

**T.C.
ISTANBUL UNIVERSITY-CERRAHPAŞA
INSTITUTE OF POSTGRADUATE EDUCATION**

MASTER THESIS

**USING WEB 3.0 TECHNOLOGIES FOR TEACHING ENGLISH TO THE
PRIMARY LEVEL STUDENTS: A STUDY ON AUGMENTED REALITY**

DAMLA BAHADIR

FOREIGN LANGUAGES EDUCATION DEPARTMENT

ENGLISH LANGUGAE TEACHING SCIENCES

THESIS SUPERVISOR

ASSIST. PROF. DR. TUNCER CAN

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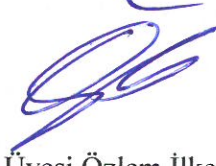
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PREFACE

First and foremost, I would like to thank my thesis supervisor, Asst. Prof. Dr. Tuncer CAN for his expert advice, guidance and his continuous support and encouragement throughout the length of this study. He was a source of inspiration and motivation and his comments and support helped me focus on my research.

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ÖZET

İlkokullarda İngilizce Öğretiminde Web 3.0 Teknolojilerinin Kullanımı : Artırılmış Gerçeklik Üzerine Bir Araştırma

Teknoloji birçok alanda olduğu gibi eğitim alanında da ilgi duyulan bir konu olmuştur. Teknoloji alanındaki gelişmelerin eğitim alanındaki etkileri öğretim yöntemleri konusunda yeni yaklaşımlar ve farklı uygulamalar doğurmuştur. Bu bağlamda artırılmış gerçeklik teknolojileri de öğretim yöntemleri konusunda bir çok yenilik sunmaktadır. Artırılmış gerçeklik teknolojileri öğrencilerin sınıflarda deneyimlemeleri mümkün olmayan konuları ya da karışık kavramları öğrenmeleri için etkili bir araç olmakla birlikte öğretim yöntemlerini de farklılaştıran bir araçtır. Yapılan çalışma artırılmış gerçeklik araçlarının ilkokulu seviyesindeki öğrencilerin İngilizce dersi başarısı üzerine etkisini inceleyen niceliksel bir araştırma sunmaktadır. Bu çalışma deney ve kontrol grubu olmak üzere iki gruba gerçekleştirilmiş ve toplam 9 hafta sürmüştür. Her iki gruba uygulama öncesinde hedeflenen konularla ilgili ön bilgilerini ölçmek için bir ön test uygulanmıştır. Ardından deney grubuna artırılmış gerçeklik araçlarıyla sekiz hafta boyunca öğretim uygulanırken kontrol grubuna görsel ve işitsel materyallerle zenginleştirilmiş geleneksel öğretim uygulanmıştır. Uygulama sonunda son test uygulaması yapılarak hedeflenen kazanımların ne derece edinildiği ölçülmüştür. Araştırma sonuçları artırılmış gerçeklik araçlarının ilkokul seviyesinde İngilizce öğretiminde başarı üzerinde anlamlı bir etki yaratmadığını göstermektedir. Öğrencilerin uygulama süresince yapılan çalışmalardan keyif aldıkları gözlemlense bile artırılmış gerçeklik araçlarının öğretim yöntemlerini farklılaştırmak dışında başarı bağlamında anlamlı bir fark yaratmadığı görülmüştür.

Anahtar kelimeler: Artırılmış gerçeklik araçları, Web 3.0, teknoloji, mobil araçlar, başarı

ABSTRACT

Using Web 3.0 Technologies For Teaching English To The Primary Level Students: A Study On Augmented Reality

Technology has been a subject of interest in education as it has been for many areas. The effects of the technology on education have resulted in emerging new approaches and different practices. In this context, augmented reality technologies also offer many innovations in teaching methods. Augmented reality helps students experience the subjects that are not possible to visualize in classes or understand complex terms along with being a different tool in teaching the subjects. This study presents a quantitative research that examines the effects of augmented reality technologies on the success of the primary level students leaning English as a foreign language. The study was carried out with a control and experimental group and it lasted for nine weeks. Before the treatment a pretest was conducted for both of the groups. Then, while the experimental group was taught with augmented reality tools for eight week, the control group had traditional teaching enriched with visual and audial materials. At the end of the treatment post-tests were applied to see the scores of the groups. The results of the research showed that augmented reality tools had no meaningful effects on the success of the primary level students in English learning as a foreign language. Although the students were observed to enjoy the treatment, it was seen that the augmented reality tools had no significant effects on the success of the students apart from being a tool that differentiate the teaching process.

Key words: Augmented reality tools, Web 3.0, technology, mobile devices, success

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ABBREVIATIONS

Web: World Wide Web

EFL: English as a Foreign Language

ELT: English Language Teaching

W3C: The World Wide Web Consortium

3D: Three Dimensional

QR: Quick Response

AR: Augmented Reality

OECD: Organization for Economic Co-operation and Development

ATC21C: Assessment and Teaching of 21st Century Skills

HTML: Hypertext Markup Language

XML: Extensible Markup Language

RDF: Resource Description Framework

OWL: Web Ontology Language

URL: Uniform Resource Loader

ABIDE: Evaluation and Monitoring the Academic Skills

PISA: Programme for International Student Assessment

TIMSS: Trends in International Mathematics and Science Study

LMS (LCMS): Learning (Content) Management Systems

HDM: Head-mounted Device

GPS: Global Positioning Systems

FATİH: Movement to Increase Opportunities and Technology

MEB: Ministry of National Education

SPSS: Statistical Package for the Social Sciences

ANCOVA: Analysis of Covariance

CEFR: Common European Framework of Reference

BICS: Basic Interpersonal Communicative Skills

CALP: Cognitive Academic Language Proficiency

CHAPTER I: INTRODUCTION

In the first chapter, statement of the problem and research questions will be presented; and the significance, assumptions and limitations of the study will be discussed.

1.1. Problem Statement

Studies have proven that using technology in education motivates students, creates new learning opportunities, provides more enjoyable learning environments, increases the communication between students and makes learning process more active, effective and meaningful (Sumodi and Rambli, 2010). In an era when the fact that the effects of technology on the learning processes are still being proven, it will be meaningful to work on the evolution of the internet and the reflections of it on education. We can summarize the evolution of the internet in three phases. While in the first phase called Web 1.0 there is just access to information and be on the net, in the second phase, Web 2.0 aims at providing the social interaction between people. As to Web 3.0, it has started recently (Hussain, 2012). This phase which is also called Semantic Web means the web content can also be interpreted by the computers (Berners-Lee et.al., 2001). With Web 3.0 it is possible to arrange the searches according to the tracks each individual leaves on the net. This may both shorten the time spent on the internet and make more effective searches. Moreover, it is also possible to reach this personalized data without any time, place or media limits (Ohler, 2010). During these evolution eras many applications have showed up and the topic of this study is also one of these Web 3.0 tools; augmented reality. With augmented reality it is possible to have concurrent display of the real environment and the visual objects using special software (Dunleavy et.al., 2009). It differs from other technological tools in that augmented reality offers larger realism (Barreira et.al., 2012) and offers more natural human-computer interaction as it lets human interact with real and virtual objects at the same time (Azuma, 1997). This difference can be claimed to be a noticeable one as in an era that posthumanist approach is getting more and more attention, “what role a supposedly exterior world may play in cognition and language” (Pennycook, 2018, pp.446-447) can be a

meaningful topic to study on by focusing on one of its multiple aspects which is augmented reality and its effects on success in this study.

Augmented reality has been proven to be one of the technological tools that affect the learning processes in a positive way. Many national and international studies show that augmented reality technologies increase the success and motivation of the students (Sırakaya ve Seferoğlu, 2016). However, in most of the studies the participants were graduate or secondary school students (Korucu et.al., 2016). Carmichael and Jordan (2012, p.160) also state that Web 3.0 has been a term that is mostly associated with higher education settings and there are few examples of how to integrate Web 3.0 applications in schools. With this study it is aimed to work on the effects of augmented reality technologies on the success of the primary level students in English learning and teaching as a foreign language.

This study presents a quantitative research and it was carried out with a control and experimental group and it lasted for nine weeks. The participants were 9-10 years old and their level of proficiency in English was A1 according to the Ministry of National Education (MEB) curriculum and Common European Framework of Reference (CEFR) (Milli Eğitim Bakanlığı, 2018, p.10). Before the treatment a pretest was conducted for both of the groups. Then, while the experimental group was taught with augmented reality tools for eight weeks, the control group had lessons enriched with visual and audial materials for the same period of time. At the end of the treatment post-tests were applied to see the scores of the groups. The comparison was done using SPSS (Statistical Package for the Social Sciences). One-way ANCOVA (Analysis of Covariance) test was used to analyze the data.

1.2. Purpose

The aim of this thesis is to study the effects of using augmented reality applications on the success of primary level students learning English as a foreign language. To analyze the effects, the research questions below have been asked;

1. How do the augmented reality applications as Web 3.0 tools effect the success of primary level students in English as foreign language?

2. When compared with the lessons enriched with multimedia elements, how do the lessons with the augmented reality applications affect the success of the students?

1.3. Significance of the Study

It is important to see the reflections of the technological developments in education in a world where technology has become a part and parcel of it. There are many studies that show the positive effects of augmented reality applications in education. Especially in the last decade there has been a boost in the studies about augmented reality. Many of these studies cover the benefits and potency of augmented reality technology as well as restraints and challenges of it (Bacca et al., 2014). While some of the studies have proven that augmented reality helps students learn better, some of them have shown that it increases student motivation (Radu, 2012). However, in most of the studies the participants were among the secondary or graduate students. With this study it is aimed to study the effects of augmented reality technologies on the success of the primary level students.

İbili and Şahin (2015, p.339) claim that it is important to have studies on the effects of augmented reality on students' cognitive and affective learning as it will provide an opportunity to develop educationally effective augmented reality materials.

As been stated above there are many studies conducted on the effects of augmented reality in education about various subjects with different age groups. Billingham et al. (2001) studied the effects of augmented reality applications on reading where as Kerawalla et al. (2006) studied the effects on science education. While Küçük et al. (2014) studied the relation between augmented reality and language education with a group of young learners aged between 10-11, Lin et al. (2013) worked with undergraduate students on a science topic; elastic collision. Albayrak and Altıntaş (2017) studied the effect of augmented reality in database lesson on students at a vocational school. Bacca et al. analyzed 32 studies conducted about augmented reality between 2003 and 2013 and they have found out that most of these studies reveal the fact that augmented reality technologies are used to stimulate the learners, clarify subjects and augment data (2014, pp.139-141). There are also studies about the effects of augmented reality games on learning. Although it

can be assumed that it is not the augmented reality but the games that have affected the results, the literature reviews show that augmented reality games have positive effects on learning, too. Kaleci et al. (2016) also state that although augmented reality environments are claimed to be parts of games and they stay out of education, they help students concentrate more compared with the traditional educational environments where they lose their interests in a very short time. Koutramanos et al. (2015) reviewed seven studies conducted by various researchers between 2007 and 2014 and their study show that the augmented reality games have impacts on learning by fostering contribution of students and increasing real learning. Solak and Çakır's study on the role of augmented reality in language learning also proves that activities enriched with augmented reality technologies have positive effects on students' academic achievement. They have also found out that this technology have also contributions to retaining information in the long-term memory (Solak and Çakır, 2015). Billinghamst and Dunser (2012, p.61) also claim that as augmented reality provides interactivity in learning, students obtain the information by experiencing and making sense of it on their own and this makes learning more memorable compared to the traditional method where the students are exposed to the learning target directly. Radu (2012) summarizes the positive learning effects of augmented reality and states that augmented reality integrated lessons increase comprehension of the subject matter, help retention, motive learners and develop cooperation. In a more comprehensive study, Diegmann et.al. (2015) reviewed 25 papers and concluded that augmented reality technologies raise inspiration, awareness and fulfilment as well as providing more detailed contents for the subjects apart from many other benefits (See Table 1-1).

Table 1-1: Benefits of Augmented Reality (Diegmann et.al. (2015, p.1551)

		Discovery-based Learning	Objects Modeling	AR Books	Skills Training	AR Gaming	Total
State of Mind	<i>Motivation</i>	7	4	2	1	1	15
	<i>Attention</i>	2	0	1	0	0	3
	<i>Concentration</i>	2	0	0	0	1	3
	<i>Satisfaction</i>	1	2	0	1	1	5
Teaching Concepts	<i>Student-centered Learning</i>	2	0	1	0	0	3
	<i>Collaborative Learning</i>	1	2	0	0	0	3
Presentation	<i>Details</i>	0	0	0	1	0	1
	<i>Accessibility Information</i>	0	0	0	1	1	2
	<i>Interactivity</i>	1	0	1	0	0	2
Learning Type	<i>Learning Curve</i>	6	4	1	6	1	18
	<i>Creativity</i>	2	0	1	0	0	3
Content Understanding	<i>Spatial Abilities</i>	0	2	1	1	0	4
	<i>Memory</i>	1	0	0	2	0	3
Reduced Costs	<i>Reduced Costs</i>	0	1	0	1	0	2

As can be seen in Table 1-1 augmented reality technologies have various advantages. Freitas and Campos (2008) had observed similar benefits in their study. They designed an augmented reality integrated system called SMART and used this structure with the 2nd grade students. They found out that SMART helped students including the weaker ones be more enthusiastic about the lesson. In his study on geographical visualization Hedley (2003) also stated that people created more settled and specific images with the augmented reality tools than with the desktop versions.

All the studies covered in this thesis show that although there are studies on the effect of augmented reality in teaching and learning in the world along with Turkey, there is still a need of new studies on English language learning with a target group consisting of primary level students. Korucu et al. (2016) have also found out that although there are many articles about augmented reality in education in Turkey, the target groups are mostly secondary or university students. Moreover, as the teaching methods have been changed and more visual and audial materials have been included in the teaching process it will be more meaning to have comparison between the lessons where augmented reality technologies are used and where multimedia elements are included. At this point it is meaningful to underline the fact that in most of the studies on augmented reality, the augmented reality integrated lessons were compared with traditional ones (Abbasi et.al., 2017, Barreira et.al., 2012, Çakır et.al., 2015, Vate-U-Lan, 2012,). However, in this study the terms “conventional” or “traditional” method was used to refer the teaching style that includes technological applications (computer, projector, Web 2.0 tools etc.) and visual-audial materials along with constructivist approaches focusing on collaboration and group work. In the English curriculum it is stressed out that for the primary levels it is important to use an eclectic method to comply with the various needs of learners (Milli Eğitim Bakanlığı, 2018, p.3). Thus, with this study it is also aimed to evaluate the augmented reality technologies as a part of the eclectic method used by teachers.

1.4. Assumptions

1. In this study, an experiment group and a control group consisting of 9-10-year- old language learners, whose levels were A1 according to the MEB curriculum and CEFR (Milli Eğitim Bakanlığı, 2018, p.10), were accepted as the sample. The groups were selected randomly.
2. It is assumed that the students participating in the study were sincerely involved in the work that was done and the pretests and post-tests that were applied.
3. The model and the data collection tools used in the research were suitable to the research problems.
4. It was assumed that there would be no internet outage to be able to use the applications without interruption.
5. The selected augmented reality applications were assumed to be compatible with both Android and iOS operating systems of smartphones.
6. The information provided from the sources was appropriately cited as a reference for the purpose of the study.

1.5. Limitations

1. The research is limited to 2018-2019 educational years.
2. This study is limited to a 8-week period of instruction.
3. The participants of the study are limited to two classes of 4th grade students.
4. The number of the participants is limited to 76 (38 participants in experimental group and 38 participants in the control group).
5. The study is carried out with the augmented reality applications that are compatible with the Android and IOS operating systems of students' tablets.
6. The augmented reality applications are limited to the ones that students can download for free from their application stores.

7. The study is limited to the use of two augmented reality applications that are HP Reveal and i-nigma.



CHAPTER II: CONCEPTUAL FRAMEWORK / REVIEW OF LITERATURE AND RELATED STUDIES

The purpose of the literature review is to set the background for the specific objectives of this study. This study aims to determine the effects of using augmented reality applications on the success of students learning English as a foreign language in primary level. The chapter starts with the evolution phases of the World Wide Web and the history of the Web as an educational tool stressing on Web 3.0. Then it continues with the definition of augmented reality, its functions, components and its use in education and in language learning. After that, constructivist approach in the era of Web 3.0 and related studies will be discussed.

2.1. The Evolution of the World Wide Web

The World Wide Web, in short the Web, was a term that was created by Tim Berners-Lee. He is a software engineer. While working as a computer programmer at CERN, Tim Berners-Lee developed the World Wide Web by forming a programming language called HTML (Hypertext Markup Language). He describes the Web as “the universe of global network-accessible information” (Berners-Lee, 1996).

The reason behind the idea of the World Wide Web was a need and this need was explained by Tim Berners-Lee in one of his TED speeches (Berners-Lee, 2009);

“...it was basically frustration. I was frustrated with I was in this working as a software engineer and this huge very exciting lab, lots of people coming from all over the world. They brought all sorts of different computers with them. They had all sorts of different data formats, all sorts of, kinds of documentation systems. So that in all that diversity if I wanted to figure out how to build something out of one little bit of this and a bit of this everything I looked into I had to connect to some new machine. I had to learn to run some new program. I had to, I would find the data, maybe the information I wanted in some new data format and these were all come in compatible. It was just very frustrating”.

According to Berners-Lee (1996) with the foundation of the Web the frustrating mismatches between computer systems came to an end. With the new programming language it has become possible to understand the data from different sources. One does not have to know the computer system of each source anymore.

In Figure 2-1, there is the first web page designed by Berners-Lee for CERN. The display of this page can also give an idea of the evaluation of the Web. As it can be seen, there are no images or a design pattern. There are just hypertexts to make the connections to the relevant sources.



Figure 2-1: The first web page [1]

Before the Web, there had been a number of systems designed by physicists. When Tim Berners-Lee designed his own program called Enquire, it contained just non-specific links and it was personally practical. It could not be applied in a broad system (Berners-Lee, 1980). In 1989 Berners-Lee developed the World Wide Web and the system started consisting of lots of information that could be shared and that let people interact with each other and with computers (Berners-Lee, 1996). It is clear that there was not any money-orientated drive when the Web was created. It was only the research facilities and private, personal Web sites that made the Web work before the companies realized the need of it (Ankolekar et.al., 2007, p.2). However, according to Berners-Lee it is the commercial potential of the Web that has driven a rapid pace of development of new features. It was not just the companies that triggered the evolution of the Web. As the Web became an attention-grabbing tool for the companies as well as the people in the technology industry, there occurred a concern about the standards of the Web and the future of this “universe of information” (Berners-Lee, 1996). As a result, Tim Berners-Lee set up

a consortium called The World Wide Web Consortium (W3C) in 1994 and this structure also helps the Web to evolve and upgrade¹.

The development of the Web cannot be said to be a random one. According to Berners-Lee (1996) there were three aims to achieve in the long term; developing the structure, adding features to let people cooperate on the Web and making an intelligent Web which can interpret the data and find solutions for us. Parallel to Berners-Lee's three goals, the development of the Web can be summarized in three eras; Web 1.0, Web 2.0 and Web 3.0. There are many definitions of these eras. According to Hussain (2012, p.14) it is only possible to read in Web 1.0 era. With Web 2.0 writing has been included to the structure and Web 3.0 has made it possible not only to read and write but also to cooperate at the same time. Gökçearsan (2011, pp. 3-4) states that while Web 1.0 is a world where the internet applications developed by people are used, Web 2.0 is a world where the internet applications developed by people as Web 1.0 tools can be changed by other people. However, Web 3.0 is a world which will develop itself by making devices possible to interact with each other. Parsa (2009, p.3) defines Web 1.0 as a monologue, Web 2.0 as a dialogue and Web 3.0 as a system that the machines can read and interpret.

According to Demirli and Kütük (2010, p.98) sharing photos, music, videos and games was undreamt-of by many people when the Web was first developed. Today we are talking about Artificial Intelligence. The development of the Web will not be expected to be limited to Web 3.0 and its features. As Berners-Lee et.al. (2001, pp.42-43) pointed out there can be various uses of Web 3.0 that have not been thought of and these can help the growth of human comprehension as a whole.

2.1.1. Web 1.0

Web 1.0 is a term used for the first period of the internet which started with its beginning in 1990 and lasted for more than ten years when a new term, Web 2.0, was suggested by Dale Dougherty in 2004 (O'Reilly, 2005). During this period the only thing that could be done was visiting websites. There was no interaction between the internet users. Hussain (2012, p.12) defines Web 1.0 as a tool which connects people to the World Wide Web. The internet users could only read the

¹ Retrieved from <https://www.w3.org/Consortium/facts#history>

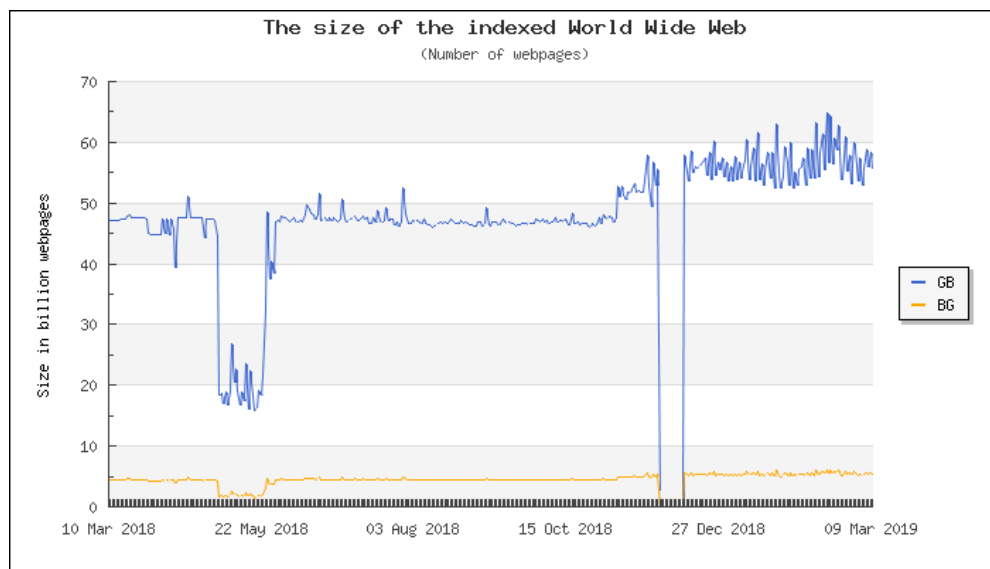
content of the websites. They were not allowed to make any comments or add their own experiences to the website. It can be said that it was the read-only period of internet. D'Souza (2006, p. 7) also defines this period as "Read Only Web". Yağcı (2011, pp. 139-140) compares it with a library where you cannot make any comments or change anything in the pages. It just consists of static web pages. Berners-Lee explains the Web in this era "as a medium for the broadcast of read-only material from heavily loaded corporate servers to the mass of Internet connected consumers" (Berners-Lee, 1996). An example of such a web page can be the one with the photos and comments of an explorer of the places he or she has travelled so far. There are no "add comments" or "like" buttons on the page. People just visit this page and read the information on the page. This structure that is based on just publishing the information on the web and transmitting this information to the computers of the users has changed with the developments in the web (Demirli and Kütük, 2010, p.99). To publish something on the Web one should know the HTML and the other technical details that are needed (Rosen and Nelson, 2008, p.212). This prerequisite can be said to result in many people just reading the pages instead of creating new ones. It is not only the web issue that has caused the system to change. It can also be claimed that as more and more people have started to use the internet, the needs of the internet users have become different. It can also be said that it has become an unsatisfactory task just to read the information on the pages as people has started to feel the need to add questions or share their own experiences. Moreover, some people want to point out different features of the topics or totally a different topic. Thus, it can be said that both the different needs and interests of the people and the development of the internet have resulted in the birth of a new web system which is mostly called Web 2.0. The fact that Amazon.com used to be a Web 1.0 site is a good example of how the system has improved through the years (Cormode and Krishnamurthy, 2008).

2.1.2. Web 2.0

The concept of "Web 2.0" began with the Media Live International conference in 2004 in a brainstorming session between O'Reilly, the founder and CEO of O'Reilly Media Inc. and Dale Dougherty, a web pioneer (O'Reilly, 2007). However, Toledano (2013, p.6) claims that it was DiNucci who first used the term in 1999 in his article, "Fragmented Future". The founder of the term is less of an

importance as it is the features of the second generation of the Web that have had effects on people and changed the way we communicate. There are many definitions of Web 2.0 but the common point is its interactivity. According to Toledano (2013) Web 2.0 is the next generation of the World Wide Web. This new era allows users to talk to each other and contribute to the Web.

Similar to the triggering element in creating the World Wide Web, Web 2.0 was also a result of a need. Demirli and Kütük (2010, p. 99) point out that people needed to upload new information on the system and it was difficult to update the web pages. This resulted in creating more manageable and easily updateable web structures. In this period it has become possible for internet users to make contributions to the websites they visit. They have also been allowed to create their own websites. Cormode and Krishnamurthy (2008) state that the key difference between Web 1.0 and Web 2.0 is that in Web 1.0 most of the internet users were just consumers. They did not contribute to the Web. However, in Web 2.0 the internet users have become to be creators as well as consumers. Yağcı (2009, p.139) also stresses that with Web 2.0 people have become a part of the production stage of the data. There are not merely consumers anymore. With this contribution feature the size of the Web has increased. On 10 March 2019 there were more than 5.2 billion web pages. In Graph 2-1 the fluctuant number of the web pages can be seen.



Graph 2- 1: The number of the web pages between 10th March 20018 and 9th March 2019 [2]

It is a fact that the entire Web is not constituted merely by Web 2.0 pages. This number includes Web 1.0 pages and Web 2.0 pages as well as Web 3 supported pages which will be reviewed in detail in the next chapter. O'Reilly (2007, pp.18-19) states that there is not a strict line between Web 1.0 and Web 2.0. Web 2.0 has some features and the web sites that have one or more of its features become Web 2.0 pages. The Amazon.com example is a significant one in this case. Although Amazon.com started its commercial life with Web 1.0 features now it can be held that it is at the core of the Web 2.0 web pages. Moreover, it seems to be a Web 3.0 page as the search can be limited to the interest of the users and the system also suggests related items or services that can be interested for the user according to his or her search criteria. This dynamism can be interpreted as the Web grows day by day. Yağcı (2009, p.140) asserts that Web 2.0 can be associated with a circle of friends where we also contribute to the information exchange by being involved in the conversation. Thus, it can be claimed that Web 2.0 era is more dynamic when compared to Web 1.0. D'Souza (2006, p.7) expresses that in Web 1.0 most of the content was static. However, with Web 2.0 it has become possible to change the content according to the needs of the users. O'Reilly (2007, p.37) also underlines this fact by stating that the Web 2.0 companies have confidence in their users and let them contribute and improve the system by supplying them user-friendly applications. Halimi et al. (2014, p.167) define Web 2.0 as social web and they affirm that the social web has changed the former model of web which is like a place with a bunch of information that any user can obtain but cannot make any changes or contributions into an interactive platform where the users can meet, cooperate, share and add more content. Web 2.0 technology has made it possible to create various tools which make it possible for the users to share their ideas and thoughts. Moreover, they are allowed to create their own web sites and interact with the visitors without any expertise on the programming language (Demirli and Kütük, 2010, p.99).

Web 2.0 tools have also important influences on education. Elmas and Geban (2012, pp.244-245) claim that Web 2.0 tools let teachers be more creative in teaching and assessing and also make students more motivated and active in classrooms. The effects of Web 2.0 on education will be discussed in detail in the next chapter.

2.1.3. Web 3.0

The fact that the Web has grown from one page which went online on 20 December 1990 to such a high number of pages in 19 years can be interpreted as that the Web grows in such a pace that it is a must to have a kind of control over what is published on the Web. What is meant by “control” is not censorship. It is a system that helps people to reach to the desired true data in a reasonable amount of time. Rego et.al. (2010, p.42) underline the importance of controlling the data flow on the internet by stating that the amount of data on the net today makes having the management systems to cope with it crucial so that not only the people individually but also the companies or corporations can find the accurate data to use in their analysis or operations.

On 7th June 2018 when “global warming” was googled, the number of the hits was nearly 277 million and the time to reach this sum was 0.37 seconds. On 12th June 2018 the number of the hits reached to nearly 282 million, which means %1.8 growth rate in five days.² In 2010 the number of the hits on the same topic was 33 million and the time was again less than a minute (Ohler, 2010, p.15). This means in 8 years the number of hits about “global warming” increased nearly by nine times and it is increasing day by day. Although the time to reach the data seems to be reasonable, it is still a question how to cover all the data indexed in the search engine. It would not be nonsensical to say that it is time consuming trying to look through all the pages, which seems to be impossible with the number of the search results above, and decide on the pages that are thought to serve the purposes of the users. Ohler (2010, p.15) states that although lots of information could be gathered with one click, people should be aware of the fact that Google arranges the links according to their popularities rather than their source credibility. That means people have to spend time to find the source that is certain and relevant for them. Hussain (2012, p.12) also highlights the fact that Web 2.0 has caused lots of data to emerge and it is necessary to know how to use this data. Berners-Lee also foresaw this problem. He claimed that search engines were very useful tools in that lots of data could be scanned quickly. However, as the search engines only dealt with the vocabulary match on the document, it did not take the quality of the documents into account (Berners-Lee,

² The author has googled the key words and done the calculations on 12th June 2018.

1996). The results of a research conducted by Jupiter Research, a research company, prove the fact that it is a must to organize the information on the web depending on its credibility. The research results show that %97 of the people searching a key word do not look beyond the top three results and %99 do not search beyond the top 30 results (Forrester Research, 2006). Yağcı (2011, pp.138-139) points out that we have all the information on the web from the ones that show us how to cure an illness to how to make a fortune. However, the tools and ways that we use to analyze, combine, share and format this treasure are quite invalid now. At this point Web 3.0 comes to the stage. There are many other terms that are used instead of Web 3.0 like Semantic Web or Next G Web (Poore, 2014, p.168). In this thesis Web 3.0 will be used to refer to all these terms.

The inventor of the Web, Berners-Lee defines Web 3.0 as “a web of data like a global database” (Berners-Lee, 1998). In today’s world it is only the humans that can make sense of the elements in the Web. Only a small portion of the Web’s content is available for the computer programs to be worked on meaningfully (Berners et.al., 2001, p.36). What is meant by interpreting by people is that it is the user who finds the relevant data to use. However, interpreting by computers is that the data is available to use if that information is the desired one for the user (Demirli and Kütük, 2010, p.101). In short, this version of web lets computers understand which data means what and who needs that data the most. In other words, with Web 3.0 computers will be able to make meaningful connections between the data and with this improved version of the web it can be said that the time to reach the desired information will also shorten. According to Gökçearslan (2011, p.10) Web 3.0 will bring such innovations that people’s lives will be much more easier as the machine will have the capabilities of thinking and interpreting which will make the data more understandable and reachable. Anderson and Whitelock (2004, p.4) state that Web 3.0 solves the problem of having a huge mass of data to search to find the relevant theme by “ostensibly allowing content to become aware of itself”. All these definitions underline the fact that Web 3.0 will be a time saver web which will help people to access true information. Yağcı (2011, p. 144) emphasizes this by stating that the most important innovation that Web 3.0 will bring is the possibility to obtain the data that is both meaningful and relevant. Thus, with this innovation it can be claimed that the computers will be defined not as robots but as smart systems.

Possibility of such a system has been being discussed by W3C since 2001 (World Wide Web Consortium, 2013). It is clear that there will need some technical arrangements and innovations. According to Ohler (2010, pp.15-16) there are three stages to be taken to have Web 3.0. These are using intelligent tagging, grouping intelligently tagged information into ontologies and using shared ontologies and databases. Poore (2014, p.169) prefers to use metadata instead of intelligent tagging. Similar to Ohler's classification World Wide Web Consortium (2011) describes the Web 3.0 stressing two important points; one is that there should be common formats to combine and unite the data from various sources and the other one is the language which will connect the data to other related data in various databases. At this point, using standardized tags or metadata seems to be the key step to make the information on the web understandable to the machines. If standardized tags are accepted by web programmers it will be easier to find any data because the data will be more understandable to the machines and machines will be able to find the relevant information for the internet users. Hussain (2012, p.12) underlines this need by stating that in Web 2.0 when a key word is noted down on a search engine, it ends up with a very long list of unrelated hits. Web 3.0 will solve this problem by having a context for the research. Yağcı (2011, p.140) also stresses the same point by stating that today when the key words are written on the search engine, there comes a list of web pages that contain those key words. To find an answer to a very simple question is not possible now because computers cannot interpret the web pages. However, it should be highlighted that in spite of all the technical arrangements, Web 3.0 will not find the needed pages for people. Poore (2014, pp.175-176) points out that Web 3.0 will not get the absolute meaning of the research. In point of fact, Web 3.0 will make it possible to sort, filter and deliver the best correspondence for the inquiry. That means it is still the people who will decide which data to use. However, as the number of the research results will diminish it can be said that people will save time.

To sum up, using metadata and ontologies are some of the innovations and arrangements that are needed for Web 3.0. However, there are other technical points to be considered to have Web 3.0. Using new programming languages is one of the most important ones. XML (Extensible Markup Language), RDF (Resource Description Framework) and OWL (Web Ontology Language) are the standard programming languages that have been accepted by W3C for Web 3.0 (World Wide

Web Consortium, 2011). These languages are being used to build the ontologies that are necessary to see the relations between various terms about the research topic (Demirli and Kütük, 2010, p.102). As Web 3.0 is a system that collects the relevant information from different web sites and integrates millions of context-free data on the net, it is crucial to have common discourses to let Web 3.0 achieve its goals.

In addition to these technical innovations, there is also the personal aspect of Web 3.0. As it is stated above, in order to find the relevant data among the enormous information on the Web, it is not only the people who have to interpret the results. The machines should also be able to read and understand them. With the programs called “agents” it is assumed that the search or the activity that is being held on the Web will not be time consuming. With the help of the independent structures called software agents it is possible to find the meaningful and useful web pages about the search to be worked on in detail (Demirli and Kütük, 2010, p.101). Ohler (2010, p.17) describes agents as special programs that make it possible for the user to reach to the meaningful data that is related with his or her learning aims. From the educational perspective, these agents can help students reach to the relevant contents that are scattered in the Web (Karalar and Özdemir, 2017, p.186). As this system holds the data about the previous researches of the users, in the new research the system tries to get to the most relevant results in a short time by combining the previous inquiries with metadata (Yağcı, 2011, p.141).

The last point about Web 3.0 is its mobility. As it has been pointed out above the personal needs and interests are important. It is crucial to have a system that does not force people to restrict themselves in terms of time and place. According to the surveys conducted by Statista (2019), as of January 2019 there are 4 388 million active internet users and 3 986 million unique mobile internet users which means nearly % 91 of the internet users are mobile internet users. The statistics about the average number of online activities per device among internet users worldwide as of 2nd quarter 2017 also show that mobile phones are the most commonly used device to go online. Tablets are the third most used ones after the personal desktops and laptops. Thus, it can be said that internet users use mobile phones more than personal computers/laptops and tablets to perform online activities. The rates are similar in Turkey. Mobile internet user penetration rate in Turkey as of January 2018 is %63 and there are 54.3 million internet users in Turkey (Statista, 2019). As people

prefer using mobile devices more than personal computers or laptops it will be meaningful to have services that support people when they are mobile. Anderson and Whitelock (2004, p.4) also mention about the mobility of Web 3.0 technologies and claim that letting people connect without the time and space restriction is one of the facilities that the new Web should supply.

In brief it can be said that Web 3.0 is expected to make the connections between both information and people easier, faster and more reliable. Web 3.0 as a new generation web helps reaching the desired information in a very short time. It also allows users to personalize the websites according to their interests. It is obvious that Web 3.0 is not the final destination in the journey. It is enthrusting to think about a Web with more features of artificial intelligence and other technologies that cannot be foreseen today.

2.2. Web 3.0 and Education

Today one of the fastest and most common ways of reaching information is the Web and there are new potentials in setting up a data substructure and generalizing it in various fields from education to environment (Gökçearsan, 2011, p.2). Web 3.0 is not a new term to be discussed in the field of technology but it is a new term in the field of education. Although there are many improvements in the use of technology in education, the central point has always been the Web 2.0 tools so far. As the technology field is one of the fastest developing areas in the world it can be said that Web 3.0 tools are on their way to conquer the field. Ohler (2010, p.17) claims that Web 3.0 reshapes the Web and this affects everything. As the changes can be foreseen in advance almost for the first time, the education area should be ready to take part in the discussions about this new technology.

2.2.1. Evolution of the Educational Web

Similar to the evolution of the Web it can be said that there is a change in the education area in terms of how to integrate the technology into teaching and learning. As it is for the Web, we can also have three eras for learning and teaching; learning and teaching 1.0, learning and teaching 2.0 and learning and teaching 3.0.

In learning and teaching 1.0, similar to Web 1.0 there is only presenting the information. Teachers are the suppliers of the learning content. Hussain (2012, p.13) claims that there are learning (content) management systems (LMS or LCMS) to promote the learning and systematize the course content for the learners. There are no interactions between the teachers and the learners. The communication is one way; from the teachers to the learners. Halimi et al. (2014, p.166) also state that in LMS there is a straight up and down way of data transfer and the social aspect of learning has been ignored.

With the Web 2.0 tools learning and teaching has become to involve more communication and cooperation. Rajiv and Lal (2011, p.338) declared that education in Web 2.0 era focuses on the terms involvement and contribution using the tools like blogs, wikis and social networking services. As it is for our daily life, it can be said that we are in learning and teaching 2.0 eras. However, Richardson (2008, p.3) point out that Web 2.0 or the Read/Write Web holds revolutionary changes for teachers and students but education has been slow to adjust these innovations. This tardiness can be said to be a problem as the technology has been developing in such a fast way that we see how it affects our daily life. Alfuhaha (2013, p.37) also stresses the necessity of this adaptation in his article;

“.....In like manner and from a macro-education perspective, schools and universities should adapt and cherish practices that meet contemporary learning needs, or else perish and be subject to de-schooling.”

It is a question if Web 2.0 should fully be adapted by the teachers and students. Unlike Richardson and Alfuhaha, Rosen and Nelson (2008, p.221) assert that students have different skills and attitudes about technology. Thus, it would be unreasonable to insist on the idea that all the students are good at using technology just because they have been surrounded with technology since they were born. A similar approach can be used for the teachers as well. Although it is urgent for today`s teachers more than ever to know the new trends in education as the technology plays a great role in the education field, it cannot be claimed that the teachers should use every Web 2.0 tool in their classes. As the technology field is a rapidly changing area, it can be argued that it is quite difficult to catch up with the developments. However, teachers should be aware of the effects of technology on teaching and learning, in short on education. As teachers have their own way of

teaching as well as their own teaching and learning environment it would be hard to say that every teacher should integrate technology into their teaching. Alfuqaha (2016, p.55) also emphasizes that the integration of technology in the classrooms should contribute to the learning results. Technology should not be used either too much for the sake of using it or too little that has no effect at all. It should also be beard in mind that the students have also different learning styles and preferences. Halimi et al.(2014, p.166) state that personal learning environments are important as the learners have different backgrounds and learning priorities. In terms of Web 3.0, Poore (2014, p.174) underlines a similar idea in her article and points out that the teachers should analyze their teaching and learning concepts and try to make use of Web 3.0 to strengthen their approaches. Thus, it would be more meaningful to say that teachers should be aware of the developments in the use of technology in classes as teachers are working with digital 21st century learners.

It is a fact that there are some problems in the education systems in the world including Turkey. Poore (2014, p.174) picks out this fact by stating that the world is undergoing some difficulties in the education field in terms of designing effective lessons, motivating students and applying pedagogies. In Turkey, similar problems have been being experienced. ABİDE (Evaluation and Monitoring the Academic Skills) 2016 report, which aims to evaluate the skills of the 8th grade students to use the information they have gained at schools in their daily lives, shows that the students cannot perform well when it comes to use their knowledge about a lesson in real life. Our students' performance in the international exams like PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) is also parallel with the results of ABİDE. All these facts can be interpreted as that the education field needs something innovatory and Web 3.0 can be a part of the solution. Karalar and Özdemir (2017, p.183) state that the learning environments developed by using ontologies and semantic web technologies can present intelligent solutions to make learning personal and fast access to the reliable and accurate educational contents in the Web. Devedžić (2004, p. 37) also emphasizes that Web Intelligence makes the educational content relevant for the user by updating it according both to his or her goals and to the current trends in education.

Alfuqaha (2013, p.36) states that the definition of pedagogy has to be changed to meet the needs of the 21st century learners. ATC21S (Assessment and Teaching of 21st Century Skills) is a project set up in 2008 aiming at defining the 21st century skills and developing ways to measure them. According to this project today's education systems do not fully prepare students to live and work in an information-age society and it is a must to include skills such as collaboration and digital literacy to the current systems. Figure 2-2 shows the skills required for the 21st century learners;



Figure 2-2: Skills required for 21st century learners [3]

Parallel with Alfuqaha's point of view, Prensky also argues that the techniques and the components of the current education systems do not correspond with the needs of the students. Today students who have been growing up in the technology time have different "thinking patterns". Prensky names this new generation learners as "digital natives" and he uses "digital immigrant" term to refer to the people who have started using the technology later in their lives (Prensky, 2001). It is clear that the digital natives do not have to get accustomed to the new era as they are born into it. However, digital immigrants are in disadvantage because they have to adapt to the new way of life and most of the time that is a problem. In a study carried out at Philadelphia University in Jordan in 2013, 42 faculty members were asked to evaluate themselves considering their use of technology in classes and the results show that %62 of the lecturers see themselves in Web 1.0 era. Only %5 of them thinks they have caught up with the new trends in education that is "Web 3.0

Edutainment” (Alfuqaha, 2013, p.38). This study can be interpreted as there is a need to work on Web 3.0 concept. Somyürek (2014, p.66) states that augmented reality technology, which is going to be discussed in detail in the next parts as a Web 3.0 tool, comes into prominence to attract the attention of the z generation (digital natives as Persky has called them) due to both its advantages over the traditional methods and technologies and its positive effects on education by supporting and enriching the learning environment.

The need for a new Web depends mostly on the expectations about the education. Poore (2014, pp.168-178) claims that education is not just about teaching an issue, it is about teaching to think and as it requires to let students develop higher-order thinking skills, Web 3.0 will be a success as long as it promotes skills like critical thinking, reasoning, analysis and evaluation. Gökçearsan (2011, p.8) also expresses that the aim of the modern education is to educate creative people who can both produce and use the information and who is open to life-long learning. According to Koper (2004, pp.5-6) Web 3.0 is a meaningful tool for education as long as it strengthens education, raises adaptability and availability of education, makes education more appealing and reduces the grunt work for the teachers. Unlike the researchers above, Rajiv and Lal (2011, p.338) stress on the technological innovations that will come along with Web 3.0. They maintain that education will improve with the help of the new technological applications like 3D (3 Dimensional) environments. Although there are studies that show the advantages of using technology in education, it cannot be claimed that technology is always useful for everyone. As Wojciechowski and Cellary state, the learning event will not be enlightening unless the learners are allowed to think about the whole process. It is important that the teachers design lessons with various activities that let students consider their participation (Wojciechowski and Cellary, 2013, p. 584). This assertion also supports both the idea that argues the skills that should be acquired by students are the 21st ones and the researches that support the idea that the education should improve the higher-order thinking skills.

According to Ohler (2010, p. 16) to use Web 3.0 at schools there are some conditions. First, as the Web 3.0 mostly deals with the data on the Web the textbooks should be either semantically accessible or kept out of the databases. Second, as education is a very broad area there will be an enormous amount of data to be tagged

and arranged. For the first condition digital libraries can be a solution. Matthews (2005, p. 8) suggests that digital libraries can have directories that are organized using tags and ontologies. This controlled lexis can be a common one for both the other digital libraries and search engines which will help researchers find the most relevant references for their interests. Devedžić (2004, p.34) also points out the importance of data management by saying that to have Web 3.0 in education it is also indispensable to have educational ontologies and databases. Even if such an educational Web 3.0 service does not come true, it can be suggested that it will still be very beneficial to have a general semantic web as it will be a time saver for both the learners and teachers. As it has been stated before there is a huge mass of data and it is not neither possible nor a must to gain control over the whole data. The important thing is that the researcher should reach the desired data in a short time. This can be deduced as having more time to think for both students and teachers when the education benefit of the new web era is considered. Poore (2014, p.170) also stresses that with Web 3.0 the researchers will spend less time searching materials because the new web will support them reach more related and correct information with the help of ontologies, agents and metadata. Devedžić exemplifies this with a student's search about Greek mythology. When a student indicates his or her research topic the agents start working and finding the relevant results according to the student's interest by communicating with the educational servers. As the agents also have the information about the student's background knowledge about the topic by tracking his or her previous searches, the results can be narrowed down to the less known ones or the student can restrict his or her search to one topic, in this example to the concept of "God" (Devedžić, 2004, pp.34-35).

Apart from being a time-saver web, Web 3.0 has also features about users' personal demands. Gökçearslan (2011, p.8) thinks that today the educational web services are under a critical process as the amount of information on the Web is huge and people demands personalized platforms where they can work concertedly. With Web 3.0 it will be easier to find the relevant information on the web as the information on the web will be filtered according to the users' needs (Ohler, 2010, p.15). Moreover, the learning environments in these intelligent systems will take the interests, aims, priorities and inspirations of the learners into account and this will help education meet the demands of the learners (Halimi et.al., 2014, p.165).

Devedžić (2004, p.32) entitles this as “personalization of learning” and claims that intelligent education systems keep an account of the users’ previous searches along with the lessons they have had so far. This documentation helps the agents and other elements of Web 3.0 to work hand in hand to reach the aims of the users. Pedagogical agents are important in this sense. With the help of pedagogical agents there will be a bridge between the users and the educational servers (Devedžić, 2004, p.31). Figure 2-3 below shows how the pedagogical agents work to help the users to benefit from the educational servers;

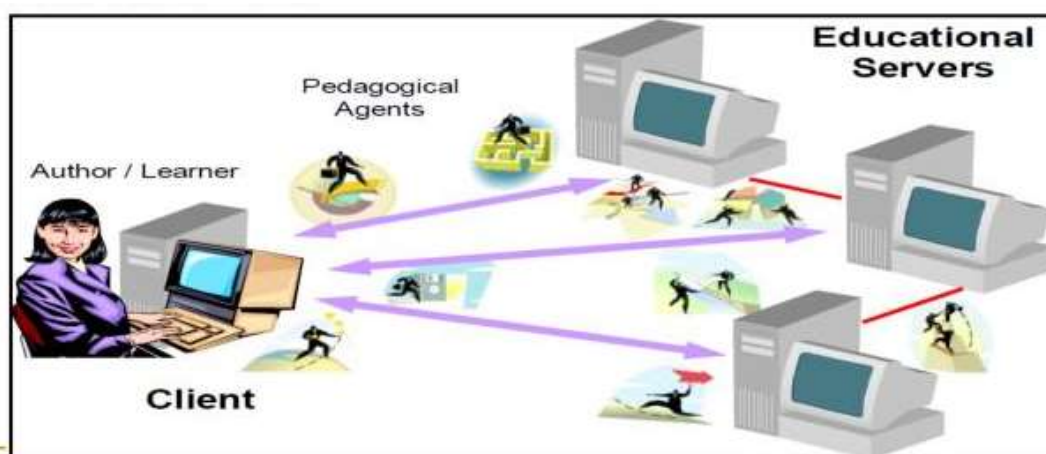


Figure 2-3: How the agents work (Devedžić, 2004)

Similar to Halimi et al.’s assumptions along with Devedžić, Poore (2014, pp.171-173) contends that there are two contexts for Web 3.0; the pedagogical scenario and the administrative scenario. In the pedagogical scenario Web 3.0 will support the learners with tools that will let them have their own personalized learning services with the help of special agents programmed for that. In the administrative scenario Web 3.0 will act like an assistant that will do the tasks like programming the learning activities, keeping the journal of the class, saving the student information including their academic reports. Whether it is the first scenario or the second one Web 3.0 with its agents can be claimed to replace the teachers. Here it will be meaningful to ask whether these agents can discern and judge what is right and good for a student to learn. Karalar and Özdemir (2017) carried out a study with the thirty-four 8th grade students in Muğla and they aimed at revealing the students’ opinions about the Web 3.0 based learning environment. The results are interesting. Although the students enjoyed the Web based learning environment they preferred to have a teacher to tell the content before learning it on their own in a computer based system.

It can be said that this study shows that it is not very possible to replace teachers with any artificial intelligence machines or any computer based systems. Rego et.al. (2010, p.43) also conclude their work with the assumption that easily reachable qualified materials are not the key for a good lesson. The important point is to arrange the activities in such a way that the qualified courses with qualified materials will support the students reach their learning goals. This conclusion can be interpreted as the proof that shows the importance of the human factor in education. Poore (2014, p.175) claims that “sense-making” is a skill that cannot be fully operated by any artificial intelligence. The results that the pedagogical agents get can be evaluated by the teachers and used for the benefit of the learners. That means teachers will continue to be the decision-makers on selecting the suitable materials while they get rid of doing the grunt work and have more time to do the academic one. New Horizon Report also underlines the same point and states that the teaching methods are developing and technology is very functional. However, learners are still in need of advisers to help them acquire the 21st century skills and the school should support such teaching practices (The New Media Consortium, 2017).

Parsa (2009, p.3) stresses that whether we are digital natives or digital migrants, it is important to keep up with the developments in the technology area because to miss the improvements in this area means making the social distance between the individuals bigger. Horizon Reports, having been conducted by the New Media Consortium and the EDUCAUSE Learning Initiative since 2004, also show that although the technologies that are supposed to have an impact on education change every year, it is obvious that technology plays an important role in education around the world (Martin et.al. 2011).

2.2.2. Augmented Reality as a Web 3.0 tool

As it has been stated before it can be difficult to categorize the tools under the headings Web 1.0, Web 2.0 and Web 3.0. Many tools and web sites include features from three of the eras as it is in the Amazon.com example. Cormode and Krishnamurthy (2008) point out that although it is very obvious that social networking sites like Facebook are the products of Web 2.0 it is a problem to label sites as Web 1.0 or Web 2.0 as the web sites are developing every day. Likewise, Ankolekar et al. (2007) claim that Web 2.0 and Web 3.0 are mutually

complementary. Each technology has its own strengths and they should get benefit from these when it is needed. Halimi and his friends (2014) also created a system which is a combination of Web 2.0 and Web 3.0. They called this system “Personal Social-based Learning Environment”, in short SoLearn. Their work is also an example for the idea of mash-up Web 2.0 and Web 3.0 that they cannot be separated in thick lines. In SoLearn the students can choose a learning objective according to their needs and start working on it. This feature can be said a part of Web 3.0. Thus, to decide whether an application, tool or web site is a Web 1.0, Web 2.0 or Web 3.0 one, it will be meaningful to refer to the peculiarities of the web eras. From this point of view it will be meaningful to focus on the most obvious features of Web 3.0 and explain why augmented reality is a Web 3.0 tool. The literature review above shows that time saver, place-free which can also be called ubiquity and personalization are the mostly referred characteristics of Web 3.0.

As time is important in the new Web era, it is important to reach the information anytime. This creates the need to access the information anywhere, too (Rego et al., 2010, p.37). Additionally, Horizon Reports have been supporting the importance of mobile technologies on education since 2006 (Martin et al., 2011, p.1900). Liu et al. (2010, p.38) underline that the mobile technologies including the wireless technology can help creating learning environments that assist reaching the targets without time and place limitations along with the feasibility of using different presentations which classic classroom environments cannot afford. Along the same line, Lin et al. (2013, p.315) claim that augmented reality applications that can be used with mobile devices let the users benefit from it without any time or location limit. Billinghurst and Dunser (2012, p.58) also state that with mobile devices, augmented reality technology can be experienced in any place which lets the learners be occupied with learning outside the classroom as well. Thus, it can be concluded that as Web 3.0 requires the data to be reachable anytime and anywhere, mobile devices like mobile phone or tablets are very functional. They allow reaching the data easily with the help of the wireless technology and mobile applications. From this point of view it can be said that augmented reality is a Web 3.0 tool as it can be used with mobile phones or tablets anywhere and anytime.

Referring to the personalization aspect of Web 3.0, augmented reality technology can be claimed to be an individual one as it can be used without time or

place limit. Users especially learners can use the application when they need it or spend any amount of time according to their needs. Kirner et al. (2012) claim that augmented reality lets users give priority to any of their aims depending on their characteristics as learners along with their own requirements. Sırakaya and Seferoğlu (2016, p.432) also point out that augmented reality is a suitable tool for the learners in that it allows them to learn in their own pace and learning styles.

According to Rajiv and Lal (2011, pp.337-338) the new generation of web includes 3D images. The improvements in the internet and computer technologies will allow 3D experiences much more possible with virtual worlds, which have already been in use with internet-based virtual environments like Second Life and Active Worlds, and augmented reality. From this point of view, augmented reality can also be assumed to be a Web 3.0 tool.

2.2.2.1. The Definition of Augmented Reality

Augmented reality is a technology that unites 3D virtual objects and real environment. This technology does not only add virtual objects. It is also possible to remove the objects or add sounds (Azuma, 1997, pp.355-361). Erbaş and Demirer (2015, p.8) define augmented reality as the enriched real worlds with virtual elements. Accordingly, augmented reality is an environment that consists of the virtual objects that are added because of empirical reasons along with the real ones. With augmented reality the intended message or information is visualized with audial and visual (3D) methods. Basically augmented reality application transfers the real environment to the screen and adds digital elements on this environment (Baykara, et.al. 2017, pp.72-74). In Figure 2-4 an augmented reality scene can be seen.



Figure 2-4 : How augmented reality looks like [4]

The beginning of augmented reality dates back to 1960s when Ivan Sutherland and his students started working on computer graphics. In the next two decades there were a few scientists who worked on it. In 1990s the need to help the workers at Boeing connect wires resulted in constructing an experimental augmented reality application to meet the need. Since then there have been many improvements on the field (Feiner, 2002, p.50). Today augmented reality is a common visual source in various areas including news, entertainment and sports (Alkhamisi and Monowar, 2013, p.25). Education is also one of the areas where augmented reality is used. Dunleavy et.al. (2009, p.8) underline the “ubiquitous” feature of augmented reality and state that learners can find any information around them using their mobile devices as it is possible to embed virtual data into the real world. Along with this exploring function, augmented reality is also used for other educational purposes like completing activities or improving capabilities (Kirner et al., 2016).

The term can be confused with virtual reality. According to Azuma (1997, pp. 355-356), augmented reality is a different version of virtual reality. In virtual reality, the users find themselves in an artificial world. They cannot see the real world around them. However, in augmented reality the users see artificial objects embedded to the real world through several tools. Dunleavy et al. (2009, p. 8) stress that there are facilities of both technologies. In virtual reality environment, it is possible to do anything that is not earthly in real world like flying from one place to another. It is also practicable to have various learning experiences. Meanwhile, augmented reality technologies let people communicate face-to-face and contribute to kinesthetic learning by providing interaction in real environments with multi-sensory situations. Taşkıran et al. (2015, p.466) underline the kinesthetic learning and claim that augmented reality is a tool that let the students be active in the lessons and learn by doing. Billinghurst et al.(2001, p.6) also mark the fact that in augmented reality the physical location is enriched with virtual objects. The effects on televisions are not examples of augmented reality as augmented reality should not only combine real and virtual, it should also be “interactive in real time” and “registered in three dimensions” (Azuma, 1997, p. 356).

Lin et al. (2013, p.314) define augmented reality as a platform where there are many real objects along with some virtual ones. That means the amount of the virtual objects in augmented reality does not have to be high. Wojciecowski and

Cellary (2013, p.571) also underline this fact and state that in augmented reality the environment contains more real objects than the 3D representations. Milgram and Kishino (1994) also worked on a common way to categorize the types of such platforms including virtual and augmented reality under the heading “Mixed Reality Environments” and came up with four types of environments to make the places of virtual and augmented reality clear. As it can be seen in the representation demonstrated in Figure 2-5. augmented reality is a technology that has less virtual elements than virtual reality. When there are more visual objects augmented reality becomes augmented virtuality. In virtual reality there are just visual object and the environment is also visual.



Figure 2-5: Virtuality continuum by Milgram and Kishino (1994, p.3)

Like Milgram and Kishino, Craig (in Altınpulluk, 2015, p.124) claims that augmented reality is an environment where it is possible to have interaction between human and computer and human and human. It will not be a utopia to think that the unstoppable development of technology will make interaction between computers possible. However, it can be said that the effects of such technology on augmented reality technologies are still an object of interest.

2.2.2.2. The Technical Aspects of Augmented Reality

Because of the pace of the development in the technology area, it can be said that the characteristics of an application change in a very short time. Augmented reality is such an application which has evolved considerably in time. Altınpulluk and Kesim (2015) state that the first augmented reality applications began with head-mounted devices, simulators, basic wearable tools, pocket computers, desktop computers and the cameras integrated into these devices. In Azuma’s paper it is also stated that the optical and video technologies were options to have augmented reality

(Azuma, 1997, p.361). Figure 2-6 shows the two types of the augmented reality devices.

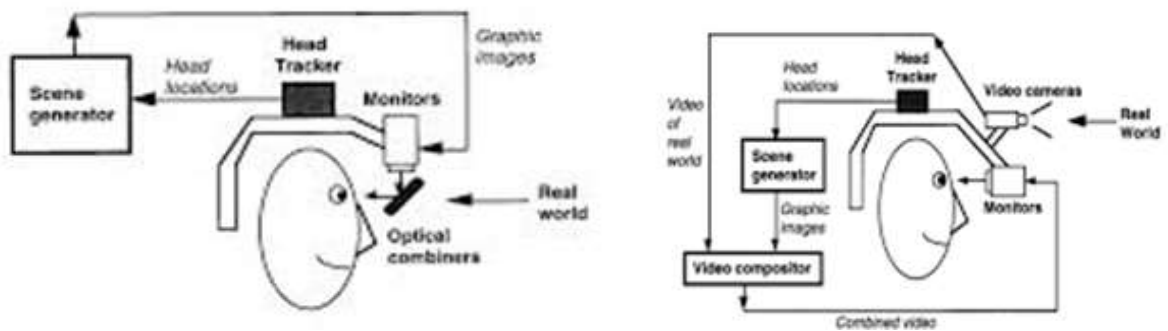


Figure 2-6: Optical see-through HMD vs. video see-through HMD
(Azuma, 1997, pp. 361-363)

Azuma (1997, pp.361-362) proclaimed that with the use of head-mounted devices (HMD) it was possible to have augmented reality. Positioning optical combiners on see-through HMDs or placing head mounted cameras on closed-view HMDs were the basic technical aspects of augmented reality. Today Google Glass can be counted the corresponding technology. Google Inc. (Mountain View, CA) pioneered it as a more modern and wieldy HMD in 2013 (Hwang and Peli, 2014, p.1022). As it can be seen in Figure 2-7 Google Glass is smaller and easier to use compared with the earlier HMDs.



Figure 2-7: Google Glass [5]

With the development of new technologies, new types of augmented reality technologies have emerged. According to Wojciechowski and Cellary (2013, p.572) there are other ways than HMD- related ones to accomplish augmented reality and

the Figure 2-8 shows a summary of their division of the types of augmented reality systems³;

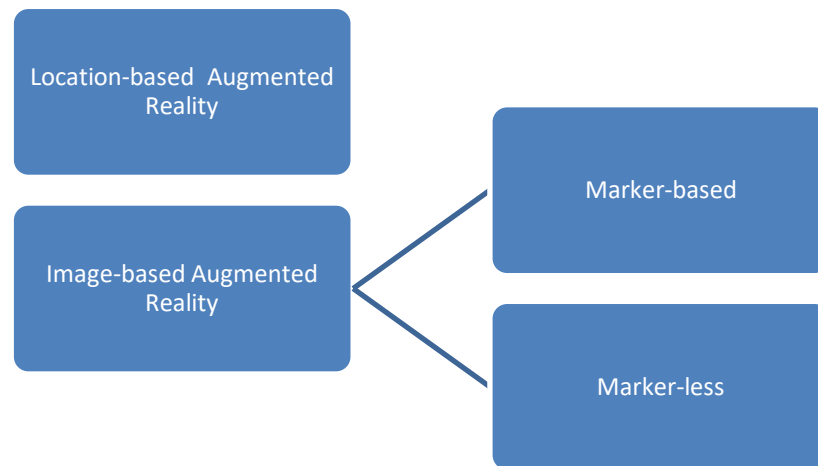


Figure 2-8: Types of augmented reality (Wojciechowski and Cellary, 2013)

In location-based augmented reality mobile devices like smartphones or tablets are used. Global Positioning Systems (GPS) and WiFi-based positioning systems are important parts of this type of augmented reality as the locations of the users are captured by these technologies and the users can see the virtual images around them on their portable devices depending on their location (Wojciechowski and Cellary, 2013, p.572). This technology is also very popular in education. According to the analysis conducted by Bacca et al. (2014, p.142) location-based augmented reality systems are the second mostly used augmented reality type after marker-based one owing to the mobile technologies like accelerometer, gyroscope and digital compass apart from GPS. With the developments in the augmented reality area there are many more useful features of such applications and the new version of Google Maps is a very good example at this point. With the new version, the application will allow users to know not only what there are around them or where they are, it will also show the direction they should take if there is a target address. The users should turn on their cameras and scan the place around them. In other words, with the new features, instead of getting a verbal direction like “Head south to X street” the users will see the directions on the map as it can be seen in Figure 2-9 (Chennapragada, 2018).

³ The author has designed the image according to the data on the relevant article.

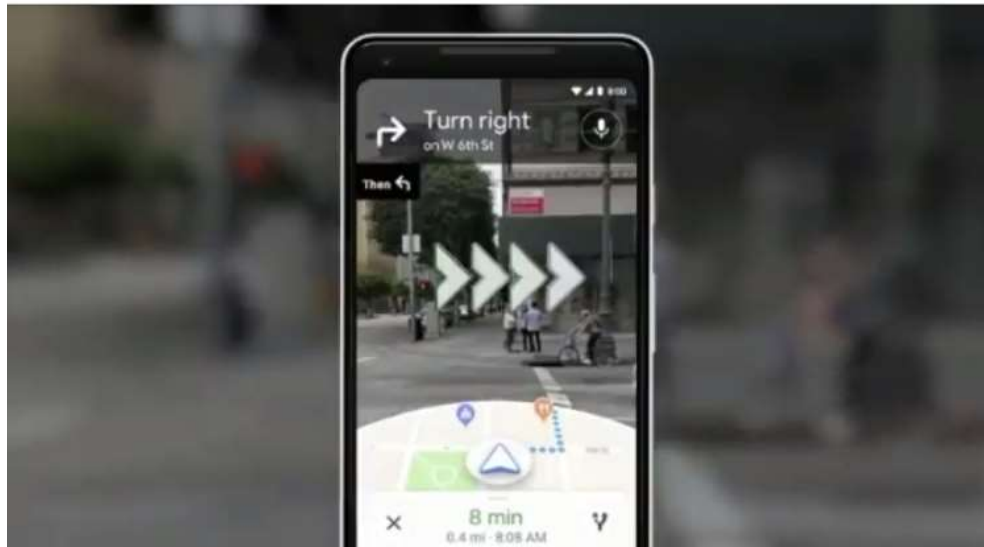


Figure 2-9: The Next Level of Google Maps [6]

In image-based augmented reality HMDs, desktop monitors, large-screen projection systems and handheld displays like smartphones and tablets are used. The system recognizes the objects either through special markers (marker-based) or a typical characteristic of those objects (mark-less) and adds the virtual information in the real environment (Wojciechowski and Cellary, 2013, p.572). In short, as Baykara et al. (2017, p.74) set out augmented reality consists of four peripheral units. These are computer infrastructure, camera, marker and the real world. According to Bacca et al. (2014, p.142) using markers is more useful in education as they are easier to recognize and quicker to get a respond. They also underline this efficiency by stating that % 59,3 of the studies they have covered have used maker-based applications. A similar explanation was stated by Baykara et al.(2017) in their study. Somyürek (2014, p.73) also stresses that augmented reality mostly occurs with the help of a mobile application by defining a qr (quick response) code which is generally black and white. Using qr codes as markers are the mostly used technology in augmented reality.

Today it is mostly the mobile technologies that augmented reality applications are used. Altınpulluk and Kesim (2015) also underline this change in augmented reality technology by referring to the developments in the technology area. Especially the boom of internet has resulted in mobile tools and software and applications compatible with them becoming widespread. In Figure 2-10 it can be seen that augmented reality is mostly used with mobile devices.

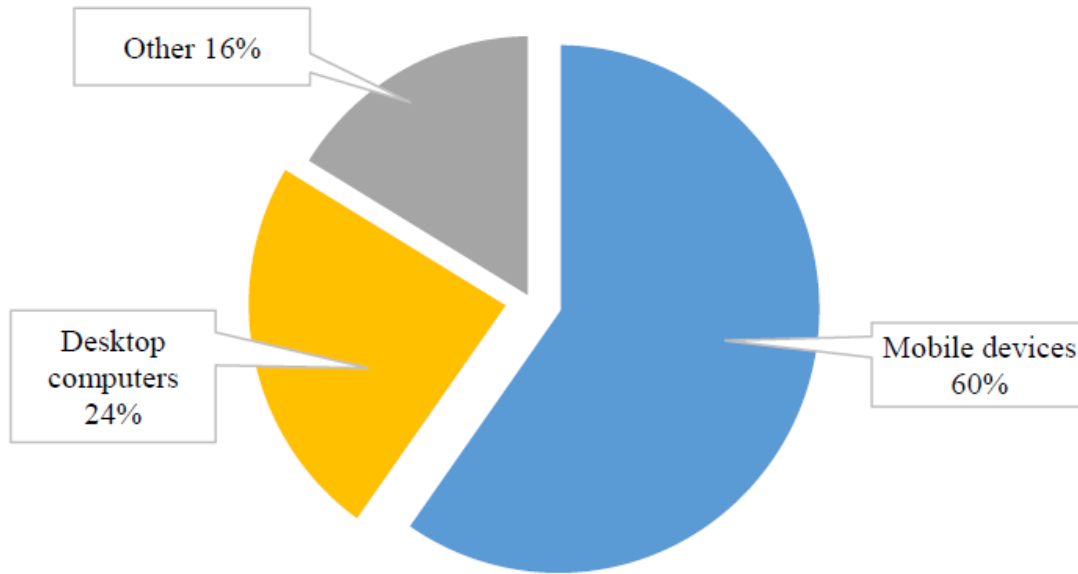


Figure 2- 10: Devices that augmented reality technology is used (Akçayır and Akçayır, 2016).

Another important development is the fact that augmented reality applications support user-friendly authoring tools more and this improvement lets the users design augmented reality environments depending on their own needs (Altınpulluk, 2015, p.126). Abdüsselam (2016) also states that although augmented reality technologies require technical data and long hours to work on, the developments in technology have provided more simple applications that can be used by the users with little technical knowledge. HP Reveal Studio that once called Aurasma is an example of such applications. Using HP Reveal either with desktops or in mobile application mode, one can create auras which can be defined as the augmented reality scenes easily⁴. Detailed information will be given in the Research Design part.

2.2.2.3. Augmented Reality Applications

There are many augmented reality applications designed for desktop computers and mobile phones. Snapchat which has originally designed for texting is also a product of augmented reality technologies. With this application it is possible to add rabbit ears, baseball caps, various mustache and etc. to the portraits. Similarly, Google Translate application helps users to translate the phrases on the street signs or

⁴ Retrieved from <https://www.hpreveal.com/>

menus into their own languages just by holding the mobile phones towards them (Baykara et.al. 2017, pp. 72-73). In Figure 2-11 there is an example of Google Translate.



Figure 2-11: Google Translate [7]

Apart from these applications there are many other augmented reality applications that can be used with both mobile devices and desktop computers. Today it is more common to use this kind of applications with mobile devices as it can be used anywhere and anytime. Vuforia, Unity, Quiver, Augment, Blippar, Animal 4D+, Layar, AR Flashcards, Anatomy 4D, Chromville, HP Reveal (Aurasma) and Wikitude are some of these applications. There are many other augmented reality applications which serve different purposes. For instance, Inkhunter is an app to try on virtual tattoos before it is inked. The app projects any tattoo design on any part of the body. Most of these applications are free. However, some of them ask for subscription to be able to use their whole features. Meanwhile, some of the applications can disappear like ZooBurst or be bought by other companies as in the case of Aurasma and HP Reveal⁵.

2.2.3. Augmented Reality in Education

As it is stated above, augmented reality technologies are being used more and more in daily life for different purposes. When it comes to education, although it could not be foreseen explicitly, augmented reality is getting more and more popular. In Martin et.al.'s work on the new technology trends in education referring to the Horizon Reports released between 2004 and 2010, they revealed that social web and

⁵ The author googled the augmented reality applications and summarized the information.

mobile devices were significant technologies that were to have an impact on education. However, augmented reality technologies were not within these technologies and they were in their premier step. When they covered the papers published in Google Scholar about education-related technologies from 2004 to 2010, they got the numbers in Table 2-1(Martin et al. 2011, p.1902).

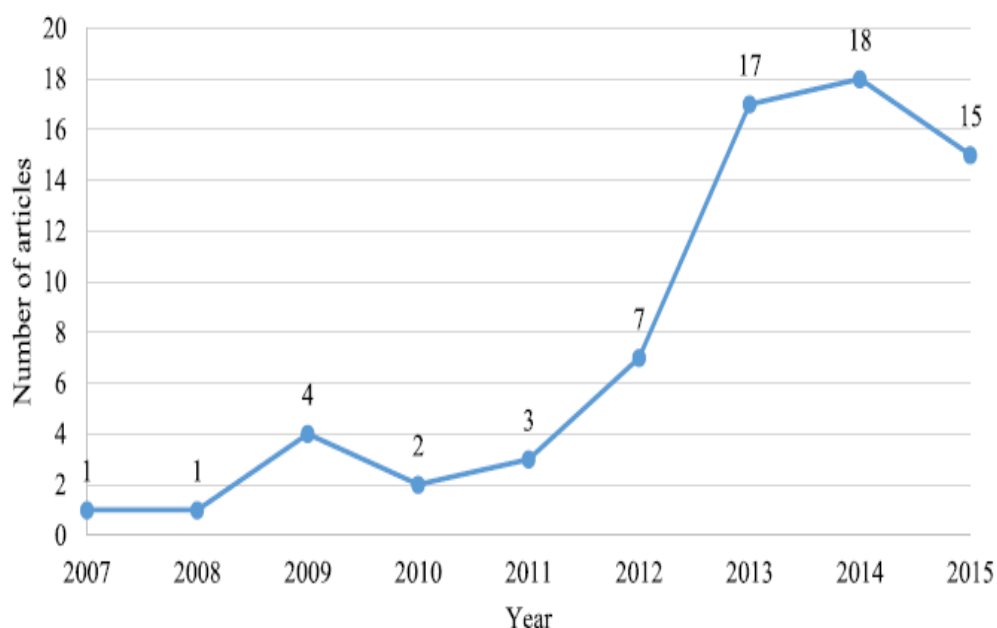
Table 2-1: Number of papers published in Google Scholar in education-related technologies from 2004 to 2010

Year	Mobile	Games	Augmented Reality	Social Web	Semantic Web	Learning Objects
2004	3366	1588	202	11379	1268	300
2005	4013	1749	214	13162	1426	398
2006	3979	2117	244	15205	1657	429
2007	4155	2336	260	17701	1588	415
2008	5125	2649	282	18392	1854	532
2009	6208	2733	306	19853	1849	461
2010	4855	2633	329	14950	1698	322

As it can be seen, the number of papers about augmented reality has increased % 62,8 in six years, which makes it the second most growing technology area after games which has a %65,8 growth rate. Referring to these numbers, they claimed that augmented reality technologies would become more and more crucial and they would have a more space in education in the following years (Martin et.al. 2011, p. 1904).

Five years later Akçayır and Akçayır (2016) confirmed this projection by stating that as there is no need for costly hardware or complicated equipment like head mounted displays to use augmented reality, it has been being used more. They also claim that as there are more mobile applications to use augmented reality, it has become a widely used technology in education. Moreover, according to Demirer and Erbaş (2015, p.809), with the developments in 2D and 3D image support, video and animation services, links to social media and outer web pages and location services augmented reality will have more areas to use as an effective teaching and learning tool. Akçayır and Akçayır's review of literature has also showed that the increase in the studies on augmented reality has continued. They reviewed 68 articles selected based on various criteria and in Graph 2-2 the number of the articles published about augmented reality in education can be seen (2016, pp. 1-4).

Graph 2-2: Number of articles about augmented reality in education



Similar to Akçayır and Akçayır's review, Korucu et al. (2016, p.81) reviewed 33 articles written between 2010 and 2016 and their findings support Akçayır and Akçayır. They have found out that there is a dramatic increase in the studies about augmented reality in the last years and education is the leading field in this growth.

The studies about the effects of augmented reality on education show how augmented reality contributes to education in a good way (Abbasi et al., 2017, Akçayır and Akçayır, 2017, Bacca et al. 2014, Billinghamurst and Dunser, 2012, Chang et al., 2011, Dunleavy et al. 2009, Giasiranis and Sofos, 2016, İbili and Şahin, 2015, Koutramonos et al., 2015). It is not just school education that augmented reality has positive effects. According to the research conducted by Dube et al. (2017) augmented reality is a useful tool even in choreography production. In their analysis they studied the effects of various interactive systems on users' performances and confirmed the potency of augmented reality.

Mobile technologies have also let augmented reality be used more in education. Billinghamurst and Dunser (2012, p.57) stress this fact by stating that augmented reality applications compatible with handheld devices are among the mostly used type of augmented reality technologies along with the augmented books. The MagicBook is one of the examples of augmented books that can be used with mobile technologies. It consists of both virtual reality and augmented reality

elements. The users can see 3D virtual objects on the pages using a handheld augmented reality display. Moreover, they can use the same device to see themselves as avatars in a virtual environment. Depending on their study about the MagicBook, Billinghamurst et al. (2013) claim that the effects of such technologies on education are positive. In Figure 2-12 examples of MagicBook can be seen.

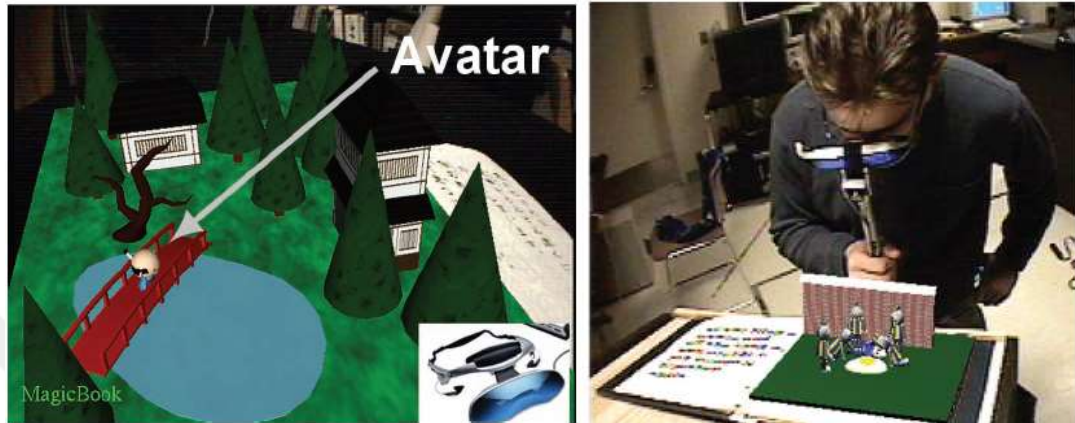


Figure 2-12: MagicBook (Billinghamurst et.al., 2013)

Lin et al. (2013) have similar findings about the effect of augmented reality on education. Their study was about the effects of a mobile augmented reality system on learners' comprehension and learning accomplishments. The results pointed out that learning with an augmented reality system helps learners be more successful when compared with learning using 2D systems. Baykara and his friends' study on an augmented reality system in preschool education was also a success. Their application was found to be an effective, pedagogically suitable and highly usable tool that can assist learning by the various pre-school authorities (Baykara et al. 2017, p.73). In their study Atasoy et al. (2017) worked with eighth grade students. The students experienced augmented reality integrated lessons about geometrical objects and volume measurement. The results of the study show that the motivation and attitude of the learners about augmented reality applications are positive. According to the results of the experiments carried out by the researchers at the University of Washington Human Interface Technology Laboratory augmented reality is a strong and appealing optical and notional learning experience for users (Shelton and Hedley, 2004, pp.337-338). Çetinkaya and Akçay (2013, p.983) stress that augmented reality increases students' perception of the real world and their interaction with it and it can be used for fun, education or edutainment which means learning while enjoying it. İbili and Şahin (2015, p.346) have studied on the relation

between computer skills and the use of augmented reality technologies in geometry teaching and similar to Çetinkaya and Akçay's findings they have pointed out that teaching materials prepared with augmented reality technologies increase the attention levels of both the learners and the teachers as well as help deep learning and let students enjoy the lessons more as they feel like they are playing a game.

Wojciechowski and Cellary (2013, p. 571) stresses the advantages of augmented reality in terms of price, security and variety of learning activities. They highlight that with the help of augmented reality systems it is possible to teach complicated topics in a more understandable and cheaper way. They state that it is not necessary to spend money on laboratory equipment anymore as it is very easy to do the experiments using augmented reality systems. They also claim that as augmented reality systems let teachers and students experience experiments visually they are also very secure compared to science laboratories in schools. Atasoy et al. (2017, p.436) also point out that augmented reality technologies can give an opportunity for the students to experience environments that are too difficult or costly to undergo in classrooms. Similarly, Erbaş and Demirel (2015, p.9) express that augmented reality can be used to let people experience the environments which are costly and insecure. Kerawalla et al. (2006) also underline the security advantage of augmented reality technologies. They claim that augmented reality technologies let learners be in safe while learning the topics that need actual involvement of the learners in such situations that are likely to be dangerous.

According to Baykara et.al. (2017, p.72) the reason behind the studies about the effect of augmented reality on education is the desire to have an education system that triggers the motivation for the learners' curiosity. Similarly, Küçük et.al. (2014, p.398) state that augmented reality technologies can provide the environment for the learners to feel more enthusiastic for learning. The results of the study of Dunleavy et al. (2009) also show that augmented reality resulted in more students to participate in the lessons because students found using handheld devices and GPS to perform their tasks very motivating. Moreover, students were able to work together to complete their tasks which fostered collaborative work. Billingham and Dunser (2012, p.56) have also emphasized the fact that augmented reality technology let users have up-to-date forms of communication and collaborative learning experiences. They

exemplify this with the experience of a 3D object from different angles and sharing the data among the group and coming up with a participatory learning environment.

Augmented reality is also claimed to help learning abstract subject. Shelton and Hedley (2004, p.324) state that augmented reality technologies use 3D virtual items to present any object or environment and it can be contended that augmented reality exploit distinctive cognitive instruments for “spatial knowledge acquisition”. Demirer and Erbaş (2015, p.808) also stress a similar point by claiming that visualizing the abstract topics using augmented reality technologies may help students understand the complicated elements more easily. With 3D representations of the complex objects, students can get a chance to zoom in, rotate and examine the elements as well as reaching animations and videos about them. Bacca et al. (2014, p. 139) have also found out that %40,6 of the studies on augmented reality that they reviewed were about science. They assume that this result shows that augmented reality is a useful tool to let students experience incidents that are not possible to be observed in the real world. They also think that augmented reality is a useful means of teaching conceptual or complicated idea. Billinghamurst and Dunser (2012, p.56) support Bacca and his friends by stating that augmented reality helps comprehension of the difficult subjects by supplying “visual and interactive” learnings that mix real and virtual data. In like manner, Tülü and Yılmaz (2012, p.183) underline that the idea of using augmented reality in education is very appealing as this technology lets the learners imagine and think about the subjects that are difficult to do so by linking them with the real world. In addition to these, Billinghamurst and Dunser (2012, p.60) maintain that augmented reality increases the reading comprehension and helps teaching spatial elements like electromagnetism as well. Kerawalla et.al. (2006) emphasize the fact that teachers do not have enough time to deal with all the important aspects of the subjects especially the complicated ones. They claim that augmented reality applications can be helpful in such environments.

The literature review shows that augmented reality can be used with different subjects for various purposes. Çetinkaya and Akçay (2013, p.984) express that augmented reality is a commonly used tool in education and they summarize the functions of augmented reality under five titles. These are supplementary, guiding and introducing, games, field trip and training. Somyürek (2014, pp.69-70) has prepared a more detailed list of the areas that augmented reality is used in education.

These are gaining 3D format for the 2D books, instruction about maintenance and repair, doing experiments in science, visualizing the terms in mathematics, geometry and geography, teacher training, upskilling the engineers about the tools and equipment, providing experience for the military and medical personnel. Sırakaya and Seferoğlu (2016, pp.423-424) have focused just on the formal education and stated that there are studies about various subjects from mathematic to geography and all of them have positive results.

It can be seen that augmented reality has mostly positive effects on education. However, it should be needed to keep in mind that there are some difficulties that may affect this positive outcome. According to Dunleavy et al. (2009, pp.16-17) technical problems like insufficient software or hardware, management problems like inability to give support to the teachers in need on time or excess of skills that is to ask students to do multiple tasks at the same time like dealing with technology while trying to solve a clue collaboratively were overwhelming for both the students and the teachers. In addition, Bacca et al. (2014, p.141) state that too many visual actions may distract the attention of the learners. Another limitation is the fact that teachers cannot add different materials for different learning outcomes. The last constraints that Bacca et al. have stressed on can be said to have been overcome to a certain extent with the help of more user-friendly interfaces as in the example of HP Reveal which allows users create their own augmented data using either the mobile application or the desktop version⁶. Apart from the technical limitations, the improvement in educational technologies can also be a factor in that augmented reality technologies cannot be as effective as it has been thought to be. The study that Ersoy, Duman and Öncü (2016, p.43) have conducted shows that although it is proven that augmented reality has positive effects on students in terms of motivation and success, they underline the fact that the success rate is not very meaningful statistically and the students do not think that the augmented reality technology is more useful than an ordinary computer-based educational activity. Sırakaya and Seferoğlu (2016, p. 418) also focus the technical and cognitive limitations of augmented reality and add that there can also be economic trouble and prejudice about the use of it.

⁶ <https://www.hpreveal.com/products/index.html>

The rising current of augmented reality technology in education can be said to bring the question of the criteria in designing materials using this technology. There are several studies conducted on how to integrate this technology in education. As it has been stated before, augmented books and augmented reality applications that can be used with mobile devices are the most common ways of integrating this technology with education and there are many studies on how to do it so (Alhumaidan et.al., 2015, Billingshurst et.al., 2001, Çınar and Akgün, 2015, Kaleci et.al., 2016, Tülü and Yılmaz, 2012). According to Kerawalla et al. (2006) there are four points to consider having a success in applying augmented reality technologies in lessons. These are choosing adaptable subjects to consider the learners' needs and interests, directing the learning environment, setting a period of time and keeping the syllabus and the needs of the school in mind. According to Craig (in Altınpulluk, 2015, pp.126-128), content is the most important element of the augmented reality. Without a good content augmented reality does not mean anything apart from a technological reform. Augmented reality application should serve a purpose and solve a problem to be an effective tool. Kaleci et al. (2016) claim that it is a necessity to design the augmented reality materials according to specific standards and that they should be appealing for the users in terms of visual elements and content.

2.2.4. Augmented Reality and Language Education

As it has been stated before, the needs of the learners and the expectations for education have changed. There are new ways of teaching and learning to meet the demands of both the learners and the teachers. As one of these new ways, augmented reality technologies offer various opportunities like adding videos and 3D images to the course books. These visual supports can be deduced to promote learning in that they make the abstract topics more understandable for the learners along with making the content more appealing for the learners and increasing motivation as many studies mentioned above have already shown. Bacca et al. (2014, p. 139) revealed that after science, "Humanities and Arts" which includes language learning is the second most studied area about the use of augmented reality in education with the rate of %21,9.

Taşkıran et al. (2015, p.462) assert that to have effective and rich learning in teaching the four skills (speaking, writing, reading and listening) and two subjects

(grammar and vocabulary) in a communicative and interactive way, new technologies and attitudes have started to be used. Liu et al. (2010, p. 37) stress this fact by stating that in their country there have been many attempts to improve English language learning. However, as the motivation level of the students are low as well as the time they expose to the language and they practice the target language is insufficient, there has been a trend to include information technologies in English learning. Bacca et al. (2014, p.139) claim that augmented reality provides different learning opportunities for the learners by integrating the augmented data with specific themes. Language learning is among these themes.

There are studies that hold that augmented reality technologies affect language learning in a good way (Barreira et al. 2012, Billinghamurst, et al. 2001, Çakır, et al., 2015, Hsieh and Lee, 2008, Küçük, et al. 2014, Liu and Tsai, 2013, Liu et al., 2010, Mahadzir and Phung, 2013, Solak and Çakır, 2015, Taşkiran et al.,2015, Vate-U-Lan, 2012). Küçük, et al. found out that augmented reality had a positive effect on students' success in learning English. They claim that if the augmented reality applications are applied in a well-planned way they can be powerful tools to contribute to beneficial learning environment. They also have found out that creating learning environment that consists of augmented reality applications which students can experience on their own can motivate the students. Lastly, the language books with augmented reality exercises may let students do extra studies at home (Küçük, et al., 2014, p.401).

There are some studies on how to integrate augmented reality to the English books and Çınar and Akgün's sample of English Language Course book with augmented reality elements may be used as a guideline. In their study they chose the sixth grade English course book and they prepared some augmented reality elements for the sixth unit of the book. When their worked was analyzed by the specialists, it was seen that the book could be an effective tool in teaching English (Çınar and Akgün, 2015). The criteria list and the results can be viewed in Appendix 11: Ders Kitabı Uzman Görüş Formu Kapsam Geçerlik Oranı ve İndeksi. In Figure 2-13 there are some examples from this augmented book.



Figure 2-13: Augmented Pop-up English book (Çınar and Aygün, 2015)

As can be seen in Figure 2-13 the augmented reality integrated book includes 3D images along with audial materials. The book also lets its users watch videos and animations related with the topic. It can be said that this book covers vocabulary teaching as well as listening skills in that it let students listen to conversations in the target language along with exposing them to certain grammar structures. These materials have been prepared using Aurasma. This application is no more available. As it has been stated before Hp Reveal is the new application being used in place of Aurasma.

Vate-U-Lan (2012) has also developed a 3D pop-up reading book like MagicBook and she has found out that students are more motivated to learn with such resource as well as that it has positive effects on their academic success. In Figure 2-14 an example from this book can be seen.



Figure 2-14: Augmented reading book (Vate-U-Lan, 2012)

Like Çınar and Akgün, Vate-U-Lan also used animations and videos in her study. The application she used was Zooburst which is also not available today. In her study she underlined the fact that the students enjoyed the material and expressed their desire to work with such a material again for further units (Vate-U-Lan, 2012, p.894). The result can be deduced as augmented reality technologies increases motivation in language learning.

Hseih and Lee (2008) also state that lessons supported with augmented reality let students enjoy the language lessons more. Moreover, this technology improves the communication between the students and the teachers. They define their learning environment as boring because of the materials are not interesting for the children (Figure 2-15).



Figure 2 15: English word cards (Heish and Lee, 2008)

With the system they developed they turned these cards into augmented reality integrated ones (Figure 2-16).



Figure 2-16: English word cards integrated with augmented reality (Heish and Lee, 2008)

Mahadzir and Phung (2013) carried out a study in Malasia and used an augmented reality integrated book to analyze its effects on motivation in English language learning. The results of this study also say that augmented reality technologies can be used as sources to motivate students to learn English.

The study that Chang et.al. (2011) have conducted shows that augmented reality integrated systems are effective learning tools in that they attract the learners' attention. Similar to Vate-U-Lan and Heish and Lee Chang et.al. also focused on vocabulary learning and they created a system with qr codes (Figure 2-17).



Figure 2-17: Augmented reality system (Chang et.al., 2011)

As can be noticed, most of the studies on augmented reality technologies in English teaching concentrate on vocabulary teaching and learning. There are many other studies on the same focal point. Barreira et.al. (2012) also focused on vocabulary teaching and they created an augmented reality game named MOW (Matching Objects and Words). In this game the target language is not only English. The game also lets students learn Portuguese, too (Figure 2-18).



Figure 2-18: MOW game (Barreira et.al., 2012)

As can be seen in Figure 2-18 the game asks students to match the flashcards correctly. Before the game the students have a chance to listen to the words, too. It can be presumed that listening skill can also be developed using augmented reality technologies.

Liu and Tsai (2013) have developed an augmented reality system to support students in terms of writing skills. In their system the students use their mobile devices and access information about buildings and then they are expected to write descriptive essays as the application lets them expose to writing samples with detailed information (Figure 2-19).

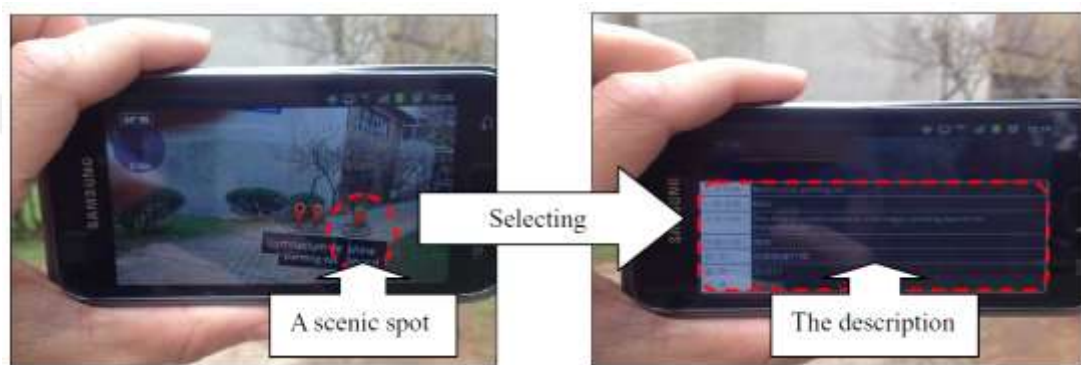


Figure 2-19: Augmented reality application for developing writing skills (Liu and Tsai, 2013)

According to Solak and Çakır (2015) augmented reality technologies can be used to provide real life environments in the classrooms which is a necessity for language learners to have authenticity while learning the target language. In their study they also investigated the role of augmented reality on success and the results of the tests they applied showed that students scored more with augmented reality integrated lessons. Barreria et.al. (2012) had similar results in their study and they claimed that students who used augmented reality games showed better performance in learning than those who has traditional lessons.

To sum up, it can be said that augmented reality technologies in English language learning and teaching are mostly related with vocabulary teaching and although there are some studies on its effects on success, most of the studies focus on its effects on motivation. It should be underlined that these studies mostly compare traditional methods with technological ones and this study differs from them in that in this study augmented reality lessons have been compared with lessons enriched with multimedia elements including technological ones.

2.2.5. Adapting Constructivist Approaches to Augmented Reality Implementation in Language Classes

As the technology starts to play a more important role in education and the requirements of the new century have changed as stated above, it has become a necessity to find a new approach or theory for teaching and learning a foreign language. In fact, it can be assumed that it is not only the way to teach or learn a foreign language that is needed to be reconsidered. There are also the changing characteristics of learners to review. Can (2009, p.60) claims that since technology integrated lessons are more common than traditional lessons with course books it is a requirement to “reconsider the pedagogy, methodology, applications, teacher roles, interaction types and learning environments”. In this sense constructivism can be said to be the needed approach in this new era for teaching and learning a foreign language. The study of Gunduz and Hursen (2015) also shows this fact with numbers and statistics. They had a content analysis research in the field of teaching and learning with constructivist approach and found out that constructivism is a new trend in this field and it is getting more and more attention. English language teaching and learning methods have also been affected by this trend recently.

Constructivism has its roots in psychology and philosophy and Piaget, Vygotsky, Bruner, Dewey, Papert and even Socrates and Kant are thought to be some of the influencers (Bada and Olusegun, 2015; Can, 2009; Jia, 2010; Jones and Brader-Araje, 2002; Kaufmann, 2004; Perkins, 1991; Wang, 2011). It can be said that the learning theories of Dewey, Piaget and Vygotsky have more connections with the general notions of constructivism. Jia (2010, p.197) summarizes the main issues in these theories in her article and states that Dewey’s focus on the creation and renovation of experiences, Piaget’s cognitive development theory and Vygotsky’s claim that learning is a social construction are the key points in constructivism.

In constructivist approach the learners are the subject of the learning process and they are the ones to construct the meaning to execute learning. Bada and Olusegun (2015, p.66) point out that learners try to connect the new data with their previous knowledge and in this process the context of the information and learners’ opinions and perspectives can affect learning. Parallel to that, Can (2009, p.62) states

that the learners cannot be assumed to be empty cans to be filled with information. On the contrary they use their experiences and environments to make sense of the knowledge. At this point it can be said that along with learners' backgrounds in terms of both cognitive and psychological loads, environment can also affect the learning process. Von Glasersfeld (2007, p.7) points out that environment consists of instructional systems which include curriculum, course books, computer programs and micro worlds; tasks and teachers. This statement can be interpreted as the fact that teachers and school culture are still important parts in constructivism. Parallel to this assumption Gould (2007, p.113) asserts that to make real learning easier, the teachers should organize their classrooms and curriculums in such a way that allow cooperation within students along with circumstances that will let students ask questions both to their mates and teachers. Here it can be said that constructivism also supports collaboration and joint studies. In addition to these, Jonassen (1994, p. 35) claims that it is important to have a supportive environment that will help learners figure out the real world using "a simulated reality". Bada and Olusegun (2015, p.67) state that to have constructive learning it is important to let students make contact with the materials or data and have the chance to experience active learning. In summary, as Kaufman (2004, p.303) underlines, this theory has changed the emphasis from teacher-based education to both knowledge and student-centered one which gives importance to cognitive and social practices.

In terms of the era of Web 3.0, it can be said that parallel with the requirements of the 21st century for learners the constructivist approach supports learners to become autonomous and active. Perkins (1991, p.20) stresses that in traditional teacher controlled classrooms it is not possible for the learners to become autonomous as they are not allowed to "manage their interactions with the content". Wang (2011, p.274) states that constructivist approach focuses on learning and it helps learners develop autonomy in their own learning process. Can (2009, p.60) also assumes that constructivist approach can help language learners become more independent and involved by contributing to their language and communicative skills along with social and interactive ones using various tools. It can be claimed that there are augmented reality applications among these tools as technological ones.

Kaufman (2004, p. 306) argues that if technology is blended with the lessons in a reasonable way, the learners can get the gist of the information. Referring to this

assertion along with the studies that show the positive effects of the mobile applications on teaching and learning that have been mentioned before, constructivist approach can also be stated to be applied with using technological tools. Can (2009, pp.68-71) points out that using online applications and various materials in teaching and learning a language are inherent in constructivist approach and this will differentiate the teaching process in the classroom as well as supplying a new methodology in foreign language teaching and learning. Moreover with a constructivist approach the learners will have the opportunity to work together to solve real life problems which will foster collaboration and knowledge construction in a meaningful way. According to Spiro et.al. (1995, pp.86-87) computers are acceptable tools to promote cognitive flexibility, which is a kind of constructive approach according to the authors, and if properly planned hypertexts can be used to present the knowledge in different forms for many times which will help learners to acquire the information in their own ways. In this sense it can again be assumed that qr codes are also kinds of hyper media and that means augmented realty is also a tool to realize autonomous learning along with having active students that can collaborate with the help of the teachers who design such environments to realize constructivist learning.

In constructivist theory although the learners are responsible for their own learning it is also the job of the teacher to support him or her when needed. Perkins (1991, p.20) states that a constructivist teacher should support learners adequately as in real life such as mother-child relationships. However, it can be difficult to realize this in crowded classrooms. He also states that although it is believed that sharing the information directly with the students is not an effective way of teaching and learning, it can be used some situations depending on the learner and the topic to teach. Kaufman (2004, p.309) claims that although constructivist approach cannot be implemented as a whole, there have been some constructivist practices used in language learning and teaching. In that sense it will be meaningful to say that in the era of Web 3.0 constructivism can be used as an effective tool when it is a need to use it as it is with the technology. Jonassen (1994, p.37) summarizes this very clearly in his article;

“.... The best designers are those who select, use, adapt, massage, or otherwise apply at- tributes and components of different models, strategies, and tactics in order to accommodate the instructional methods to the nature of

the learning problem. Objectivist models of instruction are useful, as are constructivist models, albeit in different contexts.”

It can be stated that as the new era of technology requires independent learners and guiding teachers in rich environments which are to include many tools, the methodology gets in shape accordingly. Moreover, as the physical environment and the peculiarities of the students change in every institution, it is the teacher who can design the learning environment according to the needs of his or her students using the facilities around him or her. From this point of view augmented reality technologies can be asserted to be alternative tools in language learning and they can be used to fulfil the needs of the students which can be motivation or attention or even success as the studies show that augmented reality has positive effect on learning environment.

At this point it would be meaningful to clarify the objectives of MEB in language learning and teaching. According to the curriculum the main aim in the primary level is to let students enjoy the process of learning a foreign language. For the first 3 years which starts with the second grade, the teachers are to focus on speaking and listening skills. There are limited activities for the reading and writing skills. It is important for the teachers to let the students expose to English as much as possible. It is also underlined in the curriculum that the teacher can use the mother tongue of the students if there is a misunderstanding or the students get lost in terms of both understanding and motivation. The materials should be appealing for the students and include visual ones as well as techniques like role play, drama and etc. The topics are also arranged according to the interests and needs of the students. Communication is the key point and students are expected to have meaningful conversations. It is important to use the language instead of just learning something about it. All these points can be deduced as constructivist approach is suitable to fulfil the expectations of the curriculum. Moreover, it can also be claimed that the curriculum mostly adapt BICS (Basic Interpersonal Communicative Skills) for the primary level and CALP (Cognitive Academic Language Proficiency) for the rest of the levels. According to Cummins (2008) BICS is about the communicative functions of the language and CALP is mostly related with the school success and it includes competences in language skills. Although the curriculum asks the teachers and students to focus on speaking and listening skills, it does not focus on accuracy.

Thus, it can be claimed that to develop the communicative competences of the students in a foreign language is more important than mastering them in a foreign language. It can also be deduced that the students who gain some strategies to communicate in a foreign language can be equipped with the motivation and interest to develop the foreign language that they are studying. on.



CHAPTER III: METHODOLOGY

This chapter presents information about the research design, the participants, the instruments, the data collection procedures, and the methods used for data analysis.

3.1. Research Design

The aim of the study was to find out the effects of AR tools on the success of learners in English as a foreign language (EFL). Experimental method is used to obtain the results. In experimental method, there are dependent and independent variables and the process is to observe the effects of the independent variable on dependent variable (Cohen et.al., 2005, p.211). In this research the independent variable is the learning environment which has two faces; lessons with augmented reality and conventional lessons. The dependent variable is the success of the students.

The pretest-post-test control group design was employed to establish a cause-effect relationship. The study was carried out with two groups that were at the same proficiency level, which is A1 beginner English. The selection of the experimental and control group was done randomly. While the experimental group was taught with AR tools, the control group had conventional teaching without AR tools. The two groups were presented the same topics at the same time limit that is 8 weeks (See Appendix1: Course Plan). The researcher was the English teacher of the groups and she prepared and implemented all the materials for the study. She covered third and fourth units and the language targets of these units were expressing ability and inability, expressing likes and dislikes and making simple inquiries.

Before the treatment the groups were informed about the treatment and consent forms were collected (See Appendix 2: Onam Formu). Interviews were held with many of the parents to get the background information about the students. Details of these interviews were explained in detail in the next section.

3.2. Participants

This study was carried out with two groups in Ümraniye Nurettin Topçu Primary School in Istanbul and the researcher was one of the English teachers in the school. She prepared and implemented all the materials according to the language targets and objectives described in the curriculum. There were nearly 1500 students. The number of the fourth grade students was nearly 320. The groups were not especially formed to conduct this study. Two of the classes (4-G and 4-K) were chosen randomly according to the schedule of the researcher. There were two English lessons per week for each class and researcher had these lessons in two days; one lesson in a day. 4-G was chosen as the experimental group because most of the families had tablets to carry out the study. 4-K was the control group because the number of students in this class was equal to the experimental group. The experimental group consisted of 38 students (25 females, 13 males) and in the control group there were 38 (19 females, 19 males) students. The researcher was not able to manipulate the groups. Their level of proficiency was A1 beginner. The age range was 9-10. Interviews were held with the parents to get information about the place of technology in students' lives along with their socioeconomic status and language support they get after school. Five questions were asked. These were;

1. Which technological devices does your child have? (Smart phone, Desktop Computer, Laptop, Tablet)
2. How often does your child use these devices?
3. Why does your child use these devices?
4. Does your child have English courses after school or at weekends?
5. How do you define your socioeconomic status? (Lower, middle, upper)

According to the answers of the parents of the experimental group %90 of the students were claimed to have tablets. Only %10 of the students had smart phones. %24 of the students had desktops and %29 of them had laptops. For the control group the answers were that %68 of them had tablets, %18 had smart phones, %18 had desktops and %18 had laptops. %62 of the students in the experimental group and %50 of the control group used these devices for 1-2 hours a day. % 95 of the

experimental group used these devices to do their homework or research. However %73 of the control group used these devices for fun. % 90 of the experimental group and %86 of the control group did not have any extra English courses after school or at weekends. %95 of the parents in the experimental group and %82 of the control group defined their socioeconomic status as middle. There were no parents who answered this question as upper. The answers indicate that the students have similar backgrounds which were important as they might affect the success rate. The only difference between the groups was that while the experimental group used technology mostly for homework, the control group preferred to have fun when they used it.

3.3. Data Collection

In this study, a test containing various types of questions was designed and this test was used both as the pretest and post-test (See Appendix 3: Pretest and Post-test). The pretest was applied to test the knowledge of the students about the topics that would be presented during the study. The language outcomes and objectives of the lessons were explained in detailed in Appendix:1 Course Plan and this plan was prepared by the researcher according to the curriculum of MEB. The post-test was applied at the end of the instruction to see the progress of the students in terms of knowledge about the target learning outcomes. The scores obtained from pre-test and post-test were compared to determine the effects of the augmented reality tools on the success of the students as well as the effects of the lessons enriched with multimedia elements apart from augmented reality technologies on the success of students.

The study was done in the first term of the 2018-2019 educational years. It lasted for nine weeks. In one week the pretest and post-test were applied, in the other weeks the lessons were taught using augmented reality tools for the experimental group and multimedia elements for the control group. Each week there were two lessons each of which was 40 minutes long for each group (See Appendix 1: Course Plan).

The third and the fourth units (Cartoon Characters and Free Time) of the 4th grade English Language Syllabus were chosen to teach. It was taught that the first

months of the new educational year would be busy with administrative meetings and the researcher would also need time to arrange the tablets and get the permissions from the families to conduct the study. Because of these reasons the study started with the third unit and ended with the fourth unit. The third unit covered the functions of expressing ability and inability and making simple inquiries while the fourth unit was about expressing like and dislikes and making simple inquiries about this purpose. In both of the units the objectives were to let students identify certain verbs that they would use to fulfil the language target as well as understanding and answering simple questions about the objectives.

In the curriculum the skills that are expected to be focused are listening and speaking and the students are expected to use the language in a communicative way. The conversations should be real and meaningful. The students should enjoy the process and they should not be forced to use only the target language. Thus, while preparing the activities the researcher gave importance to these points. She prepared activities that let students work in groups which allowed them to get help from peers in case of a misunderstanding or difficulty. She also let the students make sentences that had a meaning in the context. That is, the students were expected to make meaningful sentences that fulfil the needs of the curriculum which can be expressing his or her likes or dislikes or solving the problems that were introduced by the teacher. It should be kept in mind that the topics and objectives in the curriculum have been chosen according to the needs and interests of the students of those ages. Thus, to make students have activities that asked them to make sentences about the objectives can be claimed to be meaningful for the students. The activities were also enjoyable for them as augmented reality technologies were new and interesting for them. Most of the students told that the activities were very enjoyable and it was fun to have such lessons. As the experimental group was informed about the augmented reality technologies before the treatment they did not find it difficult to complete the activities. It was also observed that the students that had not been interested in language learning found the activities enjoyable and attended the lessons more than before. The control group enjoyed the lessons, too. Although there were not any activities using augmented reality, they completed many activities that included Web 2.0 tools and visual materials.

To use the augmented reality applications tablets and internet connection were needed. As the school the study was taken place did not have any technical infrastructure in this term the tablets and the internet were supplied by the researcher and the participants. Ten tablets were used. The tablets belonged to the students The internet connection was supplied by the researcher using a mobile Wi-fi that allows ten devices to have internet connection at the same time (Figure 3-1).



Figure 3-1: Mobile Wi-fi [8]

For the experimental group at least one activity integrated with augmented reality technology was used each week. As there were only ten tablets that could be used in the classes, all the activities were suitable to work in groups. For the control group corresponding activities were designed without using the augmented reality technologies.

In this study HP Reveal and i-nigma applications were used. HP Reveal is an augmented reality application that allows users both to experience augmented reality technology and to create their own augmented reality environments. It was formerly Aurasma (See Figure 3-2).



Figure 3-2: Hp Reveal [9]

Hp Reveal is a user-friendly platform where both the educators and the companies can get benefit from. It claims that it is easy for everyone to create and use augmented reality with Hp Reveal interface⁷. In Figure 3-3 an example of Hp Reveal can be seen.



Figure 3-3: An example of Hp Reveal [10]

i-nigma is a quick response (Qr) code reader which is also a kind of augmented reality tool, a marker based one, as it has been explained in the previous parts of the study. i-nigma makes it possible to connect to the web page that is embedded in a barcode which is called qr code now⁸ (See Figure 3-4).



Figure 3-4: i-nigma Qr code reader [11]

For this study eleven activities integrated with augmented reality technologies were designed to reach the goals. These activities were used with the experimental group for eight weeks depending on the language targets. Each activity was explained in details below. The corresponding activities for the control group were also described after each activity;

⁷ Detailed information can be found at <https://studio.hpreveal.com/landing>

⁸ Detailed information can be found at <http://www.3gvision.com/SuccessStories.html>

1. Scan the qr code (Cram practice and Cram game): For the third unit there were three and for the fourth unit there were two “scan the code” activities. All of the activities were aimed to let students revise and practice the vocabulary of the units. In these activities the experimental group had been introduced the target vocabulary of the third unit and the students were asked to work with the words using a web-based practice platform which was called “Cram”. Cram is an online programme where various sets of flashcards can be created according to the users’ needs. The application supplies different practicing activities once the flashcards are created by the users⁹. The URL (Uniform Resource Loader) of the practice site was embedded in a qr code and the students scanned the code to reach the activity using i-nigma (See Figure 3-5 and 3-6).



Figure 3-5: Using i-nigma
(A photo taken in the classroom)



Figure 3-6: Students working in the cram.com
(A photo taken in the classroom)

Cram Game activity was used in another lesson to let students enjoy the learning process. This activity was also designed for the third unit. The idea was

⁹ Detailed information can be found at <https://www.cram.com/>

the same with the previous activity. The students scanned the qr code and got to the game. In this one the students tried to match the pictures with the correct phrases and complete the game as fast as they can (See Figure 3-7).



Figure 3-7: Cram Game
(A screenshot of the game in the researcher's account in cram.com)

The corresponding activity for Cram practice for the control group was to revise the target vocabulary using paper-based exercises in the course book as groups of four or five. The matching game was carried out with the flashcards. The students tried to match the flashcards with the correct phrases on the board.

2. Scan the qr code (Quiziz): In this activity the students scanned the qr code which led them to quiziz.com and practiced the target language items in this web site. Quizziz is a web tool that lets the users create their own quizzes with questions that have to be answered in a set time (See Figure 3-8).

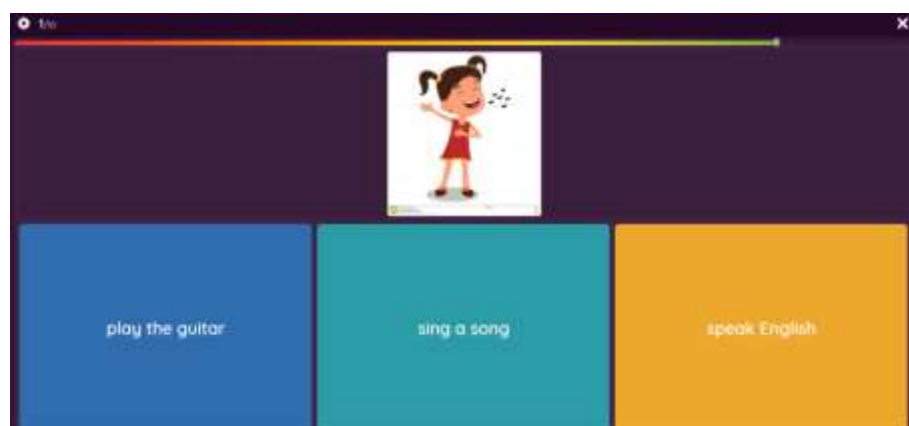


Figure 3-8: Quizziz game
(A screenshot of the game in the researcher's account in cram.com)

The corresponding activity for the control group was to answer these questions on the board and giving points to the groups who found the correct answers.

3. Scan the code (Crossword Puzzle and Spin the wheel): These activities were designed for the fourth unit. Wordwall.net was used to create the activities. Wordwall.net is another online site where various activities and worksheets can be prepared. In the crossword puzzle activity the experimental group was asked to scan the code to reach the puzzle and complete it as soon as possible (See Figure 3-9).



Figure 3-9: Scanning the code and playing puzzle in Wordwall.net
(Photos taken in the classroom)

The control group solved this crossword puzzle on paper in a group of four or five (See Appendix 4: Crossword Puzzle). The answers were given on the board and groups controlled their answers on their own.

The other activity was “Spin the Wheel”. It was designed as a speaking activity. The experimental group worked in groups and asked “Do you like....?” questions to each other (See Figure 3-10). The corresponding activity for the control group was to play it on the board and let the students work in pairs and ask the same questions to each other (See Figure 3-11).



Figure 3-10: Spin the Wheel activity for the experimental group
(A photo taken in the classroom)



Figure 3-11: Spin the Wheel activity for the control group
(A Photo taken in the classroom)

The Qr codes for these activities can be viewed in Appendix 5: Qr Codes.

4. Using symbols (Matching and Speaking Activities): These activities were prepared using Hp Reveal application for the third unit. The symbols were used as triggering figures that were directed to the visuals of the target vocabulary (See Appendix 6: Symbols). In the matching activity the experimental group was asked

to scan the symbols and match them with the correct phrases (See Figure 3-12). The corresponding activity for the control group was to use flashcards instead of symbols.



Figure 3-12: Matching activity using Hp Reveal
(A photo taken in the classroom)

For the speaking activity the same symbols were used. Students worked on their own to make sentences using the Hp Reveal application. The student who came to the board scanned the symbols pasted on the board and made sentences (See Figure 3-13).



Figure 3-13: Speaking activity using Hp Reveal
(A photo taken in the classroom)

The parallel activity for the control group was to use flashcards instead of symbols.

5. Video Worksheets: This activity was designed for the third unit. The students were asked to scan the pictures on their worksheets and find out the abilities and inabilities of the people on the table (See Appendix 7: Video Worksheet). Then the students were asked to write sentences about each person using the data on the table (See Figure 3-14).



Figure 3-14: Video Worksheet activity
(Photos taken in the classroom)

The equivalent activity for the control group was to make the students watch the videos on the board and take the notes on their worksheets to write sentences (See Figure 3-15).



Figure 3-15: Corresponding Activity of the Video Worksheet for the control group
(Photos taken in the classroom)

6. Qr Code Reading: This activity was developed for the fourth unit. The students were handed out worksheets on which there were a Qr code and a reading

passage (See Appendix 8: Qr Code Reading). The students were asked to read the paragraph about the character and complete the chart that they reached using the Qr code on the worksheet (See Figure 3-16). i-nigma was used to perform this activity.



Figure 3-16: Qr Code Reading Activity
(Photos taken in the classroom)

The corresponding activity for the control group was to let the students complete the activity in a worksheet as a group (See Appendix 9: Reading Worksheet for the Control Group).

7. Video Flashcards: This activity was prepared for the fourth unit. The students were handed out pictures of some characters (See Appendix 10: Video Flashcards). They were asked to scan the pictures using Hp Reveal to find out the favourite activities of the characters and write sentences about them (See Figure 3-17).



Figure 3-17: Video Flashcards Activity
(Photos taken in the classroom)

In the control group flashcards were pasted on the board and names were written under the flashcards. Students were asked to write sentences using the information on the board (See Figure 3-18).

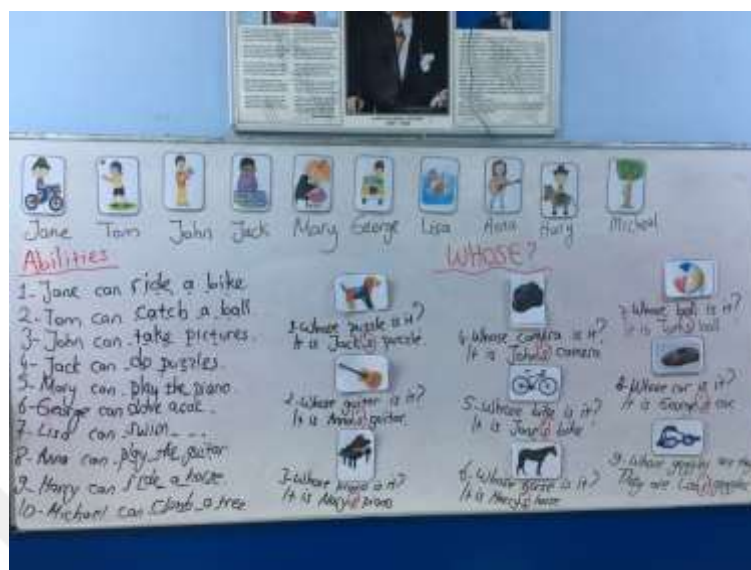


Figure 3-18: Corresponding activity for the Video Flashcards for the control group
(A photo taken in the classroom)

8. Talking Pictures: This activity was prepared for the fourth unit as a listening activity. Each group was to scan the pictures on their books to find out whether the character liked the activity on the picture or not. However, as the pictures were too small for some of the tablets, the volunteer students from each group scanned the images and found out the answers using one tablet on the teacher's table. The rest of the students listened to the sentences when the volunteer students scanned the pictures. Then each group shared their answers with their group members (See Figure 3-19).



Figure 3-19: Talking Pictures Activity
(A photo taken in the classroom)

The control group just listened to the sentences and ticked the answers on their books.

All the activities described above were implemented according to the course plan in Appendix 1: Course Plan and at the end of the study the post-test was applied to see the progress of the students in terms of success.

3.4. Encoding the Data

SPSS (The Statistical Package for The Social Sciences) was used to encode the results and in all statistical analysis. In the research whether the groups are even before the experiment was tested using T-test.

To identify if there is a meaningful difference between the pretest and post-test scores of each group, the pretest scores have been kept under control and the analysis has been done using one-way analysis of covariance (ANCOVA).

CHAPTER IV: FINDINGS

This chapter aims to introduce the results of the data analysis procedures obtained from the statistical analysis via tables and graphs.

In this study to analyze the data independent t-test and one-way ANCOVA were used. The reasons behind these choices were explained in detail.

As it was reported before, the research design includes an experimental group receiving the treatment of augmented reality tools supported learning and a control group receiving no treatment special apart from multimedia elements supported learning. Both of the groups took a pretest before the study and a post-test at the end of it. The case processing summary can be seen in Table 4-1.

Table 4-1: Case Processing Summary

Tests	Group	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Pretest	Experimental Group	38	100,0%	0	0,0%	38	100,0%
	Control Group	38	100,0%	0	0,0%	38	100,0%
Post-test	Experimental Group	38	100,0%	0	0,0%	38	100,0%
	Control Group	38	100,0%	0	0,0%	38	100,0%

As can be seen, in both of the tests the number of the participants was 38 for both of the groups and there were not any tests that were cancelled. There were few mistakes that resulted in saving some of the students' answers as not answered. In other words, these answers were treated as missing data. These mistakes were selecting more options than required and unclear drawing. In the pretest there were only five students in the experimental group and two students in the control group who made such mistakes. In the post-test one student from each group made these errors. There were eight selecting more options than required mistakes and they were only observed in the second part of the tests (Part B). Five of these miscalculations

were made by the participants in the experimental group while there was only one student in the control group who made the same fault. The same misunderstandings were also observed in the post-test. However, there was only one student from each group who miscalculated the options. The unclear drawing mistake was only seen in Part I and there was only one participant in the control group who made this mistake just in the pretest. In Table 4-2 the summary of these mistakes can be seen.

Table 4-2: The Summary of the Missing Data

PRETEST	Experimental Group	
	*	Participant number 5- Part B- Selecting more options than required
	*	Participant number 6- Part B- Selecting more options than required
	*	Participant number 9- Part B- Selecting more options than required
	*	Participant number 10- Part B- Selecting more options than required
	*	Participant number 11- Part B- Selecting more options than required
	Control Group	
	*	Participant number 39- Part B- Selecting more options than required
	*	Participant number 76- Part I- Unclear drawing
POST-TEST	Experimental Group	
	*	Participant number 33- Part B- Selecting more options than required
	Control Group	
	*	Participant number 76- Part B- Selecting more options than required

According to the table above there seem to be many mistakes in Part B which evaluated the listening skill. In the tests there were two parts which assessed the listening skill; Part A and Part B. Although there were not any problems in Part A there were eight mistakes in Part B. This can be explained with the fact that in Part A the participants were to tick the activities that were liked with a tick symbol and the ones that were not liked with a cross sign. However, in Part B, the students were to choose and mark six pictures out of ten according to the activities they listened. As there were ten pictures it may have been assumed that some of the students got confused with the number and ticked more than it was required. As the number of

such mistakes were few when compared to the number of all the participants (76 students in total), these mistakes were counted as missing data.

To check the background knowledge of the students about the target topics a pretest was applied to both of the groups. The descriptive statistics of the pretest results can be seen in Table 4-3.

Table 4-3: Descriptive Statistics of the Pretest Results

Group			Statistic	Std. Error	Group			Statistic	Std. Error
Experimental Group	Mean		30,53	2,762	Control Group	Mean		44,42	3,268
	95% Confidence Interval for Mean	Lower Bound	24,93			95% Confidence Interval for Mean	Lower Bound	37,80	
		Upper Bound	36,12				Upper Bound	51,04	
	5% Trimmed Mean		29,46			5% Trimmed Mean		43,91	
	Median		29,00			Median		42,00	
	Variance		289,87			Variance		405,76	
	Std. Deviation		17,026			Std. Deviation		20,144	
	Minimum		8			Minimum		16	
	Maximum		77			Maximum		84	
	Range		69			Range		68	
	Interquartile Range		27			Interquartile Range		38	
	Skewness		,905	,383		Skewness		,298	,383
	Kurtosis		,325	,750		Kurtosis		-1,021	,750

Depending on these results it can be noticed that while the experimental group got 33,53 points in average, the control group got 44,42 points which means there is a 13,89 points difference between the results. To investigate whether this imbalance is notable Independent Samples T-test was conducted. This test analyses whether the mean value of the test variable for one group differs significantly from the mean value of the test variable for the other group (Green and Salkind, 2005, p.167). However, to be able to apply this test, there are some assumptions to be met. These are (Büyüköztürk, 2004, p. 39 and Yazıcıoğlu and Erdoğan, 2007, p.207);

1. The test variable is normally distributed in each group.
2. The scores on the test variable are independent of each other.

The second premise was met as the sample groups were randomly selected and they did not affect each other on their test results. To eliminate the first assumption the skewness values were reviewed. Skewness is the value for symmetry which means balance in high and low scores. It is important to have normally distributed dependent variables to use parametric tests; and to test the distribution there are various methods. One of them is investigating the skewness value. (Leech et.al., 2008, pp.21-28). As shown in Table 4-3 the skewness result of the experimental group was 0.905 and for the control group the value was 0.298. According to George and Mallery (2010, p.48) the values for asymmetry and kurtosis between -2 and +2 are considered acceptable in order to prove normal univariate distribution. Similarly Leech et.al. (2008, pp.27) point out that if the skewness result is less than 2.5, that means normally distributed variables. According to these sources it can be said that the scores of the both groups had normal distribution. Since all the assumptions were met to conduct the independent sample t-test, the test was used to investigate whether there was a significant difference between the control and experimental groups in their pre-test scores. The results of the test can be seen in Table 4-4 and Table 4-5.

Table 4-4: Group Statistics for Pretest Scores

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Experimental Group	38	30,53	17,026	2,762
	Control Group	38	44,42	20,144	3,268

Table 4-5: Independent Samples Test Results for Pretest Scores

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Pretest	Equal variances assumed	2,193	,143	-3,248	74	,002	-13,895	4,279	-22,420	-5,369
	Equal variances not assumed			-3,248	72,002	,002	-13,895	4,279	-22,424	-5,366

As can be seen from the Table 4-4 and Table 4-5, the results indicated a significant difference in the scores for the pretest scores of the experimental group ($M = 30.53$, $SD = 17.026$) and the control group ($M = 44.42$, $SD = 20.144$); $t(74) = -3.248$, $p = 0.002$. These results suggest that the control group had more prior knowledge about the target functions and vocabulary than the experimental group. This result was not the expected one. The fact that the results of the control group were higher than the experimental group can be explained depending on various variables. There can be students in the control group who may be having extra English courses after the classes or the characteristics of students might have affected the results. The students in this group may have higher order cognitive skills that may have helped them use their prior knowledge in English to have higher scores. For example; although the curriculum introduces *drive a car* phrase for the first time for the fourth graders, the students may have guessed the meaning of it using their previous knowledge which is *toy car* that is taught in the third grade.

Although the pretest results demonstrated imbalance in prior knowledge of the groups, the control group could not be changed as among the classes that researcher had the control class was the most suitable one to work with in terms of schedule and participant number. Thus to compare the results of the pretests and the post-tests in an effective way, it was decided to use one-way ANCOVA. The aim of ANCOVA is to control the covariate(s) that have relation with the dependent variable statistically apart from the factor(s) the effects of which are analyzed in a study (Büyüköztürk, 2004, p.105). In other words, ANCOVA is used to regulate the differences between the groups based on a variable which is called covariate in order to determine the level of difference between two variables (Leech et.al., 2008, p.133). For this study, the case can be summarized as that the groups differed in their pretest scores (See Tables 4-4 and 4-5) and ANVOCA was used to adjust the pretest scores to evaluate the relation between the independent variable (lessons integrated with augmented reality technologies) and the post-test results (success). However, to have this analysis there are also some preconditions to fulfill. As ANCOVA is a technique that units ANOVA (Analysis of Variance) and regression it should meet the assumptions of both tests (Büyüköztürk, 2004, p.106). According to Green and Salkind (2005, p.210) these assumptions are that;

1. The scores of the groups about the dependent variable are distributed normally and the variances are equal.
2. There is a linear correlation between the dependent variable and covariate in a random sample design.
3. The regression coefficient within groups is equal.
4. The sample groups are independent of each other.

As it has been stated before the sample groups were chosen randomly and they did not affect each other in terms of scores. For the rest of the assumption various tests were conducted. To control if the variances are equal, Levene's test for equality of variances was carried out for the post-tests results. The results of this test can be seen in Table 4-6.

Table 4-6: Levene's Test of Equality of Error Variances

Dependent Variable: Post-test			
F	df1	df2	Sig.
1,592	1	74	,211

As can be seen the Sig. value (p) is higher than 0.05. This result indicates that the variances in the groups are even and the groups are homogenous.

Assessment of the normality of data is another prerequisite to have parametric tests. According to Ghasemi and Zahediasl (2012) to validate the data in a study the normality assumption should be met because it shows that the relevant statistical tests have been used for the study. Kolmogorov-Smimov Test and Shapiro-Wilk Test are the two well-known tests of normality. Öztuna et.al. (2006) and Güriş and Astar (2014) point out that Shapiro-Wilk Test has been being used more as it has better statistical power compared to other tests. As Shapiro-Wilk Test is more appropriate for small sizes that have participants below 50 (Field, 2013 and), it was used to assess normality. In Table 4-7 the result of the Shapiro-Wilk test can be seen.

Table 4-7: Test of Normality Results

	Group	Shapiro-Wilk		
		Statistic	df	Sig.
Pretest	Experimental Group	,925	38	,014
	Control Group	,948	38	,076
Post-test	Experimental Group	,846	38	,000
	Control Group	,818	38	,000

As shown in Table 4-7 the sig. values of the post-tests for both groups were 0. As the test was non-significant ($p > 0.05$) it can be said that the distribution of the sample was not significantly different from a normal distribution. That is the data were normally distributed for the post-tests of both of the groups.

Pearson Product-Moment Correlation Coefficient Test is used to define the level of the linear relationship between two variables (Green and Salkind, 2005, p.254). According to Büyüköztürk (2004, pp.31-32) that the correlation coefficient is 1.00 shows a perfect positive relation while that the coefficient is -1.00 means a perfect negative relation. 0.00 means there is no relation. There is not a common remark on the range of the coefficient to interpret the level of the relation. In some sources coefficients above the value of 0.50 are regarded as high correlation while in others as medium (Büyüköztürk, 2004, p.32, Green and Salkind, 2005, p.256 and Leech et.al., 2008, p.54). In Table 4-8 the results of the Pearson Product-Moment Correlation Coefficient Test can be seen.

Table 4-8: Pearson Product-Moment Correlation Coefficient Test

Correlations		Pretest	Post-test
Pretest	Pearson Correlation	1	,533**
	Sig. (2-tailed)		,000
	N	76	76
Post-test	Pearson Correlation	,533**	1
	Sig. (2-tailed)	,000	
	N	76	76

**, Correlation is significant at the 0.01 level (2-tailed).

According to the results it can be said that the results of the post-tests were positively correlated, Pearson's $r(76) = .533$, $p < .001$. According to Büyüköztürk's range of coefficient, the level of correlation can be assumed to be medium.

Before performing the ANCOVA, to meet the last assumption that is the regression coefficient within groups is equal, the homogeneity of slopes was tested. This test rates the mutual effect between the covariate and the factor in the prediction of the dependent variable (Green and Salkind, 2005, p.212). In Table 4-9 there are the results of the test of homogeneity of slopes.

Table 4-9: Results of the test of homogeneity of slopes

Tests of Between-Subjects Effects					
Dependent Variable: Post-test					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2923,763 ^a	3	974,588	10,328	,000
Intercept	84,803,017	1	84,803,017	898,683	,000
Group	8,398	1	8,398	,089	,766
Pretest	2,830,683	1	2,830,683	29,998	,000
Group * Pretest	70,256	1	70,256	,745	,391
Error	6,794,184	72	94,364		
Total	598,614,000	76			
Corrected Total	9,717,947	75			

a. R Squared = ,301 (Adjusted R Squared = ,272)

When the Table 4-9 is analyzed it can be seen that pretest results did not affect the post-test results [$F_{(1-72)} = 0.74$, $p > .05$].

All the data gathered from various tests explained above show that the study was suitable to conduct a one-way ANCOVA test.

Before conducting the ANCOVA it will be meaningful to see the results of the post-tests of both the experimental and control group. The post-tests were applied to the groups at the end of the treatment to see if there is a meaningful improvement in the results. The descriptive statistics of the post-tests can be seen in Table 4-10.

Table 4-10: Descriptive Statistics of the Post-test Results

Group			Statistic	Std. Error	Group			Statistic	Std. Error
Experimental Group	Mean		86,92	2,032	Control Group	Mean		89,13	1,648
	95% Confidence Interval for Mean	Lower Bound	82,80	95% Confidence Interval for Mean		Lower Bound	85,79		
		Upper Bound	91,04			Upper Bound	92,47		
	5% Trimmed Mean		88,04	5% Trimmed Mean		90,15			
	Median		90,00	Median		92,00			
	Variance		156,940	Variance		103,198			
	Std. Deviation		12,528	Std. Deviation		10,159			
	Minimum		50	Minimum		57			
	Maximum		100	Maximum		100			
	Range		50	Range		43			
	Interquartile Range		17	Interquartile Range		9			
	Skewness		-1,367	,383		Skewness		-1,721	,383
	Kurtosis		1,352	,750		Kurtosis		2,968	,750

As shown in Table 4-10 the experimental group had 86,92 points in average and the control group had 89,13 points. The minimum point in the experimental group was 50 while it was 57 in the control group. The maximum points were 100 for both of the groups. To compare the test results Table 4-11 can be reviewed.

Table 4-11: Results of the pretests and post-tests of the groups

Pretest				Post-test	
Group	N	Mean	Std. Deviation	Mean	Std. Deviation
Experimental Group	38	30,53	17,026	86,92	12,528
Control Group	38	44,42	20,144	89,13	10,159

As can be seen in Table 4-11, there was an increase in both groups' scores. However, the mean score of the experimental group (86,92) remained nearly 3 points below the score of the control group (89,13).

When the pretests were rearranged according to the post-test results, the experimental group's post-test scores changed as in the Table 4-12.

Table 4-12: Adjusted post-test scores

Dependent Variable: Post-test				
Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental Group	89,196 ^a	1,628	85,951	92,441
Control Group	86,856 ^a	1,628	83,611	90,101

a. Covariates appearing in the model are evaluated at the following values: Pretest = 37,47.

As shown in Table 4-12 the adjusted post-scores of the experimental group were 2,5 points higher than the control group. However, this does not indicate that the augmented reality tools have positive effects on the success. In order to learn whether there is a noteworthy difference between the control and experimental group in their post-test scores, the results were analyzed through one-way ANCOVA test using the pretests as covariate. The statistics can be seen in Table 4-13.

Table 4-13: Results of the one-way ANCOVA

Dependent Variable: Post-test						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2853,507 ^a	2	1,426,753	15,173	,000	,294
Intercept	84,744,309	1	84,744,309	901,215	,000	,925
Pretest	2,760,665	1	2,760,665	29,358	,000	,287
Group	91,061	1	91,061	,968	,328	,013
Error	6,864,440	73	94,033			
Total	598,614,000	76				
Corrected Total	9,717,947	75				

a. R Squared = ,294 (Adjusted R Squared = ,274)

Table 4-13 shows that the predicted main effect of success was not significant, $F(1, 73)=0,968$, $p=0,328$. Although the experimental group increased their post-test results and got more points than the control group, there was not a significant difference between the improvement of the control group and the

experimental group. The control group also got higher points in their post-tests when compared to their pretest results. In Figure 4-1 the improvements of the groups can be seen.

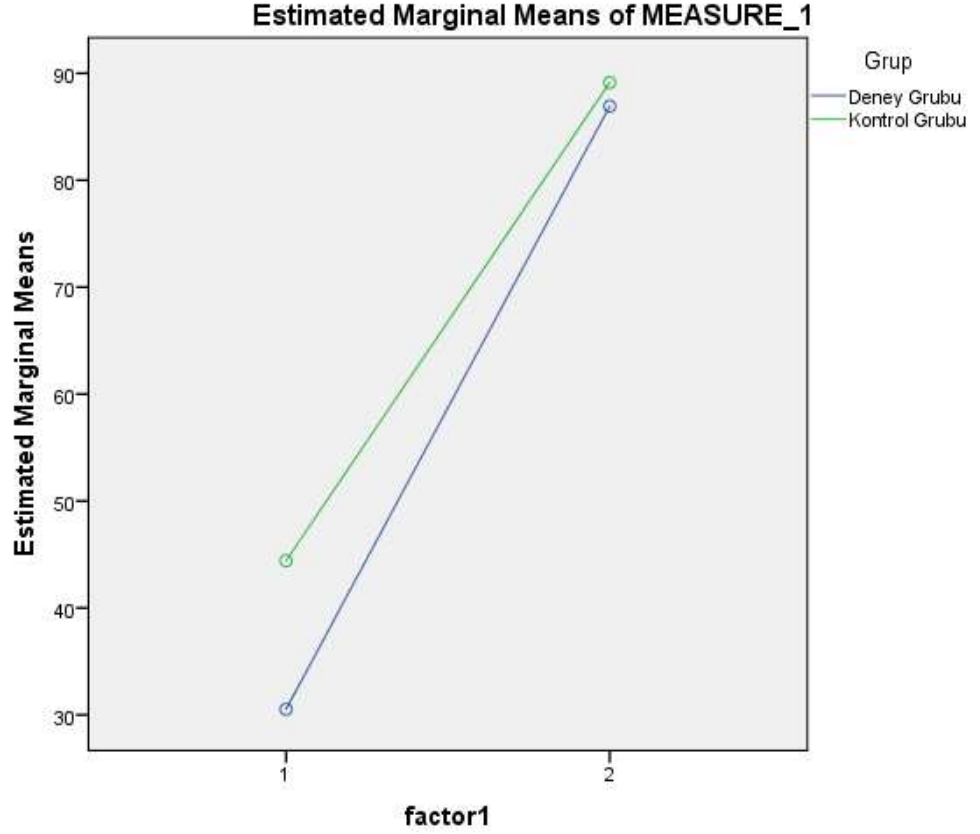


Figure 4-1: The success warp of the groups

As can be seen in Figure 4-1 both of the groups had more points in their post-tests. However, the statistics did not indicate any significant difference between the successes of both groups. It is obvious that both of the groups were successful in terms of getting higher scores in their post-tests which can be assumed as both of the teaching and learning methods were successful. In other words, it can be said that multimedia elements were as effective as augmented reality integrated lessons.

The results gave the same data in terms of the listening skill. According to the curriculum prepared by the Ministry of National Education (MEB) the main skills that are focused on in the primary level are listening and speaking. In the second grade the teaching bases on improving listening and speaking skills while in the third and fourth grades there are also reading and writing skills even if they are very limited (Milli Eğitim Bakanlığı, 2018, p.10) (See Figure 4-2).

Levels [CEFR] (Hours / Week)	Grades	Skill focus	Main activities/Strategies
1 [A1] (2)	2	Listening and Speaking	TPR/Arts and crafts/Drama
	3	Listening and Speaking Very Limited Reading and Writing*	
	4	Listening and Speaking Very Limited Reading and Writing*	

Figure 4-2: The skill focus in primary level according to curriculum
(Milli Eğitim Bakanlığı, 2018, p.10)

As can be seen in Figure 4-2 the main skills to concentrate on in the fourth grade are listening and speaking. However, there are also very limited reading and writing skills to work on. According to the curriculum the written evaluation starts with the fourth grade and the formative and summative testing procedures should include needs of the language learners that were young learners in this study and be in line with the objectives of the lessons (Milli Eğitim Bakanlığı, 2018, pp.7-10). At this point to obtain data for this study the pre and post tests were prepared in a way that both considered the requirements of the curriculum and the study. That means to evaluate the success of the students in primary level, it is important to refer to listening and speaking skills. Thus, as the aim of this study was to analyze the success of the students there included various types of questions in the tests. There were also two parts for the listening skills. However, the tests did not include the speaking skills as speaking skills could not be evaluated because of time and place limitations. It was not possible to arrange either the time or the place for a speaking exam for both of the groups. There were too many students (76 students in total) to test and there were not any classes to use to have the speaking exams. Because of these reasons although there had been many activities to improve speaking skills and practices to make students use the language functions in the class only the listening skill could be tested with specific parts. In the test Part A and Part B contained questions to test the listening skill whereas Part C, D, E, F, G, H, I and J were made up of various questions that required limited reading and writing (See Appendix 3: Pretest and Post-test). The results of the listening parts can be seen in Table 4-14.

Table 4-14: Descriptive Statistics for the Listening Parts

Descriptive Statistics		N	Range	Min.	Max.	Mean	Std. Deviation	Variance
Experimental Group	Listening pretest	38	18	0	18	6,84	4,665	21,758
	Listening post-test	38	14	10	24	20,95	4,100	16,808
	Valid N (listwise)	38						
Control Group	Listening pretest	38	20	2	22	10,79	4,686	21,954
	Listening post-test	38	20	4	24	21,68	4,224	17,844
	Valid N (listwise)	38						

Table 4-14 shows that there were improvements in both of the groups in terms of success in the listening parts. While the pretest scores were 6,84 for the experimental group and 10,79 for the control group, the experimental group got 20.95 points and the control group got 21,68 in average in the post-test. That is, the experimental group got 14,11 points and the control group got 10,89 points more than their pretest results.

However, when the pre-test scores of the groups were analyzed, it was observed that there was a significant difference between the groups (See Table 4-15).

Table 4-15: Independent Sample Test for the Listening Parts

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Listening pretest	Equal variances assumed	,092	,763	-3,680	74	,000	-3,947	1,073	-6,084	-1,810
	Equal variances not assumed			-3,680	73,999	,000	-3,947	1,073	-6,084	-1,810

As can be seen in Table 4-15 the Sig value .000 showed a meaningful difference between the groups in their pretest scores. Because of this reason one-way ANCOVA test were applied to decide whether there was a difference between the post-test results of the experimental and control groups. All the preconditions of the one-way ANCOVA test were fulfilled with the statistics. However, when the results of the control group's post-tests were analyzed, it was noted that the skewness value was higher than it should be (See Table 4-16).

Table 4-16: The Post Results of the Control Group for the Listening Parts

Control Group	Mean	21,68	,685
	95% Confidence Interval for Mean	Lower Bound	20,30
		Upper Bound	23,07
	5% Trimmed Mean	22,33	
	Median	24,00	
	Variance	17,844	
	Std. Deviation	4,224	
	Minimum	4	
	Maximum	24	
	Range	20	
	Interquartile Range	2	
	Skewness	-2,742	,383
	Kurtosis	8,379	,750

As can be noticed the skewness value was -2,742 which meant that the students got very high or very low points which resulted in unbalanced distribution of the scores. Because of this reason the results were transformed to have reliable results. The transformed results can be seen in Table 4-17.

Table 4-17: The Transformed Results of the Listening Parts

Group		N	Range	Min.	Max.	Mean	Std. Dev.	Variance	Skewness	
		Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Err.
Exp. Group	Pretest	38	18	0	18	6,84	4,665	21,758	,470	,383
	Post-test	38	1	0	1	,40	,427	,182	,436	,383
	Valid	38								
Cont. Group	Pretest	38	20	2	22	10,79	4,686	21,954	,586	,383
	Post-test	38	1	0	1	,31	,394	,155	,965	,383
	Valid	38								

With the transformed scores the skewness value was arranged and the analysis was done using these data. The results of the post tests were also changed. The adjusted results can be seen in Table 4-18.

Table 4-18: The Adjusted Scores of the Post-test Results for the Listening Parts

Dependent Variable: Listening post-test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental Group	21,454 ^a	,680	20,099	22,809
Control Group	21,178 ^a	,680	19,822	22,533

a. Covariates appearing in the model are evaluated at the following values: Listening pre-test = 8,82.

Table 4-18 revealed that the post-test results of the experimental group were higher than the control group. While the experimental group had 21.454 points, the control group had 21,178 points. The difference between the results was 0.276. To find out if this difference was a significant one or not one-way ANCOVA test was applied and the results can be seen in Table 4-19.

Table 4-19: One-way ANCOVA Test Results for the Listening Parts

Dependent Variable: Listening post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	116,882 ^a	2	58,441	3,629	,031	,090
Intercept	5,930,598	1	5,930,598	368,285	,000	,835
Listening1	106,566	1	106,566	6,618	,012	,083
Group	1,227	1	1,227	,076	,783	,001
Error	1,175,540	73	16,103			
Total	35,824,000	76				
Corrected Total	1,292,421	75				

a. R Squared = ,090 (Adjusted R Squared = ,066)

Sig. value (,0783) in Table 4-19 showed that the difference between the post-results was not meaningful. That is, although both of the groups were more successful in their post-test results in the listening parts, the difference did not

indicate that augmented reality technologies were more effective than the traditional lessons enriched with multimedia elements.

To sum up, there was not a group whose improvement was superior over the other's both in listening skills and success as a whole. That is, augmented reality integrated lessons cannot be assumed to be better than the conventional lessons enriched with multimedia elements.



CHAPTER V: DISSCUSSION AND CONCLUSIONS

In this chapter, the research findings about the effects of using augmented reality applications on the success of students learning English as a foreign language in primary level will be discussed. Then, the limitations and implications of the study will be presented and then suggestions for further study will be given.

5.1. Discussion of the Effectiveness of Augmented Reality Tools

Supported Materials on the Success of Students

As it has been pointed out in the previous chapters, technology plays an important role in education. There are many studies that show the positive effects of technology on education in terms of success, motivation and retention both in the world and in Turkey (Albayrak and Altıntaş, 2017, Barreira et al. 2012, Billingham et al., 2001, Çakır, et al., 2015, Hsieh and Lee, 2008, Koutramanos et al., 2015, Küçük et al., 2014, Liu and Tsai, 2013, Mahadzir and Phung, 2013, Radu, 2012, Solak and Çakır, 2015, Sumodi and Rambli, 2010, Taşkıran et al., 2015, Vate-U-Lan, 2012). Meanwhile, the requirements of the new century have also affected education. With the concept of 21st century skills which include ways of thinking like creativity, tools for working like information and communication technology (ICT) literacy, ways of working like collaboration and ways of living in the world like global and local citizenship, the aims of education can be claimed to change. The goal is not equipping students with the information about the subjects anymore. Today letting students have these skills through relevant teaching methods can be interpreted as the ultimate target of education. At this point constructivism can be stated as the current method that has been being discussed. According to constructivism learning is a process that requires active and creative social interaction and information is not a term that can be transferred but constituted. The principles of constructivism let the learners to reach the source and avoid them to be individuals waiting for the data (Can, 2004, p. 66).

Baykara et.al. (2017, p.72) stress that it is a necessity to adapt the new technologies and methods to embody the abstract topics and to raise productivity. With the developments in computer science and mobile technologies, many

applications that support communication, cooperation and productivity in education have emerged. In this regard, augmented reality technology was the key point in this study as it was assumed that this technology let students and teachers experience the constructivist approach as a whole. Having all this information in mind, this study aimed at understanding the effects of augmented reality technologies on the success of the primary level students in learning English as a foreign language.

In this study, to investigate the effects of augmented reality integrated lessons on success of the EFL learners in the primary schools, the control and experimental groups were pre-tested to find out whether they were at the same level. The results of the pre-test showed that there was a significant difference in the scores between the control ($M = 44.42$, $SD = 20.144$) and experimental ($M = 30.53$, $SD = 17.026$) groups; $t(74) = -3.248$, $p = 0.002$. Thus, to control the pretests results to get true results one-way ANCOVA test was decided to be used at the end of the treatment. The experimental group was instructed with augmented reality tools for eight weeks and the control group received traditional classroom instruction enriched with multimedia elements for the same period of time. During the treatment the activity or material that was designed as an augmented reality integrated one was also redesigned for the control group as a group work activity to make sure that both of the groups experienced similar teaching and learning methods. After the instruction period ended, a post-test applied in order to observe any change in participants' success. Using the pre-test as covariate the results were analyzed and it was observed that both groups increased their score, but the experimental group remained almost three points below the score of the control group. Although the adjusted scores were 89,196 for the experimental group and 86,856 for the control group, the outcome of the post-test analysis ($p = .328$) suggested that there was no significant difference in educational effectiveness of augmented reality tools supported instructions on individuals participating in the study. Thus, it can be claimed that augmented reality integrated lessons are not superior to the conventional methods enriched with multimedia elements like visual (flashcards, presentations, videos, realia etc.), audial (listening activities, songs etc.) materials and other technologies except for augmented reality ones. Although the control group did not have activities with any augmented reality technologies, the students were exposed to the visual and audial materials that had been used with augmented reality applications in the lessons for

the experimental group and both of the lessons were effective in terms of increasing success. Ersoy et.al. (2016) had similar findings about the effects of augmented reality on success. They found out that although augmented reality technology integrated lessons were more motivating and interesting for students, the test results showed that there was not a meaningful difference between the control and experimental group in terms of success. Their study was an important one in that most of the studies about augmented reality compare traditional methods with augmented reality integrated ones. However, in their study, Ersoy et.al. collated the effects of augmented reality technology and a computer-based learning system which did not include any augmented reality elements. In a similar way, this research also showed the outcomes of augmented reality based activities and teaching with multimedia integrated projects.

As been stated before in this study the augmented reality integrated lessons were compared with the conventional ones enriched with multimedia elements. What was meant by traditional teaching was not just using the course book, board and repetition. Today with the development of technology and new teaching and learning theories computers have already become a natural part of the teaching process along with the visual and audial materials. Thus, what are meant by traditional lessons in this study are the lessons that do not include augmented reality elements but have visual and audial materials to support learning. All these materials can be referred as multimedia elements. Mayer (2009, pp.1-3) states that words and visuals help people comprehend better and to realize meaningful learning multimedia elements should be used in such a way that will foster the learners' cognitive activities and make learning targets stored in the long term memory. The multimedia elements include texts, graphics, animations, videos and sounds. These materials can be used in different combinations which will be beneficial for both the learners and the teachers (Gunawardhana and Palaniappan, 2016). Mayer described the uses of multimedia elements in a detailed way in his book. According to Mayer (2009, p.3) multimedia learning elements can be used in such ways that will help learners reinforce what they have learnt by supplying drill and practice systems or let learners obtain the target language objectives by transporting the information through applying certain rules of using these elements or allow students interpret the information. The multimedia elements have already been proven to be effective tools in teaching and

learning. In the study that Ercan (2014) conducted with the fifth grade students in Kahramanmaraş, the achievement and attitudes towards science courses were analyzed and the results showed that the group who had instruction with multimedia learning materials did better than the group who had traditional learning using the course book supplied by MEB as teaching material. De Souza et.al. had similar results. They carried out their research with university students and found out that social sciences can be taught with multimedia elements more effectively (De Souza, 2017). Ulusoy (2011) had his study with eighth grade students in Adıyaman and found out that multimedia elements had positive effects on the attitudes of the students about Turkish Republic Revolution History and Kemalism lesson, too. Similarly, Shah and Khan (2015) had their treatment for 20 weeks with the 8th grade students in science lessons and concluded that multimedia elements were effective tools in teaching and they helped students got higher grades compared to the ones who had traditional lessons without any technology. This study supports the results of the academic works mentioned above. Thus, it can be said that the results of this study also showed that multimedia integrated lessons were as effective as augmented reality integrated one as both of the groups increased their test results.

Although this study showed no meaningful connection between the success and the augmented reality technologies, both the students in the experimental group and in the control group expressed that they enjoyed the teaching process. That is, the students in the experimental group liked the augmented reality technologies and the students in the control group took pleasure in the teaching process with the multimedia elements. As the focus of this study was not scaling the motivation level of the students, it will not be meaningful to comment on which groups' motivation level was higher. However, it can be assumed that both of the groups had enjoyed the teaching process and got benefit from the lessons as it can be seen from the post-test results. At this point it would be meaningful to refer to the objectives described in the curriculum published by MEB. According to the programme of study published by MEB, the students start English language learning as a foreign language in the second grade and the main aim of the first three years in ELT (English Language Teaching) is to let students enjoy the language learning process and develop a positive attitude towards English language learning. Because of these reasons they are not evaluated with any written or oral tests until they are in the fourth grade.

Although the testing starts at the fourth grade the main aim is still to allow students to take pleasure in learning a foreign language (Milli Eğitim Bakanlığı, 2018, p.38). As both of the groups in this study were observed to be contented with the teaching and learning procedure, it can be said that this work can be construed with the assumption that multimedia elements are effective tools in teaching English as a foreign language as it motivates students to attend the lessons. Moreover, the results can also be deduced as augmented reality technologies supply alternative tools in motivating students to learn a foreign language. Furthermore, it can be said that augmented reality technologies can help teachers be successful in reaching the goals of English syllabus by letting students have pleasure in English language learning.

The results can also be read in terms of CALP and BICS. As the curriculum mostly focus on communicative skills for the first three years it can be said that basic interpersonal communicative skills have gained more importance in these years. With the activities that allow students to use the language in meaningful contexts students can be claimed to learn some strategies to have meaningful conversations when they need. However, this achievement does not necessarily relate with the academic success. As Cummins (2008) said

“..Discrete language skills can sometimes be learned in virtual isolation from the development of academic language proficiency as illustrated in the fact that some students who can “read” English fluently may have only a very limited understanding of the words they can decode..”

Although the students seemed to be successful in their post-tests, it was observed that they were more successful in the lessons when they were using the language in meaningful contexts.

5.2. Limitations of the Study

The study had some limitations in terms of samples, place and the tools used for the study.

The study was conducted for 8-week period of instruction in 2018-2019 educational years in Istanbul with a small number of participants. It was carried out with 76 A1 level young learners (38 participants in experimental group and 38 participants in the control group) who were between 9-10 years old. Although the

pretest results demonstrated imbalance in prior knowledge of the groups, the control group could not be changed as among the classes that researcher had the control class was the most suitable one to work with in terms of schedule and participant number.

In the classrooms where the study took place there were no smart boards or tablets supplied by the Ministry of National Education (MEB) for the FATİH (Movement to Increase Opportunities and Technology) Project. Regarding this, the internet connection was not a strong one that would allow visiting the websites required for the study. For these reasons the internet was supplied by the researcher which resulted in limited internet connection because the portable Wi-fi the researcher provided allowed only ten connections at a time.

To have enough mobile tools to conduct the study the parents were asked to support. As the students were 9-10 years old, most of them did not have mobile phones. It was thought that it would be difficult to arrange the families to bring their mobile phones for the study for 8 weeks. Thus the tablets were used to experience the augmented reality integrated lessons. The researcher collected the tablets before the practice and checked their capacities. Twenty-two tablets were collected. However, only nine of the tablets were suitable for the study. Four of the tablets did not have enough storage for the augmented reality applications and nine of them did not have the required software versions to install the applications. As a result, the activities that were planned to do in pairs were changed into group activities. The same change was done for the activities that would be experienced with the control group without the augmented reality technologies. Meanwhile, two more tablets were allocated by the researcher in case the students forgot the tablets or the students who had the tablets did not come to the class.

Although the tablets seemed to be enough to conduct the study in groups of three or four, in some activities because of the qualities of the cameras some of the tablets did not work well and could not scan the image. Similarly, some of them did not work because of poor lighting. Although some brands worked well in those situations, others did not work efficiently. In such cases the researcher asked the groups who finished the scanning activity earlier to hand out the tablets to the groups who needed the tool. This also was another limitation in terms of time management.

As the groups had to wait for the others to complete the activity, it took more time to finish the activity than it had been planned.

5.3. Implications of the Study

Augmented reality is a technology that is being used more and more every day. The “Artırılmış Gerçeklikle Zenginleşen Kitaplar-Books That Flourish With Augmented Reality” project of the Istanbul Directorate of National Education is an example of how it is becoming widespread. This project aims to solve the limitations of the augmented reality technologies and enriching the books with augmented reality contents (Artırılmış Gerçeklikle Zenginleşen Kitaplar, 2018). The fact that there is not a specific application that includes all the subjects and their contents as well as that some applications do not continue their services as in Aurasma and ZooBurst examples or some have changed their pricing policies and require subscription to create and share contents as in Layar example can be some of the limitations of this technology apart from the knowledge required to use this it¹⁰. In this study these limitations had impacts on the design of the treatments. To create 3D images and use these for the augmented reality applications was not possible because of insufficient technical knowledge as well as the fact that this required so much time to spend. It was also not possible to use different applications as it meant uploading all these programs on the tablets which was not possible for some tablets because the tablets were the personal ones and there were not enough spaces to upload all the applications. Informing students about the use of each tool was not applicable, neither because this would have resulted in spending too much time on the preparation stage. It would have also been inefficient for the students to use different applications each time which may have resulted in confusion as both the learning item and the mean to learn it were new for the students. With the Books That Flourish with Augmented Reality Project these limitations can be overcome as this project also aims to educate the teachers to be able to use this technology in their lessons efficiently by having them attend courses about the basics of Unity, 3D modeling and Basic C# as well as creating one specific program that can be used in classes for all subjects (Artırılmış Gerçeklikle Zenginleşen Kitaplar, 2018).

¹⁰ Detailed information can be found at <https://edshelf.com/tool/zooburst/>, <https://www.layar.com/pricing/#/EUR> and <https://www.aurasma.com/>

Although the result of this study indicates that there is not a significant difference in the scores of the control and experimental groups in terms of the effects of augmented reality technologies on the success or primary level students, it was stated by the students that the lessons were enjoyable and the activities were interesting. This may be interpreted as the lessons integrated with augmented reality applications raised the students' motivation and interest on the lesson. Further studies on the augmented reality technologies might have identify these effects and these studies may have also indicate the importance of the sustainability of FATİH and Books That Flourish with Augmented Reality projects as it is necessary to supply students with the same quality tools as well as equipping teachers with the necessary knowledge about the use of these technologies.

In a broader perspective, today students are expected to use their knowledge in different situations. According to NMC Horizon Report Review to do this, students should have various skills which include critical-thinking, creativity, collaboration and ICT know-how (EDUCAUSE, 2018, p.5). This study is important as it shows teaching and learning supported with technology has effects on education. Although it was not significant in this confined study, it is worth working on it as it can already be seen that students and teachers have different needs and they should use different methods to reach their aims. At this point new technologies like augmented reality can be a part of the solution.

5.4. Suggestions for further study

In this study only the effects of the augmented reality technologies on the success of the students in learning English as a foreign language in primary level were tested. While conducting the research the cognitive abilities and personal traits of the students were not observed. In this respect these features can be search in another study and the results can also be analyzed using this data. Moreover, the attitudes toward the augmented reality integrated lessons can also be searched to support the further studies.

Although the participants were primary level students and it could be assumed that their acquaintance with technology was limited, to test it scientifically

would be meaningful as their prior experience might have some effects on comfort, competence and efficacy when using it.

Retention level can also be tested along with the effects of augmented reality on success in further studies.

To test the motivation level of the students will also be a meaningful study as today with the infinite number of information it would be meaningful to acquire students with the motivation to learn a foreign language and foster their curiosity. It will also be meaningful to work with the teachers in terms of getting their ideas to see the limitations or advantages of augmented reality integrated lessons from different perspectives.



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APPENDICES

Appendix 1: Course Plan

	Functions and Useful Language	Objectives	The AR applications ¹¹	Time
1. Week	Applying the pretest	to identify how much students know about the target language outcomes	_____	40'
	Informing about certain augmented reality applications¹²	to let students become familiar with the augmented reality applications	Hp Reveal and QR Code Reader	40'
2. Week	Expressing ability and inability I can..... I can't Can you? Yes, I can / No, I can't.	- to identify certain verbs about abilities - to give information about one's own abilities - to understand and answer simple questions about abilities	Hp Reveal and QR Code Reader	40'+ 40'
3. Week	Expressing ability and inability S/he can / can't Can s/he? Yes, s/he can./No, s/he can't.	- to identify the ability of others - to get the main idea of a simple text about abilities	Hp Reveal and QR Code Reader	40'+ 40'
4. Week	- Talking about possessions Whose is this? This is my/his/her/your ... It is John's - Expressing ability and inability	to recognize one's own and others' possessions	Hp Reveal and QR Code Reader	40'+ 40'
5. Week	Making simple inquiries Can s/he? Can you.....? Whose is this?	- to recognize possessions and abilities in short texts - to understand and answer simple questions about abilities and possessions	Hp Reveal and QR Code Reader	40'+ 40'
6. Week	Expressing likes and dislikes I like/don't like/dislike..... Do you like? Yes, I do. / No, I don't.	- to identify certain free time activities - to give information about one's own likes and dislikes	Hp Reveal and QR Code Reader	40'+ 40'
7. Week	Expressing likes and dislikes I like/don't like/dislike.....	to understand the general information in a text about likes and dislikes	Hp Reveal and QR Code Reader	40'+ 40'
8. Week	Making simple inquiries Do you like? Yes, I do. / No, I don't.	to understand and answer questions about likes and dislikes	Hp Reveal and QR Code Reader	40'+ 40'
9. Week	Revision		Hp Reveal and QR Code Reader	40'
	Applying the post-test	to identify the achievement level of the students about the target learning outcomes	_____	40'

¹¹ This plan will be applied for both classes but the augmented reality applications will not be used for the control group.

¹² The control group will not take this lesson.

Appendix 2: Onam Formu

BİLGİLENDİRİLMİŞ GÖNÜLLÜ ONAM FORMU

Sizi **Damla Bahadır** tarafından yürütülen “**İlkokullarda Yabancı Dil Olarak İngilizce Öğretiminde Bir Web 3.0 Aracı Olarak Artırılmış Gerçeklik Kullanımı Üzerine Bir Araştırma**” başlıklı araştırmaya davet ediyoruz. Bu araştırmanın amacı ilkokul düzeyinde yabancı dil olarak İngilizce öğretimde Artırılmış Gerçeklik uygulamalarının öğrencilerin başarısı üzerine etkisi araştırılmaktır. Araştırmada sizden tahminen **18** ders saati ayırmanız istenmektedir. Araştırmaya sizin dışınızda tahminen **79** kişi katılacaktır. Araştırmada belirlenen sınıflardaki öğrencilere artırılmış gerçeklik uygulamalarıyla dersler anlatılacaktır ve derslerin başında ve sonunda yapılacak Başarı Testi ile başarıları ölçülecektir. Aynı uygulama artırılmış gerçeklik kullanmadan anlatılan dersler için de yapılacaktır. Bu çalışmaya katılmak tamamen gönüllülük esasına dayanmaktadır. Çalışmanın amacına ulaşması için sizden beklenen, uygulama öncesi ve sonrasında dağıtılacak başarı testinin bütün sorularını eksiksiz, kimsenin baskısı veya telkini altında olmadan, size en doğru gelen cevapları içtenlikle verecek şekilde cevaplamanızdır. Bu formu okuyup onaylamanız, araştırmaya katılmayı kabul ettiğiniz anlamına gelecektir. Ancak, çalışmaya katılmama veya katıldıktan sonra herhangi bir anda çalışmayı bırakma hakkına da sahiptir. Bu çalışmadan elde edilecek bilgiler tamamen araştırma amacı ile kullanılacak olup kişisel bilgileriniz gizli tutulacaktır; ancak verileriniz yayın amacı ile kullanılabilir. İletişim bilgileriniz ise sadece izninize bağlı olarak ve farklı araştırmacıların sizinle iletişime geçebilmesi için “ortak katılımcı havuzuna” aktarılabilir. Eğer araştırmanın amacı ile ilgili verilen bu bilgiler dışında şimdi veya sonra daha fazla bilgiye ihtiyaç duyarsanız araştırmacıya şimdi sorabilir veya **damlaeryilmaz@yahoo.com** e-posta adresi ve **0506 531 69 91** numaralı telefondan ulaşabilirsiniz. Araştırma tamamlandığında genel/size özel sonuçların sizinle paylaşılmasını istiyorsanız lütfen araştırmacıya iletiniz.

Yukarıda yer alan ve araştırmadan önce katılımcıya verilmesi gereken bilgileri okudum ve katılmam istenen çalışmanın kapsamını ve amacını, gönüllü olarak üzerime düşen sorumlulukları anladım. Çalışma hakkında yazılı ve sözlü açıklama aşağıda adı belirtilen araştırmacı/araştırmacılar tarafından yapıldı. Bana,

alışmanın muhtemel riskleri ve faydaları sözlü olarak da anlatıldı. Kişisel bilgilerimin özenle korunacağı konusunda yeterli güven verildi.

Bu koşullarda söz konusu araştırmaya kendi isteğimle, hiçbir baskı ve telkin olmaksızın katılmayı kabul ediyorum.

Katılımcının:

Adı-Soyadı:.....

İmzası:

İletişim Bilgileri: e-posta:

Telefon:

İletişim bilgilerimin diğer araştırmacıların benimle iletişime geçebilmesi için “ortak araştırma havuzuna” aktarılmasını;

☐ kabul ediyorum ☐ kabul etmiyorum (lütfen uygun seçeneği işaretleyiniz)

Velayet veya Vesayet Altında Bulunanlar İçin;

Veli veya Vasisinin

Adı-Soyadı:.....

İmzası:

Araştırmacının

Adı-Soyadı: Damla BAHADIR.....

İmzası:

Appendix 3: Pretest and Post-test

Name-Surname:

Class:

A. Aşağıdaki tabloda Jane'in sevdiği ve sevmediği etkinlikler yer almaktadır.

Dinleyin ve Jane'in sevdiği etkinliklerin altına ✓ işareti, sevmediklerinin
altına ✗ işareti koyun. (2x6=12)

B. Duyduğunuz etkinlikleri işaretleyin. (2x6=12)

C. Boşlukları doğru isimlerle doldurun. (2x6=12)



Selma



Jack

..... can take pictures.

..... can jump high.

..... can ride a bike.

..... can drive a car.

..... can play the guitar.

..... can do puzzles.



Oğuz



Mike



Ahmet



John

D. Aşağıdaki tabloda Mary'nin yapabildikleri için ✓ işareti, yapamadıkları için ✗ işareti kullanılmıştır. Bu tabloya göre aşağıdaki sorular için uygun seçeneği işaretleyiniz. (2x6=12)

✗	✓	✗	✓	✓	✗

1. Can she ride a horse?

a. Yes, she can. b. No, she can't.

2. Can she do puzzles?

a. Yes, she can. b. No, she can't.

3. Can she jump high?

a. Yes, she can. b. No, she can't.

4. Can she play the piano?

a. Yes, she can. b. No, she can't.

5. Can she climb a tree?

a. Yes, she can. b. No, she can't.

6. Can she drive a car?

a. Yes, she can. b. No, she can't.

E. Cümleleri eşleştirin ve uygun harfleri parantez içine yazınız. (2x5=10)

1. This is my piano. (.....)

2. This is Jane's camera. (.....)

3. This is his bike. (.....)

4. This is Jack's horse. (.....)

5. This is her horse. (.....)

a. She can take pictures.

b. I can play the piano.

c. He can ride a horse.

d. He can ride a bike.

e. She can ride a horse.

F. Cümleleri okuyun ve resimlere göre doğru cümlelerin yanına “T” (True- Doğru), yanlış cümlelerin yanına “F” (False- Yanlış) yazın .(2x6=12)

					
John	Mary	Jane	Kate	Megan	Sue

1. John can take pictures.

4. Kate can ride a horse.

2. Mary can do puzzles.

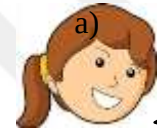
5. Megan can drive a car.

3. Jane can play the guitar.

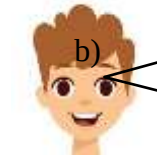
6. Sue can fly.

G. Aşağıdaki tabloda bir çocuğun sevdiği ve sevmediği etkinlikler gösterilmektedir. Bu tablo, konuşma balonlarında yazılanlara göre kim aittir? Doğru olan şıkkı işaretleyiniz. (1x3=3)



I like reading comics but I don't like coloring books. I like swimming but I don't like flying a kite.



I like watching cartoons but I don't like coloring books. I like swimming but I don't like flying a kite.



I like reading comics but I don't like drawing pictures. I like swimming but I don't like playing

H. Kelimeleri eşleştirin ve parantez içlerine uygun harfleri yazın.

1. watching (.....)
2. playing (.....)
3. flying (.....)
4. riding (.....)
5. reading (.....)

- a. a kite
- b. table tennis
- c. cartoons
- d. a horse
- e. comics

I. Paragrafı okuyun ve resimlerin altına Jane'nin sevdiği etkinlikler için ☺ (gülen surat) sevmediği etkinlikler için ☹ (üzgün surat) çizin. (2x6=12)



**Hi! My name is Jane.
I like riding a bike.
I don't like playing chess.
I like doing puzzles.
I don't like playing table tennis.
I like drawing.
I don't like watching cartoons.**

J. Resimlerin altına sevdiğiniz etkinlikler için ☺ (gülen surat), sevmediğiniz etkinlikler için ☹ (üzgün surat) çizin ve aşağıdaki soruları hazırladığınız tabloya göre cevaplayın. (2x5=10)

Do you like...?					

- Do you like playing football?
- Do you like flying a kite?
- Do you like swimming?
- Do you like planting trees?
- Do you like drawing?

Appendix 4: Crossword Puzzle

free time

Name: _____

- | | | |
|-------------------------|--------------------------|-----------------------|
| 1. riding a scooter | 6. drawing | 11. swimming |
| 2. coloring books | 7. playing chess | 12. learning English |
| 3. flying a kite | 8. playing football | 13. watching cartoons |
| 4. planting trees | 9. reading comics | 14. riding a bike |
| 5. playing with marbles | 10. playing table tennis | |

S	F	A	A	X	G	T	F	N	B	B	H	I	E	T	O	V	D	C	P
A	P	R	I	D	I	N	G	A	B	I	K	E	O	T	J	T	P	Z	L
I	L	M	P	Z	R	X	D	R	A	W	I	N	G	O	A	M	L	P	A
R	A	P	L	U	I	H	V	E	A	Z	L	N	R	T	D	C	A	L	N
M	Y	W	A	F	D	W	C	P	P	E	L	Z	E	T	Y	C	Y	A	T
L	I	A	Y	O	I	G	O	H	S	H	X	N	A	F	J	N	I	Y	I
E	N	T	I	Y	N	M	P	C	G	X	A	D	D	O	B	W	N	I	N
A	G	C	N	A	G	C	K	T	H	C	L	C	I	Y	V	Y	G	N	G
R	F	H	G	O	A	I	S	B	G	O	Q	C	N	R	U	W	C	G	T
N	O	I	T	L	S	Y	K	N	C	L	N	Z	G	K	F	V	H	W	R
I	O	N	A	V	C	L	E	M	M	O	Y	J	C	U	L	F	E	I	E
N	T	G	B	F	O	M	Q	O	E	R	R	I	O	S	Y	A	S	T	E
G	B	C	L	A	O	N	N	S	Q	I	D	H	M	D	I	N	S	H	S
E	A	A	E	O	T	R	T	W	V	N	B	F	I	O	N	B	I	M	Q
N	L	R	T	Y	E	Q	G	I	P	G	J	F	C	X	G	N	M	A	A
G	L	T	E	K	R	A	L	M	M	B	Z	G	S	E	A	S	V	R	M
L	C	O	N	K	R	D	K	M	N	O	I	N	I	J	K	R	Y	B	F
I	L	O	N	V	R	Y	R	I	O	O	A	T	C	T	I	X	Z	L	E
S	K	N	I	J	N	E	U	N	K	K	V	N	W	Y	T	W	W	E	B
H	R	S	S	M	I	R	H	G	B	S	R	L	U	P	E	W	T	S	M

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Appendix 5: Qr Codes

Qr Code for Cram (Revision)



Qr Code for Quizziz



Qr Code for Cram Game



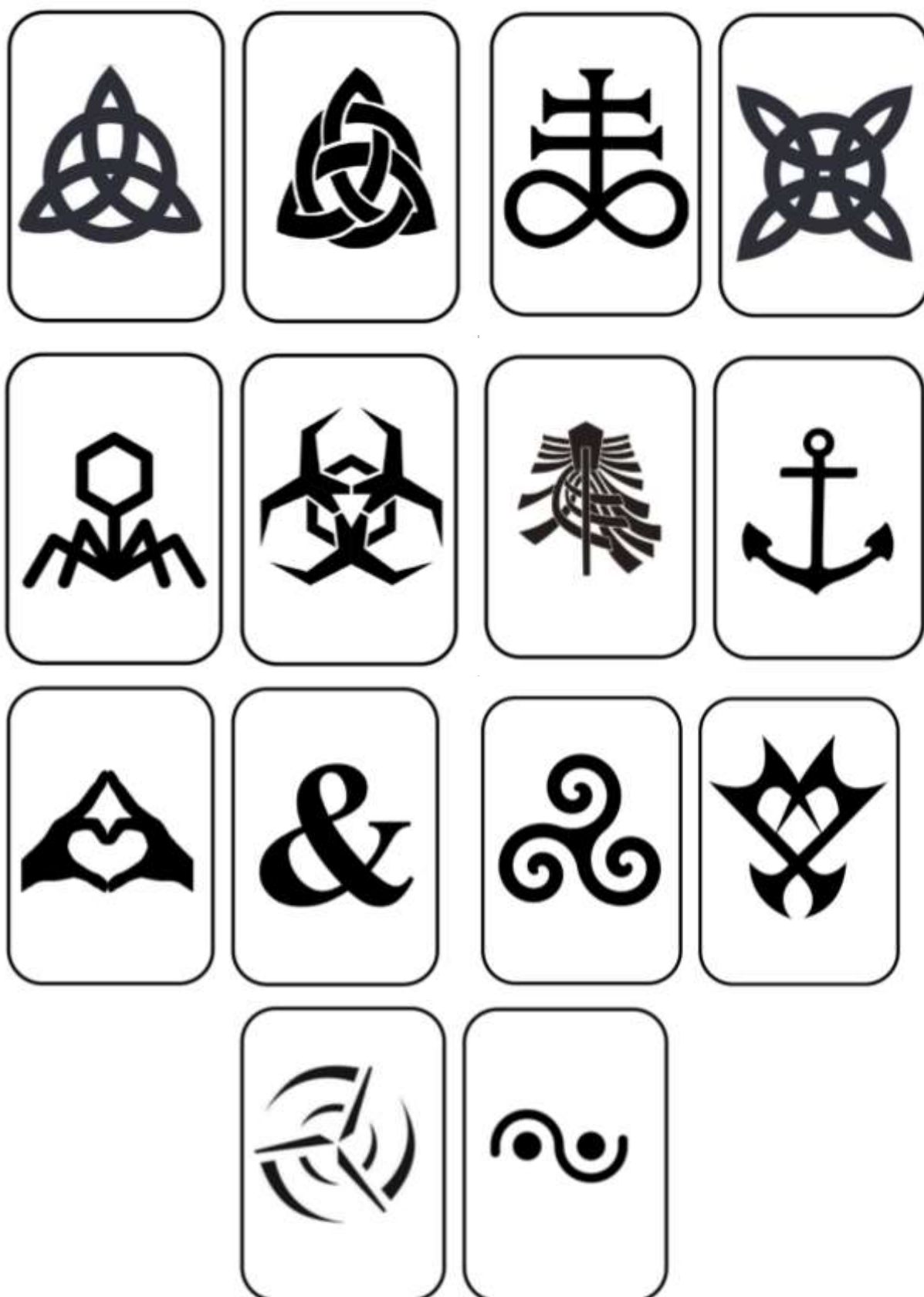
Qr code for Wordwall Puzzle



Qr Code for Spin the Wheel



Appendix 6: Symbols



Appendix 7: Video Worksheet

Scan the pictures and tick the activities using  or . Then make sentences about Mary and John.

					
Mary					

- 1.
- 2.
- 3.
- 4.
- 5.

					
John					

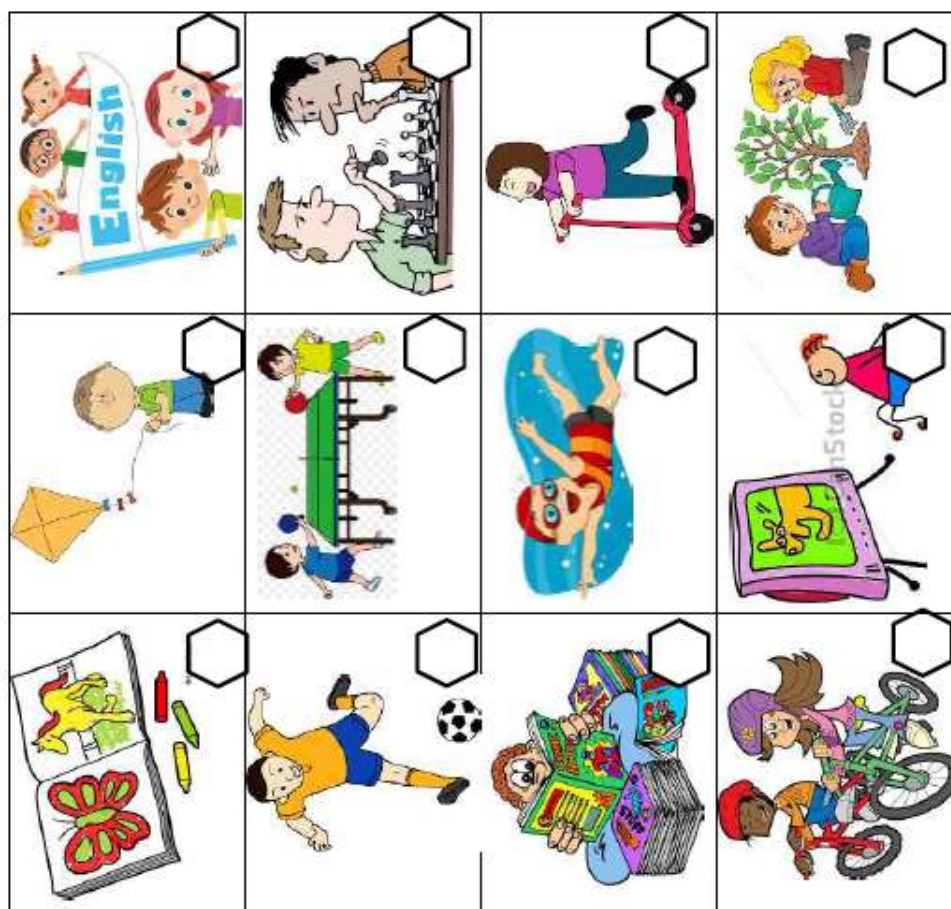
- 1.
- 2.
- 3.
- 4.
- 5.

Appendix 8: Qr Code Reading



Hi. I'm Emily. I like coloring books and watching cartoons but I don't like reading comics and learning English. I like playing table tennis and riding a scooter but I dislike playing football and riding a bike. I like flying a kite and playing chess. I don't like planting trees and swimming.

Appendix 9: Reading Worksheet for the Control Group



Put a ✓ for the activities that Emily likes



Hi. I'm Emily. I like coloring books and watching cartoons but I don't like reading comics and learning English. I like playing table tennis and riding a scooter but I dislike playing football and riding a bike. I like flying a kite and playing chess. I don't like planting trees and swimming.

Appendix 10: Video Flashcards



Jane



Mary



Lisa



Anna



George



John



Jack



Tom



Michael



Dora

**Appendix 11: Ders Kitabı Uzman Görüş Formu Kapsam Geçerlik Oranı
ve İndeksi**

Madde	Belirtke İfadesi	KGO
1. Kazanım tablosu bulunuyor mu?		1.00
2. Kelime bilgisi, sözlük bulunuyor mu?		.75
3. Kitabın sonunda kaynakça var mı?		.75
4. Kitabın yönlendirdiği web sitesinin kalitesi nedir?		.75
5. İçindekiler sayfası bulunuyor mu?		1.00
6. Sayfaların görsel tasarım kalitesi nasıl?		1.00
7. Basitlik ilkesine uygun mu? (Genelden ayrıntıya, basitten karmaşığa gidilmiş mi?)		.75
8. Taşıdığı eğitsel değer yeterli mi?		1.00
9. Dersin hedeflerine ve kazanımlarına uygun mu?		1.00
10. Etkinlikler bilgiyi inşa ettirmede yeterli mi?		1.00
11. Öğrencilerin hazırbulunuşluk düzeylerine uygun mu?		1.00
12. Hedef davranışlara uygun mu?		1.00
13. Kullanım esnekliği ve geliştirilebilirliği ne düzeyde?		1.00
14. Motivasyon ve ilgiyi sağlaması ne düzeyde?		1.00
15. Kullanımı kolay mı?		.50
16. Öğrencinin katılımını sağlıyor mu?		1.00
17. Resimlerin ve metinlerin birbirlerini tamamlamalarına ne derece özen gösterilmiş ?		.75
18. Yazı tipi ve boyutu uygun mu?		.50
19. Kullanılan görsellerin (resim, grafik) kalitesi ne durumdadır?		1.00
20. Gereken yerde başlıklar, dip notlar ve kaynakçalar bulunuyor mu ?		.75
21. Sayfaların altında, üstünde, yanlarında ve satır aralarında yeterli boşluklar var mı ?		.50
22. Alıştırmaların cevapları bulunuyor mu ?		.75
23. Kitabı destekleyen yardımcı araç-gereç (film, ses gibi multimedya içerik) var mı?		1.00
24. Kelime ve cümleler sınıf düzeyine uygun mu ?		.75
25. Metinler hedeflenen içeriğe uygun mu?		1.00
26. Kitap genel olarak görsel tasarım ilkelerine uygun mu ?		.75
27. Kitap rahat okunabilir mi ?		.75
28. Kitap kullanışlı mı ?		.75
29. Edinilen beceri ve kazanılan davranışları ölçmeye yarayan sorulara yer verilmiş mi?		1.00
30. Bilgiler, ünitelerde ve konularda mantıklı bir şekilde bölümlere ayrılmış mıdır ?		1.00
31. Sorular hedef davranışların alan ve düzeylerine uygun olarak hazırlanmış mı ?		1.00
Kapsam Geçerlik İndeksi (Kapsam Geçerlik Oranı Ortalaması) - KGI		.86

BIOGRAPHY

The author was born on December 27, 1984 in İstanbul, Turkey. She completed all her studies in İstanbul. She graduated from İstanbul University in 2006 and she started working as an English teacher in a public school in İstanbul in the same year. She spent 8 months as a Comenius Assistant in a high school in France. She helped the activities held for the Comenius Project in the host school. She ran another Comenius project when she returned to Turkey. She is also an active member of the e-twinning portal. She loves attending trainings about different subjects on teaching and learning. She is also a graduate of Lisan Akademisi, a project run by İstanbul Directorate of National Education. She has given 3 workshops for Lisan Akademisi since 2017. Married with two children she is continuing her professional and personal development by attending various adventures like this master journey.