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Example of Science Lesson Digital Book Developed with Arloopa Augmented Reality Technology Application

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Augmented Reality, virtual reality app, ARLOOPA, digital book.

Abstract: 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. ARLOOPA is an app for Augmented Reality (AR) experiences. Leading in augmented reality revolution with 3 main AR functions, marker based scanning, markerless tracking, geo-location based experiences. All content enabled in ARLOOPA Studio, ARLOOPA App is an intuitive platform designed to help easily experience augmented reality for education, promotion, entertainment or personal needs. It can be said that books with AR technology gained importance after Kindle. AR-enabled books are physical or digital copies of traditional books, both text and images. In the light of all this information, an example of a digital book developed with the ARLOOPA augmented reality technology application was presented in this study. Information such as the application content of Arloopa, its interface, in which areas it is used, creating digital book content in the application are also included in the article. It is foreseen that this article will provide support at different educational levels in creating digital content in education.

Arloopa Artırılmış Gerçeklik Teknolojisi Uygulaması ile Geliştirilen Fen Bilgisi Dersi Dijital Kitap Örneği

Anahtar Kelimeler:
Artırılmış gerçeklik, sanal gerçeklik uygulaması, ARLOOPA, dijital kitap

Özet: ARLOOPA, insanların gerçek dünya ortamına dijital içerik (görüntüler, sesler, metinler) empoze etmelerini sağlayan gelişmiş AR hizmetleri sağlayan bir artırılmış gerçeklik ve sanal gerçeklik uygulamasıdır. ARLOOPA, Artırılmış Gerçeklik (AR) deneyimleri için bir uygulamadır. 3 ana AR işlevi, işaretleyici tabanlı tarama, işaretsiz izleme, coğrafi konum tabanlı deneyimler ile artırılmış gerçeklik devriminde lider. ARLOOPA Studio'da etkinleştirilen tüm içerik, ARLOOPA App, eğitim, tanıtım, eğlence veya kişisel ihtiyaçlar için artırılmış gerçekliği kolayca deneyimlemeye yardımcı olmak için tasarlanmış sezgisel bir platformdur. AR teknolojisine sahip kitapların Kindle'dan sonra önem kazandığı söylenebilir. AR özellikli kitaplar, geleneksel kitapların hem metin hem de görsel olarak fiziksel veya dijital kopyalarıdır. Tüm bu bilgiler ışığında, bu çalışmada ARLOOPA artırılmış gerçeklik teknolojisi uygulaması ile geliştirilen bir dijital kitap örneği sunulmuştur. Arloopa'nın uygulama içeriği, arayüzü, hangi alanlarda kullanıldığı, uygulamada dijital kitap içeriği oluşturma gibi bilgiler de yazıda yer alıyor. Bu makalenin eğitimde dijital içerik oluşturma konusunda farklı eğitim kademelerinde destek sağlayacağı öngörülmektedir.

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1. INTRODUCTION

Augmented reality (AG); is application that allow real-time integration of digital information with the user's environment. In its most general definition, it can be expressed as a set of technologies that reflect digital materials to objects that exist in the real world (Sumardani et al., 2020; Bingol, 2018). When this technology, written in 3D programs, receives digital information from a known marker, it tries to run the code of the marker and layer the correct images (Icten & Bal, 2017). When the history of augmented reality technologies is examined; in 1992, Boeing researcher Tom Caudel gave the name "Augmented Reality" to her device, whsich she developed with David Mizell, which reflects virtually on technicians' heads. It took nearly 40 years for AR technology to mature.

In 2013, Google beta tested a device called Google Glass, which can connect to the internet via Bluetooth. In 2015, Microsoft introduced two new technologies: “Windows Holographic” and “HoloLens”, AR glasses with multiple receivers for displaying HD holograms. In 2016, Niantic released a game called Pokemon Go for mobile devices. Today augmented reality technology is used effectively in medical education, diagnosis of diseases and psychotherapy sessions (Derin & Ozturk, 2020). Artificial intelligence applications shaped by people's behaviors and thoughts have also gained momentum due to innovations in the field of augmented reality apps. Artificial intelligence robots and AG technology are two important platforms that affect each other.

One of the most popular applications for creating augmented reality experiences is ARLOOPA. The app is particularly popular for students from all over the world because of the value it adds to distance learning. ARLOOPA is a video maker and scanner app for Augmented Reality (AR) experiences. The 3D camera app superimposes digital data and images on the physical world. Key features of ARLOOPA include:

- Marker-based, unmarked and location-based AR
- Video, photo, GIF recording
- Social network
- Animals, vehicles, educational objects, etc. in-app library of 3D objects with various categories such as..
- Digital book developed

AR-enabled books, physical or digital copies of traditional books, both text and images, are widely used today. Augmented reality, with its many different uses, continues to spread as a revolutionary technology for children's books. It is exciting for children today that the pages of the books they have followed with still pictures and texts come to life all of a sudden (Panagiotidis, 2021).

Children can activate hotspots called "hotspots" by scanning certain places in the picture information books with the help of a smartphone or tablet computer. These hotspots are the elements inside an image that act as tags of the image recognition program. By activating the hotspots, audio texts, sounds, melodies or songs are listened and animations are displayed (Mehta, Jain, Vora & Joshi, 2017).

2. MATERIAL AND METHODS

2.1. Conceptual Framework

An example of a digital book developed with the ARLOOPA augmented reality technology application was presented in this study. When the literature studies on the subject are examined;

The first application in the field of Augmented Reality books was made by Mark Billinghurst and it is called "Magic Book". Magic Book was first tried by 2,500 users at the Siggraph Conference in 2000, and the augmented reality book went down in history as the first experiment in the field. Studies in the field of Augmented Reality Books in Turkey started in 2006 with the support of TUBITAK's Technology Support Project (TEYDEP) under the name of Live Book. It was developed by Koza Publications as a result of this three-year study, with the contributions of two technology companies (Rotasoft and Nanobiz) affiliated with METU Technopolis. Live Books, which offer fictional stories and educational content for children, was launched in 2008 (Koza Publishing, 2021). There is a significant increase in storybooks that contain augmented reality applications, especially for children. It is now possible to see good examples of animations made in the world in similar quality in Turkey.

A Portuguese startup, Augmented Reality Publisher (ARP), on the other hand, focused on producing children's books in 3D, displayed on smartphones and tablets, using augmented reality technology. It is an example of a successful AR adaptation of the famous Ezop fable, which started its work in April 2014 and with its first product, “the Rabbit and the Tortoise”.

Ibılı & Sahin (2013), in their research the 3D geometry book software was prepared by enriching the three-dimensional drawings in the geometric objects unit of the 6th grade Mathematics book with AR technology. Slartoolkit was used for ARGE3D geometry book software, which was developed using the Visual Studio 2012 platform and Microsoft Silverlight software development plane. As a result, The developed software was used as a mathematics course material in schools affiliated to the Ministry of National Education, and future educational software developers who want to make software in this field were informed about the application potential and limitations of AR software and solutions were offered. In addition, the internal and external use of AR markers on the book were compared and their effects in classroom education were observed.

Dogan (2016), in research examined the effects of the use of augmented reality applications in the content of textbooks on improving children's reading skills and reading habits. As a result, it has been revealed that AR books with enriched, quality viewer and player features such as three-dimensional graphics, animation, sounds, video and games can be preferred as auxiliary resources instead of options that prevent the connection with physical books such as e-books.

Cınar & Akgun (2017), in their research, they targeted the unit "at the fair", which is included in the 6th grade English course content. A hybrid textbook with text, visuals and augmented reality support was designed to display the content related to this subject in a more visually and audibly enriched way. The prepared textbook was presented to the examination of Educational Technology experts who took the Instructional Technologies and Material Design courses at Sakarya University Faculty of Education in terms of content suitability. As a result, it has been revealed that the developed book section has exemplary features both in the design of the books to be prepared for the English course and in the design of all coursebooks in general.

2.2. Method

This study is an example of an application development study from experimental research. Experimental research is research conducted using a systematic methodology to see how effective a certain intervention will be in solving a certain problem under controlled conditions (Creswell & Creswell, 2017). It differs from other research methods in that it allows testing the cause-effect relationship.

3. RESULTS AND DISCUSSIONS

3.1. Purpoe of the research & Important the research

In this study, an example of a digital book developed with the ARLOOPA augmented reality technology application is presented. In this study, an application has been developed for the "Sensory Organs" section in the Elementary 6th Grade Science textbook units. In addition, an AR supported digital book content was created within the subject of "Planets", which is also included in the 6th grade Science units.

With the books produced using augmented reality technologies that have become widespread recently, a new generation has been born that reads, watches and codes the world from this perspective. The reception process of both children's books and conventional education books created with more realistic graphic design elements has accelerated with the acceleration gained by the pandemic conditions (Boztepe, 2021). It is foreseen that this article will provide support at different educational levels in creating digital content in education.

3.2. Application Development Steps

In this study, an application has been developed for the "Sensory Organs" section in the Elementary 6th Grade Science textbook units. In addition, an AR supported digital book content was created within the subject of "Planets", which is also included in the 6th grade Science units. Before starting the study, ARLOOPA augmented reality application was researched in detail and modules suitable for Science course units were selected.

For sense organs unit, theoretical information was obtained from the Science book, which is used as a supplementary book in 6th grades, recommended by the Ministry of National Education. Then, a more special section, the eye's sensory organs, was explained and in the classroom ARLOOPA-based AR application was developed. Application examples are attached with their images;

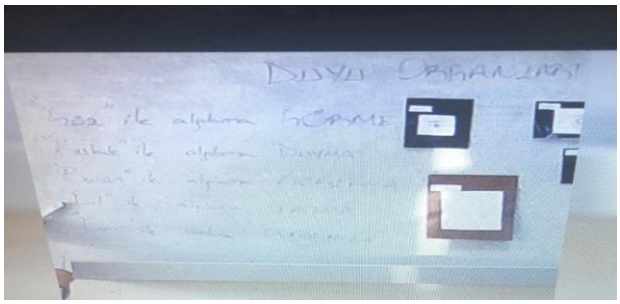

Figure 1. Sense Organs-Eye Theoretical Lecture.

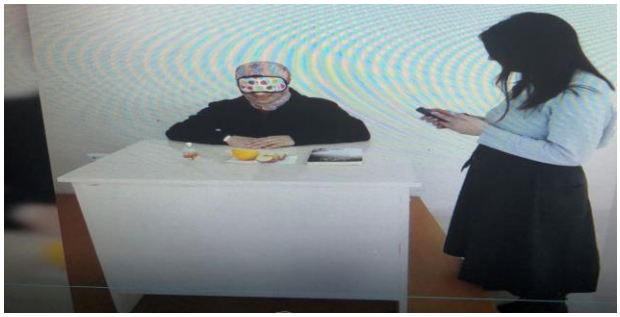

Figure 2. Test Sense Organs Lecture.

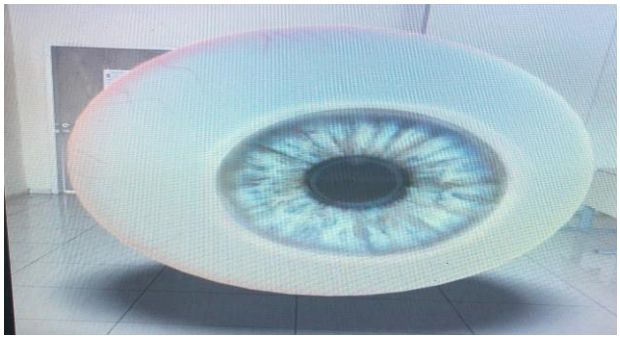

Figure 3. Integration of the Eye Object into the Real Classroom Environment.

ARLOOPA AR application offers convenience to its users with audio narration, digital content, hologram additions. With these practices, 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.

AR supported digital book content was created within the subject of “Planets”, which is also included in the 6th grade Science units. For planets unit, theoretical information was obtained from the Science book, which is used as a supplementary book in 6th grades, recommended by the Ministry of National Education. Application examples are attached with their images;

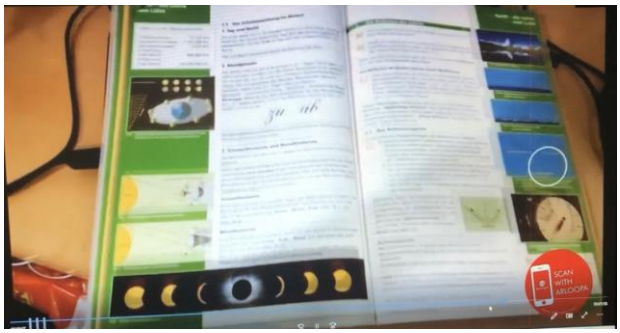

Figure 4. Theoretical information was obtained from the Science book

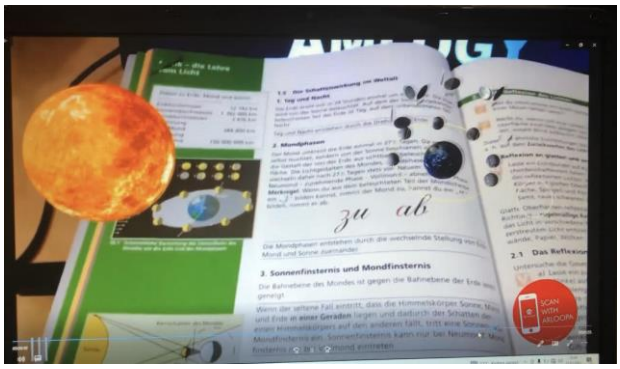

Figure 5. Integration of the Planets Object into the Real Classroom Environment

QR codes were used in the design. QR codes can be used in other fields as well as in the field of education. The possibility of placing QR codes on conventional education materials has provided a bridge between traditional education materials and communication technologies and new media (Aktas, 2014).

4. CONCLUSION

An example of a digital book developed with the ARLOOPA augmented reality technology application was presented in this study. In this study, an example of a digital book developed with the ARLOOPA augmented reality technology application is presented. In this study, an application has been developed for the “Sensory Organs” section in the Elementary 6th Grade Science textbook units. In addition, an AR supported digital book content was created within the subject of “Planets”, which is also included in the 6th grade Science units. Information such as the application content of Arloopa, its interface, in which areas it is used, creating digital book content in the application are also included in the article. It is foreseen that this article will provide support at different educational levels in creating digital content in education.

Considering the thinking skills of the Y and Z generations, which are the most intense group in education processes in the world; technologies that are fast, independent of space and providing freedom are gaining importance (Azuma, 1997; Etlıcan, 2012). AR applications, which bring together the real and the virtual simultaneously, have provided great convenience to the field of education, as in many other fields, by allowing the use of three-dimensional technologies with mobile devices and applications. Learning conditions, which change in direct proportion to the developing technology, are also getting the quality to appeal to the Z generation more with augmented reality.

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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