The manageable levels of pressure and tension confirm a relatively low-stress environment. Different facets of motivation, such as perceived choice and perceived value/usefulness, add to the diverse nature of their motivational outlook. With an overall IMI score of 4.46, the control group demonstrates a stable and well-rounded intrinsic motivational experience. Similarly, the study conducted by Segura-Robles et al., (2020) aimed to assess how a flipped and gamified approach affects students' levels of autonomy, competence, relationships with others, satisfaction, intrinsic and extrinsic motivation, and boredom in the context of Physical Education, and it had similar findings to the current study.

On the other hand, the experimental group showed similar interest and enjoyment levels, along with a sense of competence, indicating positive engagement with digital game-based exercises. The study conducted by Bicen and Kocakoyun (2018) also yielded similar results. Their findings indicated that students showed improved learning outcomes while concurrently enjoying the learning process. The utilization of gamified applications was observed to enhance the enjoyment of lessons that might have been less engaging previously.

In the IMI's third category, the EG, like the CG, also focused on effort and significance. However, the experimental group reported noticeably lower pressure and tension levels ($X = 3.28$), suggesting a potentially less stressful motivational environment compared to the

CG. This suggests that the leaderboard system incorporated into digital game-based exercises did not exert any undue pressure on students in the EG. On the contrary, it implies that such an environment may have contributed to a sense of enjoyment and entertainment within the learning setting. Additionally, students in the EG provided a lower score of 2.92 in response to the statement "I was anxious while working on this task," contrasting with the control group's score of 3.79. This indicates a lower level of perceived pressure among students in the EG. The responses to these inventory statements, coupled with the comfortable atmosphere in the classroom, might be attributed to the absence of external motivators influencing students in the form of extrinsic motivation. Participating in the game mainly for fun and pleasure may have helped the students avoid feeling stressed and pressured. Lepper (1988) states that within the context of games, vocabulary acquisition can occur in a stress-free manner. Furthermore, he suggests that intrinsic motivation stems from engaging in an activity solely for the joy of learning or the sense of accomplishment it brings. In contrast, extrinsic motivation drives people to participate with the aim of obtaining a reward. This means that when students are promised a reward for learning, they might focus more on the prize than the learning process itself. Consequently, offering rewards at the end of learning activities could introduce stress and distraction in the classroom environment. Crookes and Schmidt (1991) additionally assert that the incorporation of games featuring extrinsic rewards and badges may have an adverse effect on long-term motivation, potentially causing more harm than benefit.

In the following category, distinct differences in perceived choice and perceived value/usefulness underscore unique motivational aspects in the experimental context. With an overall IMI score of 4.25, the experimental group has a cohesive and moderately positive intrinsic motivational experience. Similarly, in a study conducted by Hazan et al., (2018), a gamified learning approach was added to the lab part of an undergraduate psychology statistics course and then compared with a traditional class. The study looked at changes in how much students wanted to learn, how capable they felt, and their scores on tests before and after the course. It turned out that for the group with gamified learning, those who felt more skilled in statistics did better on the post-test. This shows that feeling capable is a strong sign of how well students will do and is really important for wanting to learn.

Comparing the control and experimental groups shows slight differences in their motivational experiences. Both groups also, showed similar levels of interest, perceived competency, and effort. There could be several reasons for these results. Firstly, it is worth noting that participants from both the CG and EG were students attending summer school. All participants shared a common goal, which was to successfully complete the mandatory B2 level without the need to repeat another year. This shared objective may have led both the CG and EG participants to focus equally on passing all exams, resulting in similar levels of motivation. Moreover, in the first week of the process, it was clarified that the vocabulary retention test scores were not related to the grades and had no effect on passing the summer school. This might have impacted the intrinsic motivation levels of both groups.

Additionally, the context of the summer school experience could have played a significant role. These students had their Summer School session during the COVID-19 pandemic. After initially having online classes, they transitioned to face-to-face classes for the summer session. They were primarily confused about the abrupt transition from online to face-to-face instruction and are still grappling with this confusion, which may lead to demotivation. This change in learning format may have had an impact on their motivation levels. Another factor to consider is individual differences among participants in both CG and EG. Variations in learning preferences and responses to different types of activities could have influenced the motivational experiences of individuals within each group.

Similar to this study, Durrani et al., (2022) found a slight difference in their study. Their study focused on comparing how well gamified flipped classrooms work against regular classroom teaching methods, especially in terms of improving student skills. The study included 105 students from the management and IT departments of a state university. The course duration was six weeks, and the ages of the participants ranged from 20 to 25 years. The study found a small difference in how these two methods affected student skills. Surprisingly, the CG, which used traditional classroom methods, showed better learning results than the EG that was taught with gamified flipped classrooms. This discrepancy was attributed to the perceived content relevance in the traditional classroom setting.

On the other hand, in contrast, the results from the IMI regarding doing exercises indicated that the experimental group reported significantly lower levels of pressure and tension compared to the control group. This suggests that digital game-based exercises might create a less stressful motivational environment compared to worksheet-based exercises. Additionally, higher scores in perceived value/usefulness for the experimental group hint at potential motivational benefits linked to technology-enhanced learning. These results could be attributed to the characteristics of digital game-based exercises, which typically offer a higher level of interactivity and engagement. The enhanced interactivity may have resulted in a more positive and less stressful experience for participants in the experimental group. Furthermore, the perceived value and usefulness of the digital game-based exercises likely played a role in shaping a positive motivational experience, as reflected by the higher scores in this dimension for the experimental group. Similarly, Chen and Zhao (2022) noted that the positive impact of controlled motivation on the perceived usefulness of language learning apps suggests an opportunity for English teachers to take a more proactive role in advocating for the adoption of gamified English vocabulary learning apps. In summary, this study offers valuable insights into the intrinsic motivation levels of students involved in vocabulary exercises using diverse instructional methods. Although both groups generally had a positive intrinsic motivational experience, the subtle differences highlight potential advantages of digital game-based exercises, notably in lowering stress levels. These findings contribute to the ongoing discussion on effective instructional strategies for fostering intrinsic motivation, opening new ways for further research and the continuous enhancement of language learning practices.

5.2. Suggestions

This section offers potentially useful insights into pedagogical implications and suggests directions for future research.

5.2.1. Pedagogical implications

The implications of this study have far-reaching effects for all those invested in the realm of English as a Foreign Language (EFL) education. First and foremost, this study underscores the importance of adaptability for curriculum planners, materials developers, teachers, and teacher trainers. Recognizing that a single method cannot address all challenges, teachers can benefit from integrating technology into their lessons. Keeping up with current teaching trends is essential for meeting the technological demands of the new generation. Moreover, the incorporation of not only gamification but also worksheet-based exercises into lessons is shown to enliven the learning environment and foster vocabulary retention among learners. The findings from the study conducted by Durrani et al., (2022) provide additional evidence supporting the adoption of mixed learning approaches in classrooms. It emphasizes the importance of not relying solely on one approach, urging university lecturers and learning enhancement units to consider a diverse range of methods.

What's more, the findings shed light on intrinsic motivation for Turkish EFL learners in both worksheet-based and digital game-based vocabulary exercises. This suggests a pedagogical call for increased use of motivational activities in EFL classes. Integrating digital game elements or worksheets into classroom activities can effectively enhance learners' motivation.

Furthermore, the study offers implications for EFL learners, future teachers and digital game developers. Future teachers should be introduced to the potential of games and gamification during teacher education. The incorporation of digital game-based learning into the curriculum requires the development of well-designed games and digital gamified tools. Collaboration between curriculum writers and game developers is suggested to optimize the usage of digital game-based vocabulary learning.

In conclusion, this study's comparison of the effectiveness of digital game-based and worksheet-based approaches for vocabulary retention and intrinsic motivation not only provides immediate insights for educators but also sets the stage for future research in language education. The demonstrated adaptability and positive impact of incorporating technology underscore the dynamic nature of effective pedagogical strategies, advocating

for a more diverse teaching approach in the EFL landscape. The study's emphasis on intrinsic motivation serves as a call for give more attention to motivational aspects in language classrooms, encouraging educators to explore engaging activities that tap into learners' intrinsic motivation for sustained interest. This study not only provides insights for current pedagogical practices, but also challenges educators, researchers, and developers to continuously explore and innovate in the field of language education. Future studies are needed to focus on refining digital game-based learning tools and investigating the long-term impact of these diverse teaching methods, offering a comprehensive understanding of their sustained efficacy.

5.2.2. Suggestions for future research

The implementation phase of this study, conducted over four weeks with a limited population of 44 participants, offers a foundation for future studies. Expanding the participant number to include a larger and more diverse sample would enhance the accuracy and interpretation of the results. Accounting for potential participant absenteeism and implementing the IMI regarding doing exercises both before and after the study could provide a more comprehensive understanding of the intrinsic motivation levels throughout the study.

Extending the duration of the study is recommended to allow for a deeper analysis and interpretation of results. The successful implementation of this project relies on addressing infrastructure problems in a timely manner, including potential technical difficulties with internet connection or device availability. Considering the possibility of conducting the study in a computer lab with proper technical facilities can minimize potential disruptions.

Moreover, while Memrise and Easy Notecards were used as variables in this study, future research could explore the effects of different gamified tools or games on vocabulary retention. Additionally, this study focused on students with a B2 level of English and targeted specific words from teachers' book worksheets. Future studies may broaden their scope by including participants with varying language proficiency levels, incorporating

diverse topics, and assessing the effectiveness of games and digital gamified tools on vocabulary retention across different contexts.



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APPENDICES

APPENDIX 1. ETHICS COMMITTEE APPROVAL

Evrak Tarih ve Sayısı: 10.06.2022-138960



T.C.
SAKARYA ÜNİVERSİTESİ REKTÖRLÜĞÜ
Etik Kurulu



Sayı : E-61923333-050.99-138960
Konu : 08/01 Hasan Ali ŞAHİNKAYA

10.06.2022

Sayın Hasan Ali ŞAHİNKAYA

İlgi : 13.05.2022 tarihli ve E--000-0 sayılı yazınız.

Üniversitemiz Eğitim Araştırmaları ve Yayın Etik Kurulu'nun 08.06.2022 tarihli ve 08 sayılı toplantısında alınan "01" nolu karar ile Hasan Ali ŞAHİNKAYA'nın başvurusu **uygun** görülmüş ve karar örneği ekte sunulmuştur.

Bilgilerinizi rica ederim.

Prof. Dr. Murat İSKENDER
Eğitim Araştırmaları ve Yayın Etik
Kurulu Başkanı

Ek: Karar Yazısı (1 Sayfa)

Bu belge, güvenli elektronik imza ile imzalanmıştır.

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Bilgi için: Hanife Babacan
Unvanı: Birim Evrak Sorumlusu



APPENDIX 2. VOCABULARY ACHIEVEMENT TEST

LANGUAGE HUB

VOCABULARY POST-TEST

NAME-SURNAME:

CLASS:

TOTAL: ____/100

A. Choose the best option. (15x3=45p.)

- | | |
|--|---|
| <p>1. I try to avoid _____ because I can't stand driving slowly. I never drive between seven and nine in the morning.</p> <p>a) roadworks
b) traffic lights
c) the rush hours
d) heavy rain</p> <p>2. _____ on the motorway made the journey intolerable. I don't understand the reason to be done in daytime when there is heavy traffic, not at night!</p> <p>a) Roadworks
b) Traffic lights
c) The rush hours
d) Severe delays</p> <p>3. Yesterday, there was a/an _____ on the underground. We had to wait nearly an hour.</p> <p>a) slight delay
b) overcrowded train
c) severe delay
d) good service</p> <p>4. The movie was really _____. It made us laughed out loud.</p> <p>a) awful
b) furious
c) wonderful
d) hilarious</p> | <p>5. When we went to the basketball match, the person behind me kept on kicking my seat and made me _____.</p> <p>a) awful
b) furious
c) wonderful
d) hilarious</p> <p>6. I was a big fan of this musician, but then he changed his style. The new album is not the same as the previous ones. In fact, it's _____.</p> <p>a) terrible
b) wonderful
c) terrified
d) hilarious</p> <p>7. When I stay in a hotel, I usually _____ things. Last time, I looked for the car keys for half an hour because I couldn't remember where I had put them.</p> <p>a) misunderstand
b) rebuild
c) misplace
d) disappeared</p> <p>8. After that busy weekend, I _____ and missed an important meeting. I need to find a good excuse!</p> <p>a) misunderstood
b) overcharged
c) disappeared
d) overslept</p> |
|--|---|

9. My cousin came from Germany last week. We can't understand a word he says because he _____ nearly everything.
- a) misunderstands
 - b) rebuilds
 - c) misplaces
 - d) mispronounces
10. After an earthquake, my old school building was damaged. Do you know if they are planning to _____ it?
- a) overcharge
 - b) rebuild
 - c) misplace
 - d) overwork
11. Leonardo da Vinci's Mona Lisa is definitely a/an _____ painting. There is nothing else like it!
- a) unique
 - b) sophisticated
 - c) practical
 - d) incredible
12. My 18th birthday party was perfect. About forty people danced and sang the "Happy Birthday" song around me. It was a/an _____ day for me.
- a) sophisticated
 - b) suitable
 - c) unforgettable
 - d) unique
13. Another way to say "I've lost interest in collecting post cards" is _____.
- a) I've never enjoyed collecting post cards.
 - b) I don't like collecting post cards anymore
 - c) I lost my post cards.
 - d) I'm not interested in collecting post cards.
14. You "work well under pressure" means _____.
- a) you know how to get along with people well.
 - b) you can organise when to do things well.
 - c) you don't get irritated when you are busy.
 - d) you are able to think of impressive things.
15. To save the environment, we should encourage people not to _____ plastic.
- a) reuse
 - b) recycle
 - c) throw away
 - d) use up

B. Complete the sentences using the words in the boxes. There's extra ONE word in EACH box. (15x3=45p.)

attract – build – launch – make – break – run

1. Before the end of this month, we must _____ this product.
2. According to last year's data, the company didn't _____ much money.
3. Being competitive will _____ our company's reputation.
4. To _____ more customers, we should work with a good advertising agency.
5. Our family has _____ their own business for about 20 years.

keep – cut – launch – quit – reach – stick

6. After having a heart attack, he decided to _____ smoking.
7. Olivia doesn't have a healthy diet. She really needs to _____ down on salt and sugar.
8. I was able to keep my resolution only for a day since it was very hard not to _____ it.
9. We will all fail unless you _____ to the plan!
10. I believe that I will _____ my target at the end of June.

aggressive – competitive – decisive – active – impressive – inexpensive

11. Unlike golf, running is a/an _____ sport. A pair of trainers and some comfortable clothes can be sufficient.
12. Are you a/an _____ driver when there is too much traffic?
13. If the team want to win this tournament, the manager must coach them to be more _____.
14. He is not only a great scientist but also a sportsman, musician and most importantly a great father. What a/an _____ person!
15. Are you a/an _____ person? For example, when you go to a restaurant can you make choices quickly and without having any doubts.

C. Match the phrasal verbs on the left with a suitable meaning on the right. (5x2=10p.)

- | | |
|-------------------|--|
| 1. Stay in _____ | a. arrive without making an appointment |
| 2. Turn up _____ | b. experiment |
| 3. Work out _____ | c. put on plates |
| 4. Dish up _____ | d. find the answer by thinking carefully |
| 5. Try out _____ | e. remain indoors |

APPENDIX 3. INTRINSIC MOTIVATION INVENTORY

G. Intrinsic Motivation Inventory

1	Yaşınız:	
2	Cinsiyetiniz:	☐ Erkek ☐ Kadın
3	Mesleğiniz:	

GÜDÜLENME ENVANTERİ

Bu envanter iş güdülenmesi ile ilgilidir. Aşağıdaki ifadelerden her birinin sizin için ne ölçüde geçerli olduğunu (işiniz çerçevesinde) düşünerek 1'den 7'ye kadar olan numaralardan uygun olanını işaretleyiniz.		Hiç gerçek değil (1)	Hiç doğru değil (2)	Çok doğru değil (3)	Bir dereceye kadar doğru (4)	Biraz doğru (5)	Doğru (6)	Oldukça doğru (7)
1	Bu işi yapmak çok hoşuma gitti.	☐	☐	☐	☐	☐	☐	☐
2	Bu işi yapmak eğlenceliydi.	☐	☐	☐	☐	☐	☐	☐
3	Bunun sıkıcı bir iş olduğunu düşündüm.	☐	☐	☐	☐	☐	☐	☐
4	Bu iş hiç ilgimi çekmedi.	☐	☐	☐	☐	☐	☐	☐
5	Bu işi çok ilginç buldum.	☐	☐	☐	☐	☐	☐	☐
6	Bu iş bence hayli eğlenceli.	☐	☐	☐	☐	☐	☐	☐
7	Bu işi yaparken çok zevk aldım.	☐	☐	☐	☐	☐	☐	☐
8	Bu işte iyi olduğumu düşünüyorum.	☐	☐	☐	☐	☐	☐	☐
9	Diğer çalışanlarla kıyaslandığında bu işte oldukça iyi olduğumu düşünüyorum.	☐	☐	☐	☐	☐	☐	☐
10	Bir süre çalıştıktan sonra bu işte epeyce yeterli olduğumu hissettim.	☐	☐	☐	☐	☐	☐	☐
11	Bu işteki performansımdan memnunuz.	☐	☐	☐	☐	☐	☐	☐
12	Bu işte olabildiğince ustayım.	☐	☐	☐	☐	☐	☐	☐
13	Bu, benim pek iyi yapamadığım bir iştir.	☐	☐	☐	☐	☐	☐	☐

14	Bu iş için çok çaba sarf ettim.	☐	☐	☐	☐	☐	☐	☐
15	Bu iş için kendimi zorlamadım (çok çaba sarf etmedim).	☐	☐	☐	☐	☐	☐	☐
16	Bu iş için çok çabaladım.	☐	☐	☐	☐	☐	☐	☐
17	Bu işi iyi yapmak benim için önemliydi.	☐	☐	☐	☐	☐	☐	☐
18	Bu iş için fazla enerji harcamadım.	☐	☐	☐	☐	☐	☐	☐
19	Bu işi yaparken çok gergindim.	☐	☐	☐	☐	☐	☐	☐
20	Bu işi yaparken çok rahattım.	☐	☐	☐	☐	☐	☐	☐
21	Bu iş üzerinde çalışırken endişeliydim.	☐	☐	☐	☐	☐	☐	☐
22	Bu işi yaparken baskı altında hissettim.	☐	☐	☐	☐	☐	☐	☐
23	Bu işi yapmanın benim seçimim olmadığını hissettim.	☐	☐	☐	☐	☐	☐	☐
24	Bu işi seçip seçmeme konusunda doğrusu bir seçeneğim yoktu.	☐	☐	☐	☐	☐	☐	☐
25	Bu işi yapmam gerektiğini hissettim.	☐	☐	☐	☐	☐	☐	☐
26	Bu işi başka seçeneğim olmadığı için seçtim.	☐	☐	☐	☐	☐	☐	☐
27	Bu işi seçtim, çünkü seçmeyi istedim.	☐	☐	☐	☐	☐	☐	☐
28	Bu işi yapmam gerektiği için yaptım.	☐	☐	☐	☐	☐	☐	☐
29	Bu işin benim için epeyce faydalı olabileceğine inanıyorum.	☐	☐	☐	☐	☐	☐	☐
30	Bu işi tekrar yapmayı isterim çünkü bana bir şeyler katıyor.	☐	☐	☐	☐	☐	☐	☐
31	Bu işi yapmanın benim için yararlı olabileceğine inanıyorum.	☐	☐	☐	☐	☐	☐	☐
32	Bunun önemli bir faaliyet olduğunu düşünüyorum.	☐	☐	☐	☐	☐	☐	☐

APPENDIX 4. DIGITAL GAME-BASED ACTIVITIES

Cards Quiz Matching Bingo Print

EASY NOTECARDS

3.1 All Cards Options

Front



overcrowded

4 / 12

Rd 1: 4 of 4 correct (100%) 5 / 10



Small

Excellent

Huge

Tiny

Delicious

 English Hub_B2 - 3.1 - New level

539

Choose the translation for what you hear



1

containing too many people

2

the route for a method of transport which runs under the surface of the ground

3

a set of red, green, and yellow lights that is used to stop and start traffic

4

to decide that a scheduled train will no longer run

?

I don't know





 English Hub_B2 - 8.2 - New level

0

Type the correct translation

making you very interested or attracted

WORD

a g t c f s i n o

 Hint

?

I don't know





Cards Quiz **Matching** Bingo Print

EASY NOTECARDS

← 3.2 Restart game

Misses: 0 Remaining: 10 Your Best: 1:14.4 46.8

 Nice	 Big	Fantastic	Huge
 Angry	 Bad	Furious	Awful, Terrible

Cards Quiz Matching **Bingo** Print

EASY NOTECARDS

← 3.1 Restart game Pattern: Cover All

Normal speed

FIRST < 3 of 12 > CURRENT

Go to previous call

BINGO!

 cancel a train	 heavy traffic	 traffic jam
 overcrowded	good service	 severe delay
 slight delay	 rush hour	 heavy rain

a situation in which a plane, train etc. leaves or arrives very late

APPENDIX 5. WORKSHEET-BASED ACTIVITIES

4.2 Vocabulary

Language Hub Intermediate Worksheet



Prefixes: *dis-*, *mis-*, *over-*, *re-*, *under-*

A Add the correct prefix *dis-*, *mis-*, *over-*, *re-* or *under-* to the words in bold. Then complete the sentences with the correct form of the new words.

- | | |
|--|-------------------|
| 1 I can't believe I _____ and missed my meeting. | sleep |
| 2 There's no way that coffee cost £9! I must have been _____. | charge |
| 3 The man at the train station was really _____! He was so rude. | respect |
| 4 My keys can't have just _____. They must be somewhere. | appear |
| 5 I thought that was what she was saying, but I may have _____. | understand |
| 6 I just can't understand a word he says – he _____ everything! | pronounce |
| 7 This chicken is still pink. I definitely _____ it. | cook |
| 8 Are they planning _____ the old school? | build |
| 9 Ever since he _____ his watch, he's late for everything! | place |
| 10 There's always so much to do. We've been feeling a bit _____. | work |

B Write five sentences about yourself using the words from Exercise A. Work in pairs. Tell each other your sentences. Ask questions to find out more information.

8.2 Vocabulary

● Language Hub Intermediate Worksheet

Positive adjectives

A Complete the reviews with the words from the box. More than one answer may be possible but use each word only once.

Fitness tracker

This _____ device has an _____ range of product features. It is _____ amongst trackers because as well as checking weight, heart rate and steps, you can actually pay in shops with it. It looks good too with a _____ design available in a wide range of colours. It is light but resistant so it is very _____ to use while doing exercise.



Wireless headphones

With so many features in one device, this product has a complex, _____ design. But it is very easy to use, making it _____ for anyone. It is not the most stylish option on the market, but its price and features make it a _____ choice. The sound quality is excellent so it provides an _____ listening experience.



gorgeous sensible practical unforgettable impressive
unique sophisticated incredible suitable

B Work in pairs. Choose positive adjectives from the box and describe:

- a person
- a place
- a building
- an event
- an experience
- a holiday
- a gadget
- a meal
- a piece of art
- a story in the news