

Augmented Reality Applications in Education: Arloopa Application Example

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Abstract

Arloopa is an augmented reality application that enables the integration of digital content such as images, sounds, texts into real world environments. By another definition the Arloopa app is an AR visualization tool that brings the physical and digital worlds together as one. Arloopa is an augmented reality (AR) and virtual reality (VR) app and game development company which provides advanced AR and VR services, such as: cloud-based augmented reality services, custom branded augmented reality app and game development, virtual reality app and game development, 2D and 3D content creation. In this study, the integration of Arloopa application into educational environments and application examples are presented within the scope of augmented reality applications course at a government university in Turkey. In addition, in this research, the presentation of the Arloopa application within a course unit and tips will be given to be used in future research on the integration of the application into education. At the end of the process, an interview form was prepared to determine opinions from the students about the Arloopa application and the use of augmented reality applications in education in general. The interview form prepared by the researcher was applied to 27 students within the scope of the course. According to the results obtained; the students found the use of augmented reality applications in education useful in terms of making the lesson fun, providing permanence in learning, and improving creativity skills. Despite all these positive aspects, the fact that some apps are salaried is accepted as the biggest limitation.

Keywords: augmented reality application, Arloopa, student' opinons, virtual reality (vr) app

1. Introduction

We live in an age where the virtual and physical worlds are intertwined. In this context, our lives are becoming digital every day and our habits are changing. Along with digitalization, education methods are also evolving. With the opportunities offered by educational technologies, students learn more easily and the success rate in education increases. Especially augmented reality (AR) and virtual reality applications (VR) come up with important innovations in education.

Augmented Reality, one of the most popular topics today, is a type of experience that enriches existing reality. When the literature is examined, augmented reality, this concept is briefly the changing and augmentation of reality by the computer (Silva & Oliveira, 2003). It is a virtual, computer-generated type of computer vision technology of real-time views (Azuma, 1997).

Today, augmented reality applications have been used intensively from primary school to university medical education. Via to these applications, students were able to see the subjects they studied in front of their eyes, in their classrooms or at home, and thanks to the content interaction, they became better learners (Kapucu & Yıldırım, 2019). AR technology allows the combination of real objects and virtual information that can be superimposed on these objects in order to increase students' interaction with physical environments and facilitate their learning (Ke & Hsu, 2015). When AR environments are used in education, students can; it provides benefits such as visualizing complex relationships, providing experiences that cannot be done in real life, embodying abstract concepts, enabling learning with fun and increasing student participation (Yılmaz & Goktas, 2018).

Developing technology enables students to learn complex content topics in a fun and easy way through

augmented reality devices. Students can interact with objects in the virtual environment and realize permanent learning (Boz, 2019). These technologies are based on real images of virtual objects provides opportunities for interaction. In addition, augmented reality technologies turn textbooks, classroom boards and static objects in learning environments into multimedia possibilities thus, it increases the functional richness of the environments and enables different cognitive channels to work in learning.

In this context, the working principle of the Arloopa application, which is thought to had provide these opportunities, and its application in education is presented. ARLOOPA is an augmented reality and virtual reality app which provides advanced AR services that lets people impose digital content (images, sounds, text) over a real-world environment. AR is about to become a part of everyday life. With Arloopa will appear in a colorful and imaginative world.

2. Conceptual Framework

In the literature, it is remarkable that there are many studies on the use of augmented reality applications in education. It is seen that the number of studies conducted at domestic and abroad on the use of augmented reality in education is increasing day by day. In general, comparative studies between augmented reality-based applications and traditional classroom applications have revealed that augmented reality technology increases students' learning (Freitas and Campos, 2008; Kerawalla, Luckin, Seljeflot, and Woolard, 2006). Some researchers claim that augmented reality performs kinesthetic learning by internalizing body movements and senses with the content, since it provides direct interaction with the educational material (Seo, Kim, & Kim, 2006). Some of those researches;

Onder (2017), researched Augmented Reality Applications in Education: Aurasma and Color Mix in his study. In the study, a presentation was made about the working principle of applications, application preparation, development and the use of the developed tools. In addition, the environments were presented to the students' opinion. As a result; it was considered important to use these technologies in terms of students having difficulties in understanding digital lessons, concretization of information by visual learning environments and permanence of information in verbal lessons. In addition it was emphasized that the use of Aurasma and Color Mix applications in teaching environments should become widespread, as they offer AR environment opportunities, are easy to use, support distance education, offer individualized learning environments, and can be used as an assessment tool.

Demir, Yılmaz and Paksoy (2020), discussed the subject of augmented reality in his book of original studies in social sciences. The design of the augmented reality-based physics book developed by Arloopa is the subject of the book part. Augmented Reality Physics Book is structured as marker-based. When the visuals in the book are viewed with a mobile device, videos, animations and presentations become active. With this digital book, many experiments that could not be carried out in the classroom environment were moved to the augmented reality environment, and the content was supported by videos and presentations about physics concepts encountered in daily life.

Waliyuddin and Sulisworo (2022), developed a testing tool integrated with Augmented Reality (AR) and Google Scholar (GS) to promote students' digital literacy skills in their research. In this context, Arloopa application was used in augmented reality dimension. The subject matter was the scale and comparison. Product trials were applied to 11th-grade students in Sleman, Indonesia. As a result, that is, the test instrument that has been made contains valid items. In addition, at the level of reliability, the instrument test created is categorized as reliable.

2.1 The Purpose of the Research

Within the scope of this research, a sample application regarding the working principle of Arloopa application and its use in educational environments is presented. Within the scope of augmented reality applications in education course, students were asked to choose a lesson unit example and the integration of this unit into the classroom environment with the Arloopa augmented reality application was requested from the student groups. At the end of the process, students' opinions on the use of Arloopa application and augmented reality applications in education in general were discussed.

Sub-purposes for this scope:

- What are your positive opinions about the use of augmented reality applications in education?
- What are your negative opinions about the use of augmented reality applications in education?
- Would you like the use of augmented reality applications on behalf of other course contents? If the answer is yes, for which courses would you recommend using the application?

- Which of the augmented reality applications did you find more useful in the training introduced in the course? and why?

2.2 The Important of the Research

AR technology provides virtual examples and includes effective elements to supplement materials such as textbooks. With AR, classes become more interactive, increase motivation, provide different perspectives on topics, and help develop creativity and imagination.

Considering all these usage advantages, it is aimed to introduce the Arloopa augmented reality application, which is an application example in this study to be preferred more in learning and teaching environments. In addition, an interview form was developed for the evaluation of augmented reality applications in this study. In this scope it is thought that this study will be important in terms of spreading the use of augmented reality applications in education and shedding light on future research.

3. Method

3.1 Research Method

This study is an example of mixed research method. Mixed methods research is research in which the researcher collects and analyzes data, incorporates findings, and makes inferences using qualitative and quantitative approaches or methods in a single study or research program (Tashakkori&Creswell, 2007).

3.2 Study Group

The study group of this research consists of 27 university students studying at the Computer Technologies department of a state university in Turkey. When the demographic characteristics of the students are examined, their ages are between 20-25 years old. Looking at the gender variable, 15 boys and 12 girls were identified.

3.3 Data Collection Tool & Data Collection Method

The interview form prepared by the researcher was applied to 27 students within the scope of the course. The form was applied face to face to the students during the lesson. The interview form consists of demographic information and 4 open-ended questions. Before the form was applied to the study group, it was examined by 3 field experts and 1 language expert within the framework of content validity.

3.4 Data Analysis

Content analysis method was used in the analysis of qualitative data. Content analysis is a research tool used to determine the presence of certain words, themes or concepts within some given qualitative data (Buyukozturk, 2018).

4. Application Design

When augmented reality is mentioned, it is often meant to transfer virtual objects and information from the real world onto images in real time. This technology creates an artificial environment by adding virtual data on top of the real world. Many developer companies have produced augmented reality applications, opening the technology to different application areas and enabling it to appeal to a wider user base. One of these applications is ARLOOPA. ARLOOPA is an augmented reality and virtual reality app which provides advanced AR services that lets people impose digital content (images, sounds, text) over a real-world environment.



Figure 1. Arloopa Augmented Reality App

4.1 Arloopa's Key Features Include:

- Marker-based, markerless and location-based AR
- Video, photo, GIF recording
- Social sharing
- In-app 3D objects library with diverse categories, such as animals, vehicles, educational objects, etc.

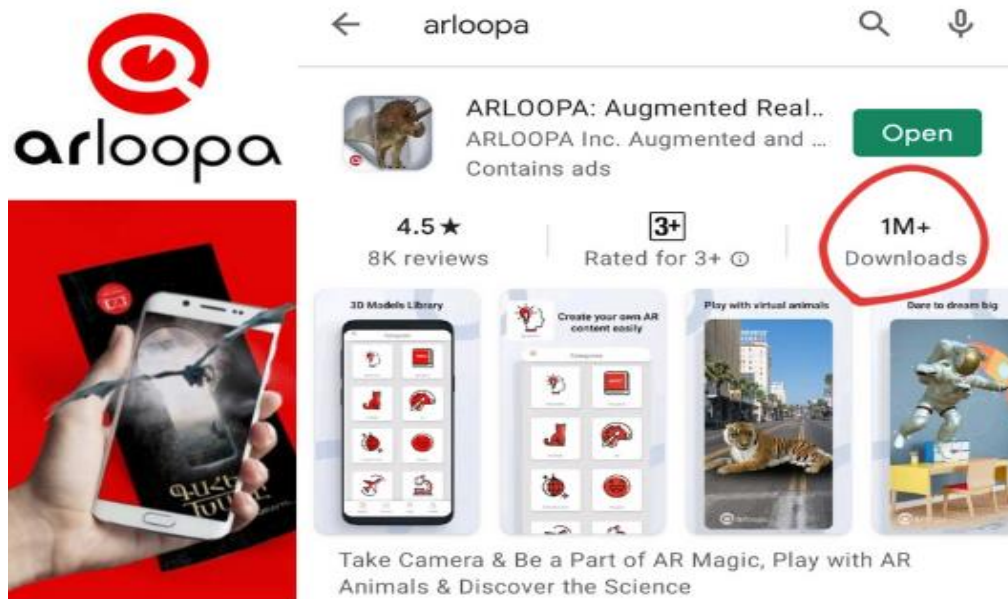


Figure 2. Arloopa Augmented Reality App

Within the scope of augmented reality applications in education course, students were asked to choose a lesson unit example and the integration of this unit into the classroom environment with the Arloopa augmented reality application was requested from the student groups.

In this study, the use of augmented reality applications in the field of science and health, one of the students' projects was chosen as a sample material. Augmented reality has a huge role in improving the healthcare industry. Just a few years after its first application in the industry, augmented reality has taken an important place in the routine of doctors and nurses, as well as in the lives of patients.

Within the scope of the course, students developed an application using the Arloopa AR application within the framework of the unit of science and health. In this research, students integrated the lung, an organ from the human body, into the virtual classroom environment with the Arloopa AR application. In this study, the lung image/digital content was integrated into the classroom environment with the ARLOOPA augmented reality application.



Figure 3. Integration of content into real environment with Arloopa AR application (I)

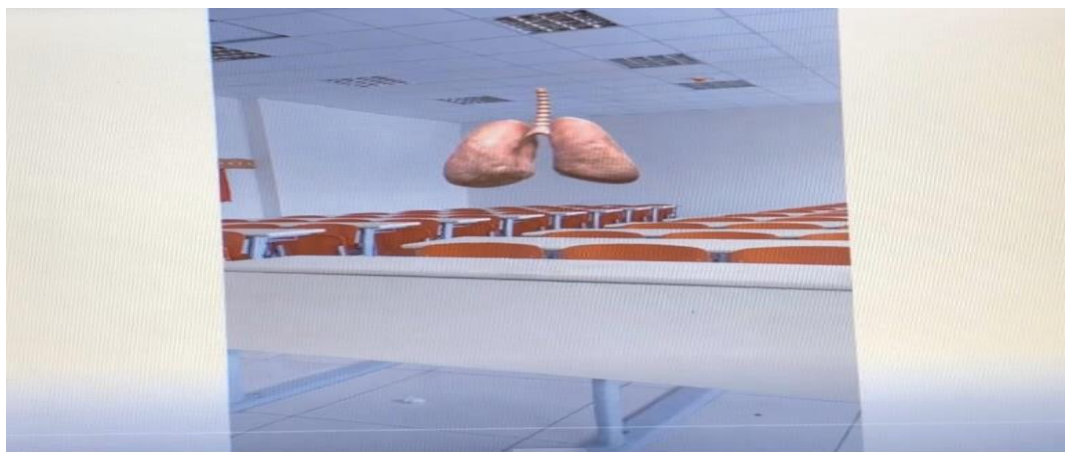


Figure 4. Integration of content into real environment with Arloopa AR application (II)

In this study, the lung image/digital content was integrated into the classroom environment with the ARLOOPA augmented reality application. In addition, information about the lung and its place in the human body are introduced through this integration. Below are the images of the application:

5. Result & Discussion

At the end of the process, an interview form was prepared to determine opinions from the students about the Arloopa application and the use of augmented reality applications in education in general. The interview form prepared by the researcher was applied to 27 students within the scope of the course. Content analysis was used to analyze the data. The findings are presented in the tables below:

Table 1. Positive criteria regarding the use of AR applications from course content

Positive Criterias	f	%
Make the lesson fun	15	20.5
Game based learning	12	17.4
Learning of intangible subjects	7	10.9
Contribution to creativity skills	6	9.2
Motivation for the lesson	5	8.8
		8.2
Persistence in learning	3	7.1
Increase in academic achievement	3	7.1
Life long learning	2	5.4
Individualized teaching	2	5.4

According to the table above, the answers given by the students were analyzed and 55 answers were evaluated according to their percentages. When the percentages are evaluated, it has been determined that the frequency of the positive effects of the use of AR applications from the course content is about **"making the course fun"**. When the other answers are examined, it has been revealed that there is diversity (Game based learning, learning of intangible subjects, contribution to creativity skills etc).

Table 2. Negative criteria regarding the use of AR applications from course content

Negative Criterias	f	%
Some AR apps are paid	25	51.0
Eye pain/neck pain	13	26.5
Lack of understanding of app objectives	5	10.2
Most app usage requires readiness	4	8.1
Difficulty of use	2	4.2

According to the table above, the answers given by the students were analyzed and 49 answers were evaluated according to their percentages. When the percentages are evaluated, it has been determined that the frequency of

the negative effects of the use of AR applications from the course content is about **"some AR apps are paid"**. Apart from this, the detail that draws attention in many studies **"physical pains"** (eye pain- neck pain) were also emphasized by students.

Table 3. Request to use AR applications from other course content

Answer	f	%
Yes	25	95.2
No	2	4.8

When the percentages were evaluated, 25 students supported the use of AR in other course contents. In addition besides Arloopa, students also stated that they found Mondly AR, Holo AR, Roar AR applications that were presented in the course useful.

When similar studies in the literature are examined; Waliyuddin & Sulisworo (2022), they produced a study using the Arloopa application. They studied on a research on High Order Thinking Skills and Digital Literacy Skills Instrument Test. The subject matter was the scale and comparison. Product trials were applied to 11th-grade students in Sleman, Indonesia. AR was created using the ARLOOPA application operated with android. As a result, an effective measurement tool has been developed by using the Arloopa application. Apart from this study, no similar research was found on the application of Arloopa. This situation was evaluated as a big gap in the field.

6. Suggestions

The research is aimed to introduce the Arloopa augmented reality application, which is an application example in this study to be preferred more in learning and teaching environments. In addition, an interview form was developed for the evaluation of augmented reality applications in this study. In this scope it is thought that this study will be important in terms of spreading the use of augmented reality applications in education and shedding light on future research.

Recommendations for future research within the scope of the study:

- Encouraging applied studies from primary education to university level in order to support the use of Arloopa and similar applications from course content.
- Based on the fact that the concept of augmented reality increases student academic success, provide necessary information and seminars to teachers so that they can use these applications in the classroom.
- When the literature is examined, it is seen that Arloopa and similar AR applications are rarely found in studies in the field of education, carrying out studies to increase the academic studies related to this field.

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