AUGMENTED REALITY AS A TOOL FOR EFL INSTRUCTION: A CONTENT ANALYSIS STUDY

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Abstract

This study aims to analyze postgraduate theses conducted in Turkiye on the use of augmented reality (AR) technology in English as a foreign language (EFL) education. The sample of the study consists of master's theses and doctoral dissertations related to the target subject in the database of the Council of Higher Education Thesis Center. The document content analysis method was employed to analyze the theses, and the analysis mainly covered the following topics: the aims of the studies, the learning environments in which they were conducted, the size of the sample group, the research methods, data collection and analysis techniques adopted in the studies, and the main findings. The main results of the study demonstrated that most of the theses used mixed research methods, they mostly used surveys as data collection tools, and many of them were conducted in university contexts. Also, many of the examined theses determined that participants generally have a positive attitude toward the use of AR technology, and that this technology can contribute positively to the active participation of students in the EFL learning process. Additionally, the findings showed that some studies focused on the affective impacts of AR in EFL contexts or its effects on some language areas such as vocabulary, and listening. However, it has been revealed that there is a lack of detailed research on AR and its effects on other language skills and domains such as reading, grammar, and pronunciation. An evaluation of the number of the theses highlights that studies on AR-based English education are very limited, and therefore, additional theses are required to investigate this subject from various aspects. To conclude, this study provides comprehensive information about the content of the obtained theses on the utilization of AR in EFL learning contexts in Turkiye.

Key Words: Augmented reality in education, foreign language education, content analysis, postgraduate theses in Turkiye.

YABANCI DİL OLARAK İNGİLİZCE ÖĞRETİMİNDE BİR ARAÇ OLARAK ARTIRILMIŞ GERÇEKLİK: BİR İÇERİK ANALİZİ ÇALIŞMASI

Özet

Bu çalışma artırılmış gerçeklik teknolojisinin yabancı dil olarak İngilizce öğretiminde kullanımı üzerine Türkiye'de yapılmış olan lisansüstü tezleri incelemeyi hedeflemiştir. Araştırmanın örneklemi Yükseköğretim Kurulu Başkanlığı Tez Merkezi veri tabanında yer alan hedef konu ile ilgili yüksek lisans ve doktora tezlerinden oluşmaktadır. Tezlerin analizinde döküman içerik analizi yöntemi kullanılmıştır ve analiz, temel olarak şu konuları kapsamıştır: çalışmaların amaçları, gerçekleştirildikleri öğrenme ortamları, örneklem grubunun büyüklüğü, çalışmalarda benimsenen araştırma yöntem, veri toplama ve analiz teknikleri ve temel bulgular. Çalışmanın ana sonuçları, tezlerin çoğunun karma araştırma yöntemi kullandığını, veri toplama aracı olarak çoğunlukla anket kullandıklarını ve çalışmaların birçoğunun üniversite bağlamında gerçekleştirildiğini göstermiştir. Ayrıca, incelenen tezlerin birçoğu, katılımcıların artırılmış gerçeklik teknolojisi kullanımına karşı genel olarak pozitif tutum sergilediğini ve bu teknolojinin öğrencilerin öğrenme sürecine aktif katılımına olumlu katkı sağlayabileceğini belirlemiştir. Ayrıca bulgular, bazı araştırmalarda artırılmış gerçekliğin yabancı dil olarak İngilizce öğrenme bağlamlarında duygusal etkilerine veya kelime bilgisi ve dinleme gibi bazı dil alanları üzerindeki etkilerine odaklandığını göstermiştir. Bununla birlikte, artırılmış gerçeklik ve onun okuma becerileri, dil bilgisi, telaffuz gibi bazı dil becerileri ve alanlarına etkisi hakkında detaylı araştırmaların eksik olduğu ortaya

konulmuştur. Yapılan tez çalışma sayısı değerlendirildiğinde, bulgular, artırılmış gerçeklik temelli İngilizce eğitimi üzerine yapılan çalışmaların çok sınırlı olduğunu ve bu yüzden bu konunun çeşitli yönlerden araştırılacağı daha fazla tez çalışması yapılmasının gerekli olduğu vurgulamaktadır. Sonuç olarak, bu çalışma, Türkiye'de yabancı dil olarak İngilizce öğrenme bağlamlarında artırılmış gerçeklik kullanımına dair yapılmış tezlerin içerikleri hakkında kapsamlı bir bilgi sunmaktadır.

Anahtar kelimeler: Eğitimde artırılmış gerçeklik, yabancı dil eğitimi, içerik analizi, Türkiye'deki lisansüstü tezler.

INTRODUCTION

Augmented reality (AR) has become one of the important tools that play an important role in foreign/second language (L2) education due to rapid developments in educational technologies (Huertas-Abril et al., 2021; Jamrus & Razali, 2019). Cabero and Barroso (2016) define AR as "the real-time combination of digital and physical information through different technological devices" (p. 44). That is to say, AR technology detects the physical environment with a camera and then adds computer-generated content such as images, sound, and video to this environment, thus allowing users to see and interact with elements in both the physical and virtual environments concurrently (see Azuma et al., 2001; Di Serio et al., 2013)**.** With AR, traditional teaching methods can be enriched with interactive and digital content; the digital and physical worlds can be combined, and virtual elements related to the real world can be presented to foreign language students (Huertas-Abril et al., 2021). In this way, L2 students can obtain a more effective and authentic learning experience. It is possible to say that this technology can offer the following benefits for the language learning process: providing students with realistic examples and experiences of the use of the target language in real life (Lee, 2020); presenting abstract concepts such as grammar rules or abstract nouns in L2 to students in a more concrete way (see Belda-Medina & Calvo-Ferrer, 2022; Merzlykin et al., 2018); supporting the retention of learning (see Korosidou & Bratitsis, 2021); raising students' cultural awareness in L2 (Liu et al., 2023); and improving language skills and making the L2 learning journey more captivating and interesting (Azimova & Solidjonov, 2023).

The potential advantages of AR technology in enhancing various language skills and areas have been confirmed by a variety of studies. For example, Tsai (2020) compared the effects of learning English vocabulary with AR technology and the conventional classroom method on the vocabulary achievement of Taiwanese primary school students learning EFL. The findings indicated that AR-supported vocabulary learning proved to be superior to traditional classroom methods. Likewise, Ebadi and Ashrafabadi (2022) explored the consequences of using AR on university-level EFL learners' reading comprehension skills and attitudes in Iran. In contrast to the experimental group that used AR-based technology to read, the control group received lessons through a conventional classroom method. At the conclusion of the reading skill tests, it was determined that the reading comprehension skills of the group using AR were better than those of the group exposed to the traditional teaching approach. Furthermore, interviews with the students revealed that the use of AR to foster reading skills enabled them to enjoy the reading process and stimulated their interest in reading. Similarly, Wang (2024) scrutinized the influence of AR-based implementation on the speaking proficiency of Chinese undergraduate EFL students in terms of vocabulary, pronunciation, fluency, and content. The students assigned to the experimental group took part in role-playing activities in an AR-enriched context, whereas the students in the control group did not use an AR application during role-playing activities. The results of the study demonstrated that participants exposed to AR-supported activities exhibited better speaking performance in the target language. Additionally, Koc et al. (2022) conducted quasi-experimental research to investigate the effects of AR-integrated instructional materials on grade 10 B1-level EFL learners' writing skills. As a consequence of the implementation, it was determined that the use of AR-based education can positively contribute to students' writing skills and motivation.

Additionally, many studies on the affective impacts of AR-based applications on language learning processes have also shown that student attitudes toward such applications are generally positive. Taskiran's (2019) research is one example of this. In her survey-based descriptive study, Taskiran (2019) explored the outcomes of combining AR-supported instructional materials with game-centric methods on Turkish EFL learners' motivation and enjoyment, as well as their beliefs about the usefulness and value of these learning materials. The survey results revealed that learners had positive attitudes toward the utilization of AR-based learning resources, and engagement in AR-oriented learning contexts was motivating and enjoyable for them. In another study, Redondo et al. (2020) investigated the effects of using AR technology for EFL teaching on children's motivation, learning

and socio-affective relationships in early childhood education programs in Spain. In this study, which adopted a quasi-experimental design, the experimental group received English instruction via AR technology-based methods, while the control group was taught using conventional teaching approaches. The analysis results of the pre- and post-tests demonstrated a substantial improvement in the learning outcomes of the experimental group, which utilized AR technology as part of the learning process. Additionally, the data showed a considerable enhancement in motivation level and socio-affective relationships of the experimental group, taught through AR-centered instruction. In an additional study conducted in Iran by Norouzifard et al. (2022), it was found that the integration of AR tools positively influenced students' motivation and attitudes towards EFL education.

Apart from these studies, some literature review and meta-analysis studies have also demonstrated that AR can be a supportive tool in the L2 learning process. For example, in their meta-analysis, Yang and Zhang (2024) indicated that AR-based applications in EFL settings can have positive effects on improving EFL learners' language skills. Additionally, in their systematic review study, Selvarajoo and Hashim (2022) found that AR-technology based applications have the potential to enhance ESL learners' vocabulary knowledge. Likewise, Hasbi and Yunus (2021) conducted a review study on AR and English language learning, and underlined that AR can play a constructive role in enhancing language learning experiences. In light of these studies, it is possible to conclude that AR-based applications can have positive outcomes in EFL contexts in terms of both improving language skills and creating positive emotions in learners toward the learning process.

As previously highlighted, many studies carried out worldwide generally emphasize that AR has the potential to enhance and enrich EFL learning environments. Examining the impacts of such technological advancements in the area of foreign language education in Turkiye, a country where English is taught as a primary foreign language, will provide new insights into the studies to be conducted in this field. Therefore, it is important to evaluate existing research on AR applications in the field of EFL teaching. Koc et al. (2022) emphasize that studies on the integration of AR technology in foreign language education contexts are relatively scarce. For that reason, observing research trends on this subject and analyzing related content seems essential to shed light on future research and improve education practices. Considering these factors, this study intends to expand the literature by analyzing master's and doctoral theses related to AR-based EFL education in the context of Turkiye. To achieve this, it examines the content of the selected theses, focusing on aspects such as research focus, setting, sample size, design, data collection tools and analysis methods, and main findings.

METHODOLOGY

Research Design

A document content analysis methodology was adopted in this research to examine theses on AR-based EFL learning and teaching in Turkiye. Document analysis, as Bowen (2009) defined, is a research method for assessing the contents of documents (written or digital) within an organized procedural framework. Similarly, O'Leary (2017) referred to document analysis as the "collection, review, interrogation and analysis of various forms of written text as a primary source of research data" (p. 375). In this study, target documents were analyzed through content analysis, which includes both quantitative and qualitative methods (White & Marsh, 2006). Content analysis was preferred, since it was thought to provide an in-depth understanding of the studies selected in line with the objectives of the research.

Selection of Research Documents

As this research aimed to investigate master's and doctoral theses on the use of AR in EFL education contexts in Turkiye, a search was made on the Council of Higher Education Thesis Center. The term "augmented reality" was entered into the search field, and the "all fields" search, which covers title, keywords, abstract, and other data, was performed without setting any time limits. As a result of the initial search, it was determined that there were 767 theses related to the search term "augmented reality" in total. All of these theses were manually analyzed for the identification and selection of subject areas. The focus of this study was on empirical theses focusing mainly and entirely on augmented reality and EFL education. One thesis on the design of augmented reality applications was not included in the analysis. In addition, theses concentrating solely on English as the target foreign language were selected. As a result of the thorough examination based on the inclusion criteria, it was

decided to include a total of 11 theses, 1 doctoral dissertation and 10 master's theses related to the target subject in the analysis. The distribution of theses by year was as follows: 2016 (1 master's thesis), 2017 (1 master's thesis), 2019 (4 master's theses), 2021 (1 master's thesis), 2022 (1 doctoral dissertation and 2 master's theses), 2023 (1 master's thesis). These data show that there are few studies related to this subject and the number of these studies has tended to decrease in recent years. The table below (Table 1) presents the examined studies.

Table 1. Analyzed Theses

Author/Year	Thesis Title	Type of Thesis
Bahadir (2019)	Using web 3.0 technologies for teaching English to the primary level students: A study on augmented reality	Master's Thesis
Cinar (2017)	The effect of the use of a coursebook supported by augmented reality on students' achievement and attitude to English language teaching	Master's Thesis
Demir (2022)	An examination of using augmented reality-supported educational toys in preschool English teaching	Master's Thesis
Dogan (2016)	The effectiveness of augmented reality supported materials on vocabulary learning and retention	Master's Thesis
Karacan (2019)	Exploring factors that predict pre-service English teachers' intentions to use augmented reality using decomposed theory of planned behavior	Master's Thesis
Okumus (2021)	Pre-service EFL teachers' perceptions and self-efficacy of augmented reality technology: A mixed-method study	Master's Thesis
Parlar (2022)	The effects of augmented reality technology in situated English language learning	Master's Thesis
Pozharina (2019)	The effects of using mobile augmented reality integrated materials on students' motivation and attitude level in EFL academic writing classes	Master's Thesis
Sengur (2023)	The effect of storytelling with augmented reality applications on English speaking anxiety	Master's Thesis
Tandogan (2019)	Investigating the effectiveness of ARCS based instructional materials enhanced with AR on ESP vocabulary achievement and motivation	Master's Thesis
Varli (2022)	Learners' reflections on experiencing augmented reality in the English classroom at tertiary level	Doctoral Dissertation

Coding Process and Data Analysis

First, a coding scheme was created for the content analysis of the master's and doctoral theses addressing the target topic. In light of earlier studies, the coding scheme comprised the following classifications: thesis author, year, thesis title, and type, research focus/objective, research context and participant sample size, research designs, data gathering instruments, data analysis methods, and primary findings. The data coded in the scheme were analyzed using both quantitative (assessing the occurrence rate of patterns) and qualitative content analyses (Harwood & Garry, 2003). The quantitative analysis centered on identifying the frequencies of the obtained data, such as research (educational) contexts, sample sizes, and data collection tools. The qualitative analysis focused specifically on the interpretation of the purpose and main findings of the theses. Also, the researcher recoded and evaluated the same data at a different time to ensure consistency and accuracy. After that, the findings were reported. The subsequent section provides a detailed presentation of the findings.

FINDINGS

Research Context and Participants

According to the analysis results, it was identified that the studies examined took place in the following educational settings: Kindergarten (n=1), primary school (n=1), secondary school (n=3), and different educational levels (preparatory school level, tertiary level) of various universities (i.e. private, foundation and state universities) (n= 6). To explain this in more detail, four studies included students from university-level English preparatory schools as the study sample. Two studies were carried out with pre-service EFL student-teachers at the English language teaching department. Three studies included participants from secondary schools. Also, one study was conducted with EFL students in a primary school, while the other was conducted with kindergarten children. These results show that most of the studies were carried out with a sample group at the university level. This situation highlights the need for further studies with participants from different educational levels to evaluate the influence of AR on the EFL context at various levels of education. In addition, there is a need for more comprehensive studies focusing on the effects of AR use on the English learning process of different age groups (e.g. young learners vs adult learners). Regarding sample sizes, the distribution of participant sizes in the studies is as shown in Table 2:

Table 2. Distribution of Research Studies by Participant Size

Sample size	Frequency
1-50	6
50-100	4
100 and above	1

As presented in the table, the most commonly used study group size in relevant postgraduate theses was between 1 and 50. In four studies, the sample size was between 50 and 100, and in one study, it was 100 and more. On the basis of these findings, it can be concluded that the number of participants in the studies was compatible with the research design and objective of the studies.

Research Designs, Data Collection Instruments and Data Analysis Methods

The content analysis revealed that 8 theses employed a mixed-methods research design using both quantitative and qualitative data while 3 theses adopted only quantitative methods. Using mixed methods is an effective way to offer deeper and comprehensive insights into the research issue (Cresswell, 2012). The results indicated that most of the studies tended to use mixed research methods. No study was solely based on qualitative methods. Also, the majority of the studies (n=8) employed experimental research that compared control and experimental groups to determine the effects of AR-supported EFL education. According to Gopalan et al. (2020), a significant expansion in the educational application of quasi-experimental research approaches has been observed in recent years. Based on these findings, it is possible to say that the studies examined here also showed a tendency to use experimental approaches.

Following the content analysis, it was revealed that the theses on AR-based EFL instruction settings utilized a wide variety of data collection tools in accordance with the research goals and designs. The most commonly used data collection tools were surveys (n=10) consisting primarily of Likert-type scales (e.g. Instructional Materials Motivation Survey, Technology Acceptance Model Survey, English Attitude Scale, Augmented Reality Applications Attitude Scale). The questionnaires and scales used in the studies were classified as surveys, since they involved structured data collection from participants using predefined questions and response options. Additionally, semi-structured interviews were frequently used as a qualitative data collection tool in the studies (n=8) to obtain the participants' views on the AR implementation. For a similar purpose, in some studies, the data collection process was enriched by using learner reflection forms (n=2) or learner journals (n=1), participant observation (n=2), student motivation (n=1), and student information forms (n=1). Besides, to determine the effects of the AR application on students' EFL success, pre- and post-achievement tests (n=6, e.g. vocabulary achievement test, general English achievement test) were employed in various theses. These qualitative and quantitative data collection instruments have demonstrated that the examined theses sought to empirically present evidence on the role and effectiveness of integrating AR technology in EFL contexts. Table 3 presents the frequency of data collection instruments.

Table 3. Distribution of Data Collection Tools

Data collection tool	Number of studies
Surveys*	10
Interviews	8
Achievement tests	6
Reflection forms/papers	2
Participant observation form	2
Motivation form	1
Learning journal	1
Student information form	1

*The scales and questionnaires employed in the studies were regarded as surveys.

With respect to data analysis, the methods used in the studies were examined under two main categories: quantitative and qualitative data analysis methods. It was determined that descriptive statistics were adopted alongside inferential statistics for the analysis of quantitative data in the studies. Descriptive statistics such as mean and standard deviation were used for the presentation of the basic features of quantitative data (see Phakiti, 2014). Inferential statistics (e.g. ANOVA or correlation) were employed to "gain a better understanding of the nature of the relationship between two or more variables (e.g. linear or causal-like relationships)" (Phakiti, 2014, p.193). In other words, inferential statistical tests were commonly utilized to reveal relationships and differences within and between groups. Examples of statistical tests performed in the studies were as follows: Paired sample t-test, independent sample t-test, Wilcoxon Signed-Rank Test, Friedman Test, Analysis of Covariance (ANCOVA), Pearson Correlation Coefficient, Mann-Whitney U Tests and so on. Additionally, one of the studies used the path analysis method, as a type of multiple-regression analysis, which "allows researchers to study direct and indirect effects simultaneously with multiple independent and dependent variables" (Stage et al., 2004, p. 6). Furthermore, regarding the analysis of qualitative data, the theses mainly adopted content and thematic analytical approaches to identify recurring themes and patterns for a more in-depth understanding of the target subject.

Research Focus of the Studies

As a result of the content analysis of the statements indicating the main aim and objectives of the theses, the focal points of the theses were categorized under four themes (see Table 4): 1) Participants' attitudes and perceptions, i.e., identifying and gaining insights into participants' attitudes and perceptions toward the use of AR in EFL instruction process (e.g. Cinar, 2017; Demir; 2022; Dogan, 2016; Karacan, 2019; Okumus, 2021; Parlar, 2022; Pozharina, 2019; Tandogan, 2019), 2) Affective influences of AR, i.e., assessing the nonlinguistic impacts of AR-integrated EFL education, such as participants' motivation (e.g. Demir; 2022; Pozharina, 2019; Tandogan, 2019), and anxiety levels (e.g. Sengur, 2023), 3) Effectiveness of AR on EFL achievement, i.e., determining the impacts of using AR technology on learning outcomes and success such as English vocabulary learning and retention (e.g. Demir, 2022; Dogan, 2016; Tandogan, 2019), listening skill achievement (Parlar, 2022), and general English achievement (e.g. Cinar, 2017; Bahadir, 2019; Varli, 2022), 4) Adoption of AR technology for EFL teaching, i.e., understanding how pre-service student teachers of EFL perceive and accept the use of AR in their teaching practices (e.g. Karacan, 2019; Okumus, 2021).

The findings revealed that certain studies attempted to uncover nonlinguistic or affective impacts of the AR-integrated EFL education process. Given that there is a close link between students' attitudes, perceptions and their success in L2, some research efforts have been directed toward identifying participants' attitudes, and perceptions toward AR applications. Also, motivation, which is believed to be an important and determining factor in L2 learning achievement (Gass et al., 2013), was also the focus of several studies. Besides, anxiety, which is among the important affective factors influencing success in a foreign language (Ansari, 2015), was also the topic of research as an affective variable. Taking into account the importance of these variables, some theses have been dedicated to determining how AR applications influence participants within the framework of the affective dimension. Additionally, some of the theses have concentrated on identifying the influences of AR applications on students' progress in the target language and aimed to contribute to the understanding of the effects of this innovative technology on EFL learning achievement. Furthermore, two studies aimed to investigate the factors related to the employment of AR technology for EFL teaching practices based on the viewpoints and

perceptions of pre-service EFL teachers, which is important for designing effective EFL teacher education programs that equip prospective teachers with the essential skills to integrate AR technology into their classes. The table below (Table 4) provides an overview of key research focuses in AR-based EFL instruction, organized by themes that highlight the main research objectives of the examined theses.

Table 4. Research Focus/Aim of the Studies

Theme	Description	Primary Research Focus/Aim
Participants' attitudes and perceptions	Gaining insights into participants' attitudes and perceptions toward the use of AR in EFL contexts.	To identify how AR-based EFL instruction process affects participants' attitudes and perceptions toward the use of AR in EFL settings (e.g. Cinar, 2017; Demir; 2022; Dogan, 2016; Karacan, 2019; Okumus, 2021; Parlar, 2022; Pozharina, 2019; Tandogan, 2019, Varli, 2022).
Affective influences of AR	Assessing the nonlinguistic/affective impacts of AR-integrated EFL education contexts.	To explore how AR technology affects participants' motivation (e.g. Demir; 2022; Pozharina, 2019; Tandogan, 2019) and anxiety levels (e.g. Sengur, 2023).
Effectiveness of AR on EFL achievement	Determining the impacts of using AR technology on learning outcomes.	To investigate the effects of AR technology-based education on participants' learning success/performance such as English vocabulary learning and retention (e.g. Demir, 2022; Dogan, 2016; Tandogan, 2019); listening skill achievement (Parlar, 2022), and general English achievement (e.g. Cinar, 2017; Bahadir, 2019; Varli, 2022).
Adoption of AR technology for EFL teaching	Understanding how pre-service student teachers of EFL perceive and accept the use of AR in teaching English.	To determine prospective teachers' perceptions about AR (e.g. Karacan, 2019; Okumus, 2021); to identify primary factors that influence prospective EFL student teachers' intentions to incorporate AR technology into their future teaching practices (Karacan, 2019) and to assess the level of acceptance prospective EFL teachers have for integrating AR into their teaching (Okumus, 2021).

Primary Findings of the Studies

The findings of the target theses were examined in line with the categories created based on their main purposes. The content analysis of the primary findings of the studies showed that AR-based instruction can have a positive role in the process of EFL learning and teaching in terms of various aspects. For example, the findings of a number of studies revealed that the attitudes and perceptions of the participants toward the use of AR technology in EFL education contexts were generally positive (e.g. Dogan, 2016; Karacan, 2019; Okumus, 2021; Parlar, 2022; Tandogan, 2019; Varli, 2022). In addition, in some studies, it was emphasized that students' use of AR in the learning process can make this process more enjoyable and engaging (e.g. Bahadir, 2019; Demir, 2022; Parlar, 2022; Pozharina, 2019). It is generally underlined that there is a positive and strong link between enjoyment of learning a foreign language and engagement with the target language (see Wang, 2022). As confirmed by the findings of the previously mentioned theses, the fact that AR makes the EFL learning environment fun and enjoyable indicates that AR may have a positive potential for enhancing the language learning process. Furthermore, as pointed out by numerous researchers, learner motivation is considered an essential element that contributes to L2 achievement (Dornyei, 1998; Gardner, 2007; Ng, & Ng, 2015). In relation to this, several

theses reported in their findings that integrating AR into the EFL learning process can increase learners' motivation levels (e.g. Dogan, 2016; Demir, 2022; Pozharina, 2019; Tandogan, 2019), and so this may indicate that AR can play a role in improving achievement. Similarly, self-efficacy, which is defined as a person's sense of their own ability to accomplish a particular task effectively (Mercer et al., 2012), is considered by many researchers as an important factor that has been associated with L2 achievement (see Kirmizi, 2015). In connection with this, one thesis (Pozharina, 2019) reported in its findings that the use of AR-based teaching materials had positive effects on increasing students' self-efficacy level. Moreover, one of the theses (Sengur, 2023) revealed that the use of AR can alleviate learners' speaking anxiety levels. Considering that high anxiety has a negative effect on the foreign language learning process (Khan, 2015), it is promising that AR has been found to be a supportive tool in reducing anxiety. Based on these findings, it is possible to say that AR can play a positive role in creating a learning environment free from stress and negative emotions.

When it comes to the achievement dimension, five of the theses investigating the impact of AR on students' EFL success showed that AR had a positive impact on students' vocabulary learning success (Dogan, 2016; Demir, 2022; Tandogan, 2019), listening skills (Parlar, 2022), and general English academic achievement (e.g. Cinar, 2017). However, two studies (Bahadir, 2019; Varli, 2022) found that AR-supported learning did not yield higher scores in the achievement tests. Bahadir (2019) emphasized that although AR is not very effective in increasing the general academic success of EFL learners, it enriches the learning and teaching processes. Similarly, Varli (2022) underscored that although the AR implementation did not result in significantly higher scores in achievement tests, using this technology contributed positively to learners in terms of being more autonomous and self-confident. In light of these results, it is possible to infer that even if AR does not directly contribute to academic language success, it can improve and enhance the efficiency and quality of the learning process. Along with these outcomes, another important finding was the results regarding the perceptions of prospective teachers about the employment of AR technology for EFL teaching purposes. For example, in the studies of Karacan (2019) and Okumus (2021), pre-service student-teachers of English who were found to have positive attitudes towards AR reported that, based on the benefits and advantages of AR, they would use it as an effective teaching instrument in their future classes. These studies also emphasized that the perceptions and attitudes of prospective teachers are very important determining factors in their future use of AR for EFL instruction. Considering the general results of all the studies, it is possible to deduce that incorporating AR technology into EFL contexts with proper planning can provide valuable support to both teaching and learning processes.

DISCUSSION AND CONCLUSION

This study examined postgraduate theses on the use of AR technology in EFL instruction in Turkiye. The results suggest that AR technology is a relatively new field that can have transformative potential in the context of EFL learning and teaching. Even if it does not have a direct effect on learners' language achievement in some cases, the findings indicate that AR, as an additional supportive tool, can enrich the learning process and support the continuation of this process in a more enjoyable and engaging way. These results corroborate the outcomes documented in prior research (e.g. Hasbi & Yunus, 2021; Selvarajoo & Hashim, 2022; Yang & Zhang, 2024). In addition, the common finding of many analyzed theses is that AR-based language learning applications create positive attitudes in learners towards the educational process. This finding also supports the results of previous studies conducted in diverse educational and country contexts (e.g. Ebadi & Ashrafabadi, 2022; Norouzifard et al., 2022; Redondo et al., 2020). From these results, it can be deduced that enriching the learning process with the latest technological developments such as AR may contribute to evoking positive emotions in students towards learning and to making them more integrated in the learning process. Moreover, as reported in some studies, it is important to pay attention to the views of pre-service teachers about the use of AR in EFL education to maximize its potential benefits.

When some methodological features of the theses are considered, a notable aspect of the results is that most of the theses used both qualitative and quantitative data collection instruments, which provided deeper insights into the integration of AR tools into EFL education. The adoption of mixed method design (i.e. combining quantitative measures and qualitative data) by most of the studies is important because it both allows for the cross-validation of the target data and helps to create a more cohesive understanding of the research area, which single-method studies cannot provide (Kelle, 2006). In line with this, most of the studies utilized mixed-methods design, which enabled the target topic to be addressed in a more comprehensive manner. In addition, another

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www.jret.org @Her hakkı saklıdır. Dergide yayınlanan yazıların; intihal, etik ve diğer tüm sorumluluğu yazara/yazarlara aittir.

topic of discussion is that although there were theses conducted in different educational contexts, the number of theses carried out in university settings was higher than in other levels of education. One possible explanation for this could be that the frequent and effective use of technological devices by university-level students in their daily lives may have made them ideal participants for a more detailed and comprehensive investigation of the effects of AR technology in EFL educational environments. However, this situation reveals that further studies are needed to investigate and clarify how AR-based EFL education affects students of different educational levels and ages. This would ensure that the findings are comprehensive and representative enough, and provide a deep understanding of the AR-based learning and teaching practices.

Another important topic of discussion is the scarcity of postgraduate theses on the use of AR in the EFL education environment. Although AR technology is innovative, it was determined that the number of theses on the use of AR in the field of EFL in Turkiye is unfortunately quite sparse. The reason for the small number of theses on this topic can be explained by both practical and pedagogical challenges in AR's application in classrooms. If researchers and educators are not sufficiently familiar with how to use AR or lack the technical expertise to implement AR-based interventions, conducting research in these contexts can become difficult and this may limit the number of studies on this subject. Also, accessing AR technology equipment can be expensive, which can be prohibitive for researchers in conducting research. Besides, AR content specifically designed for EFL instruction might be insufficient, deterring researchers from utilizing this technology. Finally, AR applications in language education are a relatively new field, which may have led to the production of fewer studies. If AR technology is made more available to researchers and educators, research and pedagogical efforts could multiply. In light of these assumptions, the number of future studies can be increased by considering such situations and compensating for them.

In conclusion, although this study provides valuable insights, it presents some suggestions for future research based on its limitations. Since only master's and doctoral theses conducted in Turkiye were included in the study, future studies can provide more information about AR-based applications and their trends and shifts in the field of EFL by examining articles published in various journals to obtain a more comprehensive perspective. Because the current research is limited to a very small number of studies in a single country, this limits the generalizability of the findings to other educational contexts. Based on this, further research should consider examining how findings from other countries align or contrast with those observed in Turkiye. Also, since the current study focused specifically on the primary aims and findings of the theses, future studies could be planned to include secondary and additional objectives and findings related to the target topic. Additionally, the present study focused only on English as a target foreign language; therefore, future research may explore the effects of using AR platforms on the learning and teaching of different foreign languages. Moreover, since the current study addresses the use of AR in general EFL education, it is recommended that future content analysis research focus on how AR-based approaches affect specific language areas and skills such as grammar, pronunciation, listening, and so on. Besides, further studies are advised to delve into the impacts of AR technology on the EFL learning process from the perspective of affective factors. Finally, given the scarcity of AR-related applications, there is a need for more studies focusing on how AR can be used more effectively and efficiently by teachers and students during their language learning and teaching journey.

Research and Publication Ethics
In this study, all the rules specified in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions specified under the second section of the Directive, "Actions Contrary to Scientific Research and Publication Ethics", have been carried out.

Disclosure Statements
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2. No potential conflict of interest was reported by the author.

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