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A Research into the Effect of Augmented Reality-Enhanced Storybook Reading on EFL Learners

Artırılmış Gerçeklik ile Geliştirilmiş Hikayelerin İngilizce Öğrenenler Üzerindeki Etkisi

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Öz: İçinde bulunduğumuz çağ beraberinde yeni teknolojileri de getirmekte ve artırılmış gerçeklik (AG) bu yenilikçi teknolojilerden biri olarak karşımıza çıkmaktadır. Son zamanlarda, AG'nin eğitim alanlarına entegrasyonuna yönelik artan bir ilgi vardır. Bugüne kadar, yabancı dil eğitimi alanındaki çalışmalar çoğunlukla AG'nin kelime öğretmek için kullanılmasına ve yine AG'nin çoğunlukla öğrenciler üzerindeki etkisine odaklanmışlardır. Ancak, AG destekli hikaye kitaplarının yükseköğrenim seviyesindeki öğrencilerin İngilizce okuduğunu anlama üzerindeki etkisi ve AG'nin önceden bulunmuş olumlu etkilerinin olası nedenleri hala kapsamlı bir şekilde araştırılmamıştır. Bu nedenle, bu çalışma AG destekli hikaye kitaplarının İngilizce öğrenenlerin öğrenme sürecindeki etkisini öğrencilerin öznel deneyimlerinden faydalanarak daha derinlemesine anlamak ve öğrencilerin İngilizce öğrenme ve okuduğunu anlama için AR teknolojisinin kullanımına ilişkin önerilerini almayı amaçlamış ve odak grup görüşmeleri aracılığı ile nitel olarak yürütülmüştür. Bulgular, AG destekli hikaye kitabının çoklu duyusal unsurlar yardımıyla öğrencilerin heyecanlarını artırarak merak duygusu uyandırdığı, öğrencileri hikayenin bir parçası haline getirerek hikaye ile etkileşime girmelerine olanak sağladığı, empatik düşünmeye, okumaya ve öğrenmeye daha hevesli olmalarına yardımcı olduğu, görsel ve öğretici dil kullanımı sayesinde okuduğunu anlamayı ve İngilizce öğrenmeyi geliştirdiğini göstermiştir.

Anahtar Kelimeler: Artırılmış gerçeklik, İngilizce öğretimi, Okuduğunu anlama, Yenilikçi teknoloji

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Abstract: The era that we live in now brings along new technologies and augmented reality (AR) is one of these innovative technologies. Recently, there has been an increasing interest in the integration of AR into educational areas. To date, in the field of language education, the studies focused on mostly the use of AR to teach vocabulary and the effect of AR on learners in a narrow range. However, the effect of AR-enhanced storybooks on tertiary level learners' English reading comprehension and possible reasons for the before-founded positive effects of AR have still not been comprehensively investigated. Hence, the present study carried out a qualitative study with focus group interviews to get a deeper understanding of the effect of AR-supported storybooks on the learning process of English language learners with the help of their subjective experiences and to obtain students' suggestions regarding the use of AR technology for English learning and reading comprehension. The findings demonstrated that the AR-enhanced storybook increased reading comprehension and English learning, thanks to its use of visual and didactic language, arousing a feeling of wonder, interacting with the story by making the learners a part of the story, appealing to their interest, and increasing their excitement with the help of multisensory elements, and leading them to emphatic thinking and be more enthusiastic to read and learn.

Keywords: Augmented realiy, Reading comprehension, English language teaching, Innovative technology

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1. INTRODUCTION

One of the major features of the modern era is digitalization, which has broad implications in a variety of fields, including education. Technology has already been used in education since the 1920s; it is not a recent development (Cuban, 1986, p.1). Within the following years, it has undergone lots of changes and development, and its use varied. Hence, because of digitalization, a great number of technologies have entered educational areas for several decades. One of the newest technologies in the educational area is augmented reality (AR), which is defined as the combination of virtual 3D elements with real-world elements (Azuma, 1997). AR offers numerous pros to the realm of education; it is clearly understood from the definition, as it connects the real-life environment with virtual elements by posing a great opportunity for learners to construct their knowledge on a concrete base (Liberatore & Wagner, 2021; Dargan, Bansal, Kumar, Mittal, & Kumar, 2022).

The use of AR in language education has its foundation in some theories such as Sociocultural Theory (Lantolf & Thorne, 2006, p. 59), which shows the importance of learner interactions with the environment in order to learn something new. According to Vygotsky (1978), collaboration and scaffolding are the elements of successful learning, and AR has a great feature to enable learners to collaborate with each other and their surroundings, and it is useful in terms of scaffolding (Chen, 2020), as it supports various aspects of the learning process such as allowing contextual learning, providing immersive language experience. Constructivism (Bruner, 1996; Dewey, 1916; Piaget, 1973) is another key approach in the field of AR use in language education. According to constructivism, learners construct their knowledge with the help of their own experiences in their learning processes. Here, the key term is related to the learning process which includes the meaningful learning settings, as the learners can create their knowledge in such kinds of meaningful situations with active engagement. Wang et al. (2018) claim that AR-supported learning is a part of constructivism since AR is aligned with situated and constructivist learning theory (Dunleavy & Dede, 2014), it means learners can control their own learning with active interactions with both virtual and real environments. Other aspects of the constructivist approach such as discovery-based, situation-based, problem-based learning theories influenced the AR learning process, as well.

Connectivism is another approach that influenced AR learning, as the learners can connect their beliefs, experiences, etc. with both virtual and real environments enabled by AR (Greenwood & Wang, 2018). As connectivisim claims that learning occurs through connections and experiences within networks, AR can be regarded as a networked learning environment where learners engage with digital content, collaborate with peers, and interact with the language in various contexts (Zhang, Wang, & Wu, 2020). By giving students the resources, they need to interact, work together, and adjust to the continually evolving context of language learning in a digitally connected world, augmented reality technologies are consistent with connectivist ideals.

Within several years, the use of technology and especially innovative technology integration in language learning has increased enormously, and the effects of these kinds of technologies on language learning are continuously being reported by different research studies. Particularly, it has been claimed that the benefits of using AR in language education are several. First, it offers accessible learning materials with no special equipment. AR enables the understanding of abstract concepts in authentic, contextual, and situational learning environments. It also offers a collaborative and social learning environment by engaging attention, enhancing motivation, and making the learners enjoy the learning process more. It helps to develop the critical thinking and problem-solving skills of the learners and fosters self-efficacy beliefs. Lastly, it may universally be applied to any level (Blazauskas & Gudoniene, 2020).

2. LITERATURE REVIEW

To date, some research has been conducted to identify the effects of AR in language education in terms of several aspects. Some of the research interests connected with AR in language education are motivation, engagement, and attitudes. Redondo et al (2019) conducted an experimental study to identify the effect of AR in early childhood on English language learning, motivation, and socio-affective relations of learners. As a result of the experimental process, there was a significant improvement in motivation, learning, and socio-affective relationship in favor of the AR group. Taşkıran (2019) carried out a study to investigate the effect of AR games on university-level learners' English language learning motivation. She used a questionnaire to collect data and analysis showed that the students accepted the AR activities, they enjoyed the process, and were motivated during the process. Another study was carried out by Lee (2020), investigating the difference between an AR mobile game and a printed game in terms of their effects on student engagement and attitudes toward English language learning. 42 undergraduates participated in the study and the results showed that both groups had a similar level of engagement and positive attitudes; however, the print-game mode was more useful in students' opinions. The students reported that the print game was more useful for them to learn English.

On the other hand, there are few studies on the effect of AR on learners' reading comprehension. One of the very first studies on the related topic was carried out by Vate-U-Lan (2012). He developed a material which was a 3D reading book enhanced with the AR technology and the material was administered to 99 third graders in Thai, and the results showed that AR-enhanced 3D book contributed to the learners' learning process. Another study by Alsowat (2016) investigated the effect of AR on 59 tertiary level English learners' reading comprehension, self-efficacy, autonomy, and attitudes. The quasi-experimental study design, a reading comprehension test, a self-efficacy scale, an autonomy scale, and a questionnaire for attitudes were used in order to collect data and the data analysis showed a significant difference in terms of reading comprehension, self-efficacy, autonomy, and attitudes in favor of AR group. Bursalı & Yılmaz (2019), as well, investigated the effect of AR-enhanced reading texts on reading comprehension and learning continuity of 5th grade students and their attitudes towards AR materials. The experimental research was carried out with 89 fifth grade students in total, and the results showed that the AR group outperformed in terms of reading comprehension and learning continuity, and they were satisfied, desired, and less anxious to learn English with the help of AR. Another study was conducted by Kuru Gönen and Zeybek (2021), and they investigated the use of QR-code enhanced reading texts for comprehension of culture-specific terms of university-level learners. The results showed a positive effect in terms of comprehension. One of the most recent ones was the study by Yulian, Ruhama and Sucipto (2022) to investigate the effect of a developed AR application for reading comprehension in terms of critical thinking for critical reading activities, and that showed positive results in favor of the groups exposed to AR application. Another recent study was conducted by Ebadi and Ashrafabadi to expolore the impact of AR on EFL learners' reading comprehension applying a mixed-method study design, and it was found that the children who used the AR program had increased text reading comprehension, and they enjoyed using AR preffering it to traditional reading methods.

Recently, there has been a growing number of publications focusing on AR use in foreign language education, as it was seen above, confirming that AR-enhanced materials increase the level of motivation, and engagement of learners during the learning process. Most of the present research focused on vocabulary learning and teaching, a few of them focused on reading comprehension, and the common results of these studies were the positive effects of AR on learners' engagement, motivation, achievement, and enjoyment. On the other hand, possible reasons behind the positive effect of AR use in English language learning and reading comprehension have still not been comprehensively investigated. This study set out to get a deeper understanding of the learning process of tertiary level English language learners with an AR-enhanced storybook for reading comprehension, and to get learners' suggestions concerning the use of AR technology for their English language learning and reading comprehension. The main contribution of the present study would be to fill the gap in the existing literature by focusing on the

experiences of language learners and the possible reasons of effects of AR-enhanced texts on reading comprehension, especially in tertiary level context from a qualitative point of view. A deeper understanding of the topic would be beneficial for language teachers, curriculum designers, and language learners in the process of language learning and teaching since it can be developed better and more efficient materials for language learning in the tertiary level.

The study sought to answer the following specific research questions:

1. How would tertiary level learners describe their learning process while interacting with AR-enhanced stories?
2. What are the subjective experiences and perceptions of tertiary level English learners regarding the impact of AR-enhanced storybook on their reading comprehension?
3. What are the suggestions of tertiary-level learners for the use of an AR-enhanced storybook to learn English?

3. METHODOLOGY

3.1. Research design

The present study has been carried out by applying a qualitative study, including the data collecting via recorded interviews, field notes, observation lists, and images, since it is the best design to meet the needs of the present study, as it focuses on the important views and descriptions of the learners about a learning process (Dörnyei, 2007, p.37) with the help of recorded interviews and observation checklist. As a qualitative study type, the present study conducted a phenomenology research design, as it focused on the understanding of a phenomenon (Cresswell, 2013). In the present study, for the first research question, descriptive phenomenology was preferred as it was focused on obtaining a detailed and systematic description of the learners' experiences with AR-enhanced stories. For the other two research questions, interpretive phenomenology was preferred as it was aimed to explore not only the impacy of AR-enhanced storybooks on reading comprehension, but also the subjective perceptions of learners, in addition to focusing on learners' suggestions, which involve their interpretations and meaning related to using AR-enhanced storybooks for language learning. According to the results of most experimental or quantitative studies, AR has lots of positive effects on language learners; however, with the help of the qualitative phenomenology research design, the possible underlying reasons will be illuminated. The collected and recorded data will be analyzed by a content analysis, which means analyzing the data to determine the presence of certain words, themes, or concepts (Cohen et al., 2007).

3.2. Participants and Research Context

The research setting consists of 185 students enrolled in a preparatory school of a state university in Turkey. All the students were distributed randomly into four groups, and the number of students who goes on the education is about 150 in total. The institution carries out a hybrid education system (the students have a chance to attend either online or face-to-face), so approximately 40 students out of 150 attend the lectures face-to-face. For the present study, they were explained the research aim and the process and asked whether they would like to participate, so 11 volunteer students were selected into two specifically formed groups by providing a purposeful sampling to take part of the study. The reason behind this is that the study is a qualitative one, and this kind of study deals with smaller participants as they are labor-intensive (Dörneyi, 2007, p.38). As in the nature of the study, there is a need to get more and more information and feedback from the students; the ones whose level of English is higher, and the ones who are more interested and willing to learn, based on their will to take part in the study, are included in this study, on a volunteer base, in order to get better information.

The students were divided into two according to their groups for focus group interviews, and the number of the students was 6 (3 female, 3 male) for the first group, and 5 (3 male, 2 female) for the second group. The age range of the students was 19-24. Their English language level was B1(CEFR) based on their language proficiency test.

3.3. Data collection tools

To get a deeper understanding and detailed views on the AR-enhanced storybook, a focus group interview with nine semi-structured questions is administered while taking observation checklist, consisting of seven questions, notes by the researcher during the learning process of learners. It is believed in this study that conducting focus group interviews would reveal better data as it encourages learners to talk freely about their own learning processes in a group which is interactive (Ho, 2006), and learners can inspire and challenge themselves in addition to reacting to the emerging points (Dörnyei, 2007, p.144).

The semi-structured interview questions were created by reviewing the literature under the supervision a professor in the field. The aim of these questions was to explore the participants' perceptions, experiences, and opinions about the use of AR in the context of reading and language learning. The questions were distributed as follows; two questions aimed to capture participants' overall experiences and assess the perceived utility of the AR-enhanced storybook; one question aimed to reflect on the distinctions between traditional paper-based reading and the AR-enhanced experience; one question aimed to reflect participants emotional aspects of the experience; two questions were focused on participants' perceptions of the impact of AR on their learning and comprehension; two questions aimed to uncover any challenges or issues participants encountered during the AR-enhanced reading. In total, the aim was to gather rich qualitative data than can inform the development and enhancement of AR applications for educational purposes, particularly in the context of language learning and reading.

3.4. Material

As an AR-enhanced storybook 'Wonderscope' application designed by Within Unlimited, Inc. was used. 'Wonderscope' is an application, only used on iOS devices, designed especially to enhance reading skills of kids. It includes several AR-enhanced stories, and for this study, one of these stories was used, titled 'Clio's Cosmic Quest' as it is only the one that is free for every user. The topic of the AR-enhanced story was about tiny stardust wishing to be a bright big star to illuminate the whole universe one day.

The AR story was transcribed by the researcher to make a paper copy of it, in order to distribute it to the participants before the AR reading. The story was almost three sheets of paper long, had 1115 words and its level of language was B1 according to the CEFR, which was analyzed through a text analyzer.

3.5. Data collection and analysis

As a first step of the data collection process, the ethics committee approval was obtained from the university in which the study was conducted. Then, the actual data collection process was conducted in a clear order. The present study was carried out in three phases (Figure 1).

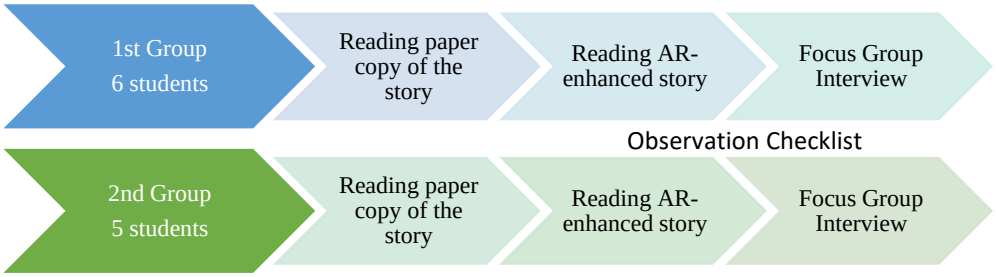
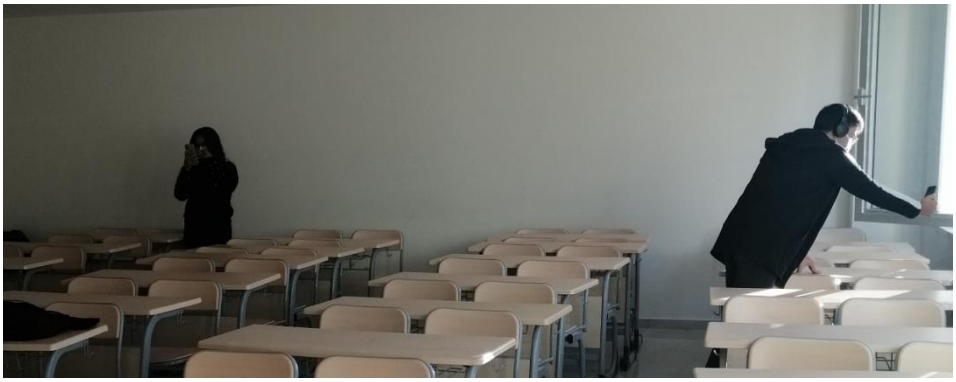


Figure 1. *Data collection process of the study*

Two groups of students participated in this study; however, they were exposed to the same process. This was done for focus groups. The grouping of the learners for focus groups and data analysis procedure were

influenced by Green and Hart (1999) as they grouped the learners into 5-6 in a group and recorded and transcribed data later.

In the first phase, the participants are handed out a paper copy of the story and asked to read it. After completing the first reading, so as to get detailed answers about the material, the learners are exposed to a small intervention, since it is believed if the learners use the material, they can explain their ideas better. In this stage, learners who do not have a smart iOS device are supplied with a device by the researcher, and the others who have it asked to download the related application on their smart iOS devices. When all the students are ready to use the material, they are asked to read the story on the application. All the students are distributed to different parts of a class, but they are all within sight of the researcher (Picture 1).



Picture 1. *Learners' reading AR-enhanced storybook*

During this stage, the researcher used an observation checklist to observe learners' exclamations, feelings, motivation, and expressions during the learning process. It was believed that using an observation technique would yield better data, as it was related to direct information coming from the learners instead of their own ideas (Dörneyi, 2007, p.178), and the results of observation would be beneficial in terms of crosschecking the learners' shared ideas on focus group interviews.

At the end of reading the story on AR application, the students were exposed to a focus group interview, which lasted almost 30 minutes. The focus group interviews were in Turkish language as it was significant that participants could understand and discuss the topic better in detail. During the focus group interviews, the researcher was the moderator of the interview, and she started the interview with an introductory part, explaining the research topic briefly, introducing AR, and explaining the reason for recording their voices, and getting their volunteer signatures to participate in the study. The researcher started to ask semi-structured interview questions prepared beforehand; however, based on the obtained answers, some more questions were added and asked about the topic.

All the focus group interviews were recorded and then transcribed in the Turkish language by the researcher; however, the selected quotations were translated into English language and back-translated into Turkish by another English language teaching expert. The selected quotations were demonstrated with the letters alphabetically (A, B, C, etc.) in the tables without giving their names. The transcription and data analysis process were administered with the help of MAXQDA, which is a qualitative data analysis software. The content analysis was done following a deductive approach based on the frequency of occurrence of codes, and themes and subthemes were generated by means of these codes. After coding and generating themes and subthemes of the transcriptions, for inter-rater agreement, content analysis tables were sent to two English language teaching experts. As the interrater reliability, which is the extent of agreement among data interpreters, is highly important for the thrustworthiness and trasnferability of the results of the study, the Cohen's Kappa value was calculated. As a result of the calculation of two raters'

agreement values, the Cohen's Kappa value was found 0.80, which shows the almost perfect agreement (McHugh, 2012).

3.6. Ethical considerations

In this study, all the rules stated to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions specified under the title of "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, were not carried out.

Ethics committee permission information:

Name of the committee: Tarsus University, Scientific Research and Research Ethics Committee

Date of ethical review decision: 17/12/2021

Ethics assessment document issue number: 2021/38

3.7. Themes and subthemes

The determination of main and sub-themes of the data involved a comprehensive approach that combined deductive reasoning, guided by the overarching research questions, and inductive analysis derived from open coding. The main themes were established deductively, moving from the general to the specific, as recommended by Burns and Grove (2005). It was used a deductive method to answer the first research question by utilizing the information in the Center for Development and Learning (CDL) report. The CDL report provided a thorough explanation of learners' learning processes in the particular environment under study, acting as a basic framework. It was added an inductive component to the deductive technique to further improve the specifically and depth of the study. It was methodologically gone over the data using open code to find new concepts that were not specifically addressed in the CDL report.

The first main theme, which is related to the first research question, is 'description of the learning process', and themes under this main theme are explained one by one here. (1) Motivation: One of the key aspects of learning is the motivation, as the higher motivation the better learning is (Gardner & Lambert, 1972). (2) Attention: Attention is one of the key elements of the learning process since it plays a significant role in learners' learning. If a student is not interested in or excited about something during learning, the learning may not be effective (Thorne & Thomas, 2008). Under this theme, the words in reference to attention such as interest, excitement, appeal, and interaction were identified. (3) Memory: Retaining the information is another key aspect of the learning process, and the things about the memory systems and items are significant. Under this theme, 'permanent learning' sub-theme was used, which included keywords about memory items such as visuals, etc. (4) Language: Language, here, mentions the items used in the material during giving and receiving information (Thomas & Thorne, 2008). The sub-themes were 'visual language', which is the visual language perceived by the learners, and 'didactic language', which is related to the informative and enabling learning language in the material. (5) Organization: It is related to the organization of the material in addition to its ease of use. The sub-themes were 'inclusiveness', which is related to the materials' feature as it includes the learners in the story itself, 'effective learning', and 'easy learning'. (6) Emotions: As Krashen (1988) claims the feeling of the learners plays a significant role in learners' learning process, this theme is related to the feelings of the learners during their learning process. The sub-themes were 'emphatic thinking' and 'enthusiasm for learning'. (7) Minor Problems: These are the comments about the challenges faced by the learners during the AR-enhanced reading process.

The second main theme was the 'effects on reading comprehension' and here there were two themes, 'clarification', which is related to the comments about clarifying the comprehension, and 'retention', which is related to retaining the necessary information of the story.

The third main theme was the 'suggestions', and the themes were about the development of material and the use of material.

4. FINDINGS & DISCUSSION

As was claimed by Jamrus and Razali (2019) that AR technology augments the input with the help of interaction, immersion, and practicality, so it enables learners to be more engaged in the learning environment, leading to positive effects on learners. Based on this claim, the present study tries to shed more light on the effects of an AR-enhanced storybook on tertiary level learners' learning process and reading comprehension, as well as getting their suggestions for the use of AR-enhanced materials to learn English. Hence, in this section, the content analysis tables were demonstrated under each subheading related to the research questions, and all three research questions will be dealt with one by one.

4.1. How would tertiary level learners describe their learning process while interacting with AR-enhanced stories?

The first research question focuses on the learners' own description of their learning process while reading an AR-enhanced story. All the themes and subthemes with learners' comments were demonstrated in Table 1. The main theme 'description of the learning process' were coded under seven themes based on the learning process items reported by Thomas and Thorne (2008) in the Center for Development and Learning. Based on their reported items, the first theme was motivation. Even if there is no consensus about the definition of motivation among scholars (Dörnyei, Csizer, & Nemeth, 2006, p.9), Dörnyei (2001) reports that motivation is about the individuals' choice of action, intention, and effort to perform that action. The founder of the term 'motivation' is regarded as Robert Gardner, and he claimed different dimensions of motivation in learning. Two of the most significant dimensions of motivation were the integrative and instrumental dimensions of learning. If the learners are motivated by an instrumental reason, such as gaining a reward at the end of a task, it is defined as instrumental motivation (Gardner, 1985). On the other hand, if the learners are motivated to learn something for themselves and for their self-learning, it is defined as integrative motivation (Gardner & Lambert, 1972). Keeping this information in mind, when the findings of the present study were considered, it was seen that the AR-enhanced reading improved learners' integrative motivation. All the learners reported several times that AR reading made them more and more motivated to read and learn. One of the learners claimed as:

"B: Reading was so enjoyable for me that I can read and play it anytime."

As it was clear from this comment done by the learner, the use of an AR-enhanced storybook was an enjoyable process making them motivated to read. Jamrus & Razali (2019) report that reading is a boring activity for learners, but with the help of AR, learners' motivation toward reading can increase. Additionally, Küçük, Yılmaz, and Göktaş (2014) posit that learners' motivation can be increased more while learning something by means of AR applications rather than traditional methods.

So far, the finding is in line with the previous studies carried out by Vate-U-Lan (2012), Redondo et al (2019), and Taşkıran (2019) in terms of AR effect on learners' motivation. The advantage of having more motivated learners is that the teachers may apply many more ways to carry out reading lessons with the help of AR (Jamrus & Razali, 2019). However, the main aim of the present study was to get a deeper understanding of the reasons for the positive effects of AR on learners' learning process, including their motivation. The second theme was focused on 'attention'. The dimensions influencing the attention of learners were coded under this theme. According to the learners, their 'interest' was raised with the help of an AR storybook, since reading an AR storybook was a different experience for them so it was an interesting process for them. On the other hand, the process had some dimensions making them excited about the reading. Two of the learners commented about the process by supporting each other:

"E: Following all the steps was so exciting."

"H: I felt so excited about what to happen at the end."

As it can be inferred from these comments, the AR-enhanced storybook had some steps to be followed by the learners and completing the steps one by one got the learners' attention by making them excited about the story and made them wonder about the end of the story. Some of the learners also reported several times that the AR storybook was appealing and made them wonder. Mahadzir and Phung (2013) reported in their study that AR had positive effects on learners' learning and retention process as it increased their excitement of learners.

The most important sub-theme of the attention process was 'interaction'. According to the learners, the AR storybook was an interactive book, so they had a great interaction with the book and the character getting their attention. While learning a language, interaction plays a significant role. One of the learners claimed that:

"H: Actually, I just moved around the place in the story, the main character looked into my eyes, we had chat, and we were in total interaction."

Based on the comments done by the learners, it might be said that AR storybooks have a unique feature of making learners interact with the story and getting their attention. Silva, Roberto, and Tecihrieb (2015) reported that the integration of AR into the lessons increases the enthusiasm, willingness, and excitement of the learners while decreasing anxiety.

The other learning process item focused on in the present study is the memory, which is the effect of AR on their retention. Learners reported that the AR storybook has a good impact on their retention leading to permanent learning. In the view of learners, the combination of elements in the story, such as visuals, audio, animations, etc, affected their learning process in terms of retention. In this context, Garnder's (1983) Multiple Intelligence Theory comes to the stage, as the AR storybook appeals to various senses of learners at the same time. Multiple Intelligence Theory posits that all individuals have different bits of intelligence, for instance, visual-spatial, linguistic-verbal, bodily-kinesthetic, etc. With the help of an AR storybook, different learners can focus on different elements of the learning process, for example, a visual-spatial learner can learn with the help of images and animations in the AR storybook, or bodily-kinesthetic learners can learn with the help of body movements (as they must move during the story and to click on the screen to progress) that they need to perform during the reading. The result is in line with the studies reported by Billinghurst and Dünser (2012), and Bursali and Yilmaz (2019) in favor of AR effects on retention, by supporting the claims of Jamrus and Razali (2019) in terms of the positive effects of AR on learners' long-term memory.

During the language learning process, another important item is the use of language, which is the mean of giving and receiving information in a material. Under this theme, two different aspects of language have been coded; visualization, which is the visual language of items, and didactic language. Learners in the study mostly reported that visual language was one of the most important elements of the AR storybook. Two of the learners claimed by supporting each other that:

"C: At first, when I read, I understood something different, but later I got the point after reading it on AR."

"H: I saw everything by myself with some visuals and I understood better."

When learner C's sentence is considered with the combination of learner H, it may be claimed that the learners benefited from the visual language in the story by enhancing their understanding. Jamrus and Razali (2019) reported that the visual language elements, such as texts, graphics, animations, etc, could be annotated with real objects by enabling learners to visualize information in order to understand it better. Additionally, they reported that AR had the feature of combining real information with augmented visual data which leads learners to an interactive and entertaining learning process.

In addition to visual language, having a didactic language feature in an AR-enhanced storybook influenced the learners' learning process. When they were asked to tell three words about the AR storybook reading

process, almost all of them reported that it was a didactic process, since they read a story, learned new information, as well as learned new vocabulary with the help of the AR storybook.

When it comes to the organization of the learning process, the most important subtheme was the inclusiveness of the AR-enhanced storybook. One of the most significant findings of the present study is connected to this feature of the AR storybook, as all the learners reported that they felt a character in the story while reading it. A learner compared AR-enhanced storybook reading with a paper-based storybook reading with these words:

"I: While reading something, we are just someone who reads it from outside; however, in this story I was in the story as a story character, and I lived it."

Another learner reported that:

"C: I was in the story, and it was the best thing."

When the comments done by the learners are analyzed, it may be claimed that the more learners are included in the story, the better they learn. In the nature of AR-enhanced storybooks, learners got interaction with the characters, directed the story, and they became a character in the story, which made them more motivated, more activated, and more intended to learn.

With the help of this inclusiveness feature, the learning process turned into an effective learning process by means of other elements such as visuals. Fabregat, Baldiris, and Munoz (2017) reported that there were some cases getting learners' attention and offering them an effective learning environment, and visualization, interaction, and inclusiveness features of AR are some of these cases, as it was proved by the learners:

"G: There was something making me wonder and listen carefully and thing about what is going to happen… I was in the story, and it was the best thing…"

"B: …, we could see even the words that we don't know how to pronounce, but it just pronounced it, so we learned it. It was so effective for me… There was a combination of visuals and audio, so it helped me keep in mind better."

Additionally, the learners reported no difficult part of the AR-enhanced storybook reading process.

In terms of emotions, the AR-enhanced storybook reading has a unique feature of leading emphatic thinking. Empathy is defined by Rogers (1975) as to feel as if you were in someone's situation, to feeling in pain or pleased as if you were in that situation. Learners in the present study reported that they became happy with the character of the story when the character felt happy. On the other hand, they also thought that the character was real, and the situation was reciprocal. One of the learners reported that:

"J: I felt that I had an imaginary friend, whenever I ask, need help, feel unhappy, I thought he would help me."

It showed that the learners felt a part of the story, as was claimed before in the inclusiveness part. Additionally, these features led them to be more intended to learn by increasing their enthusiasm for learning.

"K: Learning something just like this is a great thing, and I can learn more things with the help of these kind of apps. I just felt motivated to learn."

When all the items were considered as a whole, it might be claimed that AR-enhanced materials got learners' attention and increased their motivation as they offered a novel, effective, interactive, and inclusive learning environment to learn English, and the reason behind these positive aspects might be the transition from traditional learning into an innovative way of the learning environment (Jamrus & Razali, 2019).

About the problems related to the AR storybook, only some minor problems were reported by the learners, which were related to the app, including the problems of finding a clear place to set the app, microphone, sound, etc. A similar finding was reported by Bacca et al. (2014) as the application's not working properly, having difficulty in accessing the augmented information, etc.

All of the findings from focus group interviews were in line with the observation notes taken by the researcher during the process, as the learners showed increased motivation, excitement, smiling, and amazed faces while reading the AR-enhanced storybook.

Table 1.

Description of Learning Process with Learners' Comments

Main Theme	Theme	Sub-theme	Comments
Description of Learning Process	Motivation		A: I think it helped us to be more motivated to read. F: We became more motivated as it was so enjoyable. B: Reading was so enjoyable for me that I can read and play it anytime.
	Attention	Interest Excitement Appeal Interaction	D: It was a totally different process for me, because the thing that I think at first and the thing that I've experiences later was totally different. E: It was an interesting process for me.
			E: Following all the steps was so exciting. H: I felt so excited about what to happen at the end.
			D: The app was so appealing and got my attention. G: There was something making me wonder and listen carefully and think about what is going to happen.
			D: We had a conversation with Clio and the others. F: We were in interaction with the characters. H: Actually, I just moved around the place in the story, the main character looked into my eyes, we had chat and we were in total interaction. C: The character was always in interaction with me by talking to me.
	Memory	Permanent Learning	B: There was a combination of visuals and audio, so it helped me keep in mind better. E: I like watching something and watching helps me remind better. And with this app, I watched, and I learned better.
	Language	Visual Language Didactic Language	H: I saw everything by myself with some visuals and I understood better. C: There were lots of animations and pictures. B: All the things in the story visualized in front of me with the help of pictures and animations. C: At first, when I read, I understood something different, but later I got the point after reading it on AR. J: When I see the real Nebula while reading it, and living in it, I totally understood what it is. D: The things shaped in my mind came into the existence after reading AR story. F: One of the best parts of the process is about the visuals because everything that I imagine was real in front of me.
			A, C, D, F, G, H: It was a didactic process for us. We saw lots of things at the same time.
	Organization	Inclusiveness Effective Learning Easy Learning	F: I was in the story so much that I was even going to jump out of window. C, E, H: I was one of the characters of the story. B, D, G: I was in the story, and it was the best thing. K: We were included in the story, and we added something from ourselves. I: While reading something, we are just someone who reads it from outside; however, in this story I was in the story as a story character, and I lived it. K: When we don't give any respond, the story doesn't move on. D: Because it both included us in the story, and we directed the story. A: Being a character of the story made me feel well about reading it as soon as possible.
			B: Teacher, we could see even the words that we don't know how to pronounce, but it just pronounced it, so we learned it. It was so effective for me. J: I am a visual learner. Before reading AR story, I tried to understand the story on paper, but after seeing the plot on AR, it was totally effective for me.
			A, B: I, J: It was an easy process. We don't face with any problems.
	Emotions	Emphatic Thinking Enthusiasm for Learning	A: We became happy with Clio, and we felt happy when he was happy. I: We wanted to support his dream as if it was real. J: I felt that I had an imaginary friend, whenever I ask, need help, feel unhappy, I thought he would help me. H: When the character was sad, I also felt sad for him.
			F: It was enjoyable in terms of various aspects, so I just wanted to learn more and more.
	Minor Problems		E: There was a problem while finding a place to set the app. A: I had some difficulties with my microphone and sounds. B: I don't know what the problem is, but my app just didn't response for a while once.

4.2. What are the subjective experiences and perceptions of tertiary level English learners regarding the impact of AR-enhanced storybook on their reading comprehension?

It is known that AR technology used for reading skills leads to having more positive attitudes of learners toward English reading and more achievement in reading (Bacca et al, 2014). Hence, the second research question focused on the effects of AR-enhanced storybooks on learners' reading comprehension, and the findings were analyzed under two themes: comprehension and retention.

In terms of clarification, learners reported that they understood the concepts better when they read the story in an AR-enhanced storybook. One of them claimed that:

"H: While reading on print, I didn't understand the story, but after reading AR story, I understood all the details and the plot of the story better."

When they were asked to summarize the story after AR-enhanced storybook reading, they did it well with no mistakes. They all got the idea of the transformation of a star into a solar system. Here, another important item was embodied learning, which is the combination of cognition in the brain and bodily movements. Skulmowski and Rey (2018) reported in their study that there are several interventions enabling learners to get learning items easier and appealing to their multisensory processing, and some of these interventions are gestures, physical and virtual elements, etc. With the help of an AR-enhanced storybook, learners had an opportunity to reach multisensory representations of elements leading them to grasp the idea of reading texts. One of the learners supported this claim with his words:

"C: I didn't understand at first, it was unclear for me. However, with the help of visuals, audios, animations on AR app, I understood the story well."

About the effects of AR-enhanced storybooks on learners' retention connected to reading comprehension, learners agreed that they would remember the plot of the story in a long term.

"I: If I had read the story only on paper, I would have remembered only a few small parts, but now with the help of AR, I could remember all details."

The possible reason behind this effect, again, is related to the features mentioned above, such as visual language, enhancing motivation and enthusiasm for learning, interaction, and mostly inclusiveness feature of AR-enhanced storybook. Besides, multisensory learning might be another influencing factor in the retention of learners, as with the focus on more than one sense, learners can learn and retain better (Shamz & Seitz, 2008).

Table 2.

Effects of AR-enhanced Storybook on Reading Comprehension and Learners' Comments

Main Theme	Theme	Sub-theme	Comments
Effects on Reading Comprehension	Clarification	Enhanced learning	A, B, D, F: I understood the concepts better. C, J: The story was clearer when I read it on AR. H: While reading on print, I didn't understand the story, but after reading AR story, I understood all the details and the plot of the story better.
		Embodied Learning	B: Everything turned into something different after AR app, because we saw the visuals, we heard the voices, and we interacted with the characters. C: I didn't understand at first, it was unclear for me. However, with the help of visuals, audios, animations on AR app, I understood the story well. H: After interacting with AR app, I got the point of story because everything was in front of my eyes.
	Retention		I: If I had read the story only on paper, I would have remembered only a few small parts, but now with the help of AR, I could remember almost all details. A: This was like a memory for me, and I believe remembering memories is easier. B: When you are just in the story, both you learn and remember better.

4.3. What are the suggestions of tertiary level learners for the use of AR-enhanced storybook to learn English?

Jamrus and Razali (2019) reported that the students who were exposed to AR application to learn English reading skills were more willing to apply and use AR technology in their future English language learning process. Therefore, the third research question was about learners' suggestions for the use of AR-enhanced storybooks to learn English. In the context of the development of applications, they offered some useful things, and all their comments about the suggestions were demonstrated in Table 3. For instance, one of the learners offered that the AR storybook might be used to teach English to young children. Another one reported that the use of AR technology might be fruitful for them to practice English, as sometimes they do not have anyone to practice with. Hence, a character created by AR technology maybe a friend for them to practice speaking.

Table 3

Suggestions Done by the Learners for the Use of AR-enhanced Storybook to Learn English

Main Theme	Theme	Comments
Suggestions	Development of application	A: There should be captions to help us learn more vocabulary. G: I wish we could make the decisions. I mean, there would be two options and we could choose one of them to go on. C: When we don't understand something, they may tell it us again. H: The following of the words might be stricter. J: We could speak more, and the application could follow us in a better way.
	The perceived use of application	B: The app might be used in the language learning process of young children. It includes animations and gets students attention. They can hear how a word pronounces, in instance. I think they can learn better because they will both see and hear the story and be included in it. C: We can use this app and read this kind of story when we are alone to practice English. For example, when I am alone at home, I can practice my English with this app. We can have a chat, and when we feel bored, the app may be an imaginary friend for us. D: It might be good for us to use this kind of application while learning new words, for example, while learning fruits and vegetables, we can move around in a store. K: Lots of visuals and animations combined with our inclusiveness in a story will lead us to a better learning, so we can read more and more story with this AR technology.

5. CONCLUSION

Considering language education in today's conditions, it might be concluded that the integration of innovative technologies into language learning processes should be increased. Technology is such a lively thing that it develops and changes day by day, launching new and appealing versions. One of the newest innovative technologies is the augmented reality technology and its use and integration into various fields have become conspicuous. Recently, several research studies on the use of AR technology to teach English have been carried out; however, they mostly have focused on vocabulary teaching and learning, and mostly on young learners. Only limited studies have been carried out to improve the English reading comprehension of tertiary-level learners. On the other hand, the previous studies confirmed the positive effects of AR technology on learners' language learning process; nevertheless, these studies had the lack background information about the possible reasons for these positive effects of AR technology.

On the grounds of these gaps, the present study set out to find potential reasons for the positive effects of AR-enhanced storybooks on tertiary level learners' English reading comprehension, and to get their suggestions about the use of AR technology for their English language learning and reading comprehension. By carrying out a qualitative, phenomenology study with 11 tertiary level English

learners by means of focus group interviews, the study demonstrated that AR-enhanced storybooks increased learners' motivation by getting their attention with the help of visual and didactic language, appealing to them with a feeling of wonder and interaction with the characters of the story. Additionally, learners reported that they would retain the story more because of the combination of visuals, animations, and other elements, as it is in line with multisensory learning. One of the most important features of an AR-enhanced storybook, in learners' opinions, was the inclusiveness feature of the story, as they became a character in the story, making them motivated and enthusiastic to learn, arousing their emphatic thinking, and making their learning effective and permanent.

On the other hand, the tertiary level learners believed that the use of AR technology enhanced their reading comprehension by clarifying the concepts with the help of an enhanced and embodied learning process. Regarding the retention of story items, they also believed that AR-enhanced story reading would be beneficial for them to remember the plot of the story in longer terms.

Besides, concerning the suggestions for the use of AR-enhanced storybooks to learn English, they believed that the elements of the story, such as visuals, animations, and reading aloud would be beneficial for them to learn new vocabulary, and increase their comprehension. Additionally, these kinds of applications might be used to teach English to young learners and might be used to practice their own English speaking.

In terms of pedagogical implications of such a study for incorporating AR-enhanced storybooks in language learning contexts might be as follows: To improve reading comprehension, educators might use AR storybooks as an additional resource to complement traditional reading materials, so reading can be made more immersive and interesting with the help of interactive components, didactic language, and visuals of AR. Educators can also create visual and aural language learning activities by taking into account the benefits of multimodal features. Additionally, it is clear that AR-ehnahced storybooks appeal to learners' interests and increase excitement; hence, educators can leverage this by incorporating technology-enhanced content that aligns with learners' interests.

As with other studies, the present study had limitations. The present study was conducted under Covid-19 pandemic circumstances, and the institution was carrying out a hybrid design to carry out the lessons, which meant the students who wanted to attend lectures online had a chance to attend online, at the same time as the students who wanted to attend in lectures face-to-face. Hence, there were limited students on the research site. Therefore, a limited number of students could participate in the study, so the findings may not be generalized. For further studies, more students could participate in the study, and more focus group interviews would be carried out to get more opinions from the learners. Additionally, the suggestions done by the learners for the present study might be taken into consideration to develop new applications and do research about the effects of the applications on various English skills of learners.

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GENİŞLETİLMİŞ ÖZET

1. GİRİŞ

Dijitalleşme, eğitim dâhil birçok alanda karşımıza çıkmaktadır. Dijitalleşme nedeniyle her geçen gün teknolojik araçların eğitim alanında kullanımı artmakta ve artırılmış gerçeklik (AG) de bu yeni teknolojilerden biri olarak kabul edilmektedir. Dil eğitim süreçlerinde de kullanılan AG, sanal ortamlara gerçek nesneleri dâhil eden bir teknoloji olması sebebiyle, öğrencilerin bilgilerini somut bir temel üzerinde yapılandırmaları için iyi bir fırsat sunmaktadır. Sosyokültürel öğrenme, yapılandırmacı yaklaşım, bağlantıcılık gibi teorik temellere dayanan AG'nin dil eğitiminde kullanılması öğrencilere öğrenmeyi daha kalıcı, daha eğlenceli, daha motive edici hale getirme gibi imkânlar sağlamaktadır. Son zamanlarda yabancı dil eğitiminde AG kullanımına odaklanan çalışmalar, AG'nin öğrencilerin öğrenme süreçlerinde motivasyonlarını ve katılımlarını arttırdığını kanıtlar niteliktedir. Literatürdeki mevcut çalışmaların çoğu kelime öğrenimi ve öğretimine odaklanmış, birkaçı ise okuduğunu anlama becerisi üzerinde çalışmış ve bu çalışmalar AG'nin öğrencilerin ders katılımı, motivasyonu, başarısı ve ilgisi üzerinde olumlu etkileri olduğunu ortaya koymuştur. Öte yandan AG kullanımının İngilizce öğrenimi ve okuduğunu anlama üzerindeki olumlu etkisinin ardındaki olası nedenler kapsamlı bir şekilde araştırılmamıştır.

Bu çalışma, okuduğunu anlamaya yönelik AG destekli bir hikâye kitabıyla üniversite düzeyindeki İngilizce öğrenen öğrencilerin öğrenme sürecini daha derinlemesine anlamak ve onların İngilizce öğrenme ve okuduğunu anlama için AG teknolojisinin kullanımına ilişkin önerilerini alma amacıyla yürütülmüştür. Bu çalışmanın önemi, AG'nin üniversite düzeyinde dil öğrenenlerin okuduğunu anlama üzerindeki olumlu etkilerinin olası nedenlerine odaklanarak alana katkı sağlayacak olmasıdır. Bu nedenlerin derinlemesine anlaşılması, dil öğrenme ve öğretme sürecindeki dil öğretmenleri, müfredat tasarımcıları ve dil öğrenenler için üniversite düzeyinde dil öğrenimine yönelik daha iyi ve daha verimli materyaller geliştirmeleri açısından faydalı olabilir.

2. YÖNTEM

Öğrencilerin öğrenme süreçlerine ilişkin önemli görüş ve açıklamalarına odaklanması sebebiyle bu çalışmada nitel bir araştırma süreci yürütülmüştür. Araştırma sorularına yönelik verilerin elde edilmesi amacıyla, betimleyici fenomenoloji ve yorumlayıcı fenomenoloji süreci takip edilmiştir. Çalışma 19-24 yaş aralığında, İngilizce dil seviyesi Avrupa Dilleri Ortak Çerçeve Programı'na göre B1 düzeyinde olan, 11 gönüllü öğrencinin katılımı ile gerçekleştirilmiştir.

Veri toplama araçları olarak kayıt altına alınmış yarı-yapılandırılmış görüşmeler, alan notları, gözlem listeleri ve fotoğraflar kullanılmış ve uygulama materyali olarak Within Unlimited, Inc. tarafından tasarlanan 'Wonserscope' isimli uygulama kullanılmıştır. Bu uygulamada AG ile geliştirilmiş hikâyeler yer almaktadır ve bu hikâyelerden biri olan 'Clio's Cosmic Quest' isimli hikâye bu çalışmada kullanılmıştır. Toplam 1115 kelimeden oluşan B1 düzeyindeki bu hikâyenin yazılı bir kopyası uygulamadan önce katılımcılara dağıtılmıştır.

Etik kurul onayının alınması ile başlayan süreçte, veri toplamaya başlamadan önce öğrenciler iki ayrı odak gruba ayrılmışlardır. Üç aşamadan oluşan çalışmada her iki gruptaki öğrencilerden birinci aşamada hikâyenin yazılı versiyonunu okumaları, ikinci aşamada aynı hikâyenin AG destekli versiyonunu kullanmaları istenmiştir. Son aşamada ise öğrenciler yaklaşık 30'ar dakika süren odak grup görüşmelerine alınmıştır. Görüşmeler kayıt altına alınmış, transkripsiyon ve veri analiz süreçleri ise MAXQDA programında yürütülmüştür. Araştırma soruları temel alınarak tümdengelimli akıl

yürütme ile açık kodlamadan türetilen tümevarımsal analizi birleştiren kapsamlı bir yaklaşım takip edilerek verilerin ana ve alt temaları belirlenmiştir. Oluşturulan temalar için değerlendiriciler arası güvenilirlik süreçleri takip edilmiştir.

3. BULGULAR, TARTIŞMA ve SONUÇLAR

Birinci araştırma sorusuna yönelik elde edilen sonuçlara göre 'öğrenme sürecinin tanımlanması' ana temasında, motivasyon, dikkat, akılda kalıcılık, kullanılan dil, düzen, duygular ve ufak problemlere yönelik temalar oluşturulmuştur. Bu temalar altında öğrenciler, AG destekli hikâyenin kendilerini öğrenmeye daha motive hale getirdiğini, materyalin ilgi ve dikkat çekici, heyecan verici ve etkileşim odaklı olduğunu vurgulamışlardır. Öğrenciler aynı zamanda AG destekli materyalin görsel ve işitsel öğeleri barındırması sebebiyle kalıcı öğrenmeye olanak sağladığını, materyalde kullanılan görsel ve öğretici dilin öğrenme sürecini iyileştirdiğini vurgulamışlardır. Materyalin öğrencileri doğrudan içine dâhil etmesi öğrencilerin etkili ve daha kolay öğrenmesine olanak sağlamıştır. Aynı zamanda öğrenciler materyaldeki karakter ile empati kurabilmiş ve bu da öğrenme isteklerini arttırmıştır.

İkinci araştırma sorusu AG destekli hikâye kitabının öğrencilerin okuduğunu anlama üzerindeki etkisine odaklanmış ve bu kapsamda açıklama ve hatırda kalıcılık temaları oluşturulmuştur. Bu temalar altında öğrenciler, hikâyedeki içeriğin açık ve anlaşılır olmasının öğrenmelerini iyileştirdiğini ve doğrudan tüm vücutlarını kullanarak materyale dâhil olmalarının somutlaştırılmış ve daha kalıcı bir öğrenme sürecine imkân sağladığını belirtmişlerdir.

Son araştırma sorusu ise AG destekli hikâye kitaplarının İngilizce öğrenme sürecinde kullanılabilmesine dair öğrencilerin önerilerine odaklanmış ve bu kapsamda öğrenciler hikâyedeki görseller, animasyonlar ve sesler gibi unsurların yeni kelimeleri öğrenmeleri ve anlamlandırmaları açısından faydalı olacağını belirtmişlerdir.

Sonuç olarak, AG destekli hikâye kitaplarının görsel ve didaktik dil yardımıyla öğrencilerin dikkatini çekerek, merak duygusuyla onlara hitap ederek ve hikâyedeki karakterlerle etkileşim kurmalarına olanak sağlayarak öğrencilerin motivasyonunu artırdığı gözlemlenmiştir. Ayrıca görsellerin, animasyonların ve diğer unsurların birleşimi sayesinde çoklu duyumsal öğrenmeye uygun olarak hikâyenin daha iyi akılda tutulabileceği sonucuna varılmıştır. AG destekli hikâye kitabının öğrencilerin görüşlerine göre en önemli özellikleri; materyalin kapsayıcılık özelliğinin olması, öğrencilerin hikâyenin içinde bir karakter haline gelmeleri, onları öğrenme konusunda motive ve hevesli hale getirmesi, empatik düşünmelerini harekete geçirmesi, barındırdığı çoklu öğeler yardımıyla öğrenmeyi kolaylaştırması ve öğrenmeyi etkili ve kalıcı hale getirmesidir.

Bu çalışma sonucunda elde edilen verilere göre eğitimciler AG destekli hikâye kitaplarını ek öğrenme materyali olarak kullanabilirler. Buna ek olarak, AG destekli hikâye kitapları öğrencilerin ilgisini çektiği ve onları öğrenmeye daha hevesli hale getirdiği için eğitimciler bu tarz teknolojileri eğitim-öğretim süreçlerine daha fazla dâhil edebilirler.

ETHICAL CONSIDERATIONS

In this study, all the rules stated to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions specified under the title of "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, were not carried out.

Ethics committee permission information:

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CONTRIBUTION OF RESEARCHERS

The contribution rate of the first researcher is 60%, and the second researcher's is 40%.

Author 1: Determination of the topic, research design, data collection and analysis.

Yazar 2: Determination of the method, research design, reviewing the study.

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CONFLICT OF INTEREST

There is no conflict of interest in the research.