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Augmented reality in 9th grade history: Student opinions on the usefulness and effectiveness of the material¹

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Abstract


Research problem/aim; The aim of this study is to determine the opinions of the 9th grade students who use teaching materials designed with augmented reality technology on the usefulness and effectiveness of the material. For this purpose, 3 activities were designed using 9th grade topics and a total of 27 AR materials were applied to the students in these activities. **Method;** In this study, "developmental research" and "case study" were used. As data collection tools, "AR application course observation form", "student evaluation form" and "3 AR activities" were designed by the researchers. **Findings;** 30 codes were formed and the answers given by the students to the questions and grouped as positive and negative by combining them under the theme of effectiveness, usefulness and suggestions which is the main question of the research. **Conclusions;** According to the results of the research; In the "usefulness" theme, the most repeated positive code is "functionality / interactive", while the negative code is "unrealistic", In the theme of "effectiveness", the most repeated positive code was "providing 3D detection", while the negative code was "not contributing". In the theme of suggestions, the code "animation and graphics should be developed" was repeated the most.


Keywords: Augmented reality (AR); 9th grade student; history lesson; developmental research; case study.

Introduction

With the development of technology in education system and changes in student profiles, important developments are needed in history teaching as well as in every field of education. Traditional history teaching methods are thought to be insufficient for the students to establish time, space, and man context. Possible underlying reasons for this situation are the methods and techniques (Özbaran, 1992), textbooks, incomplete performances of teachers in applied field (Safran, 2009) and accordingly, failure to establish a connection among the subjects. In this context, it is reported that students think and want that methods, techniques and materials used in history lesson should be

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changed and transformed and particularly, “history lesson should be relieved from boredom, memorizing and monotony; and it should have a fastmoving character and students should be more active and can use teaching materials more” (Ulusoy, 2009, p.419). New arrangements have been made in the textbooks as well as new methods and techniques, studies have been conducted in history teaching with a lot of domestic and foreign projects and these studies are continuing (Erol Şahin, 2014). Traditional and result-oriented history teaching methods are unable to attract the interest of the young generation of the 21st century but innovative and new history teaching methods with thinking skills which become prominent have begun to be the top of the agenda.

Focus on remote teaching in recent years has allowed digital history teaching methods to be important and studies on technological materials have gained popularity. One of these technological materials is “augmented reality”. Augmented reality is a technology which can easily be used by a smart phone or a tablet and adapted to every environment. Especially, practically displaying three dimensional (3D) images of the objects which cannot be reached in terms of time and cost on the smart phones and tablets of students has caused augmented reality to be also used in history teaching as it is used in every field of teaching. This technology created by combination of real world and virtual world ensures that reality can be perceived more deeply and in a more quality manner by adding additional information, videos and visual items to the current reality with the support of technology. Even though augmented reality is expressed in the same category as the virtual reality in the literature; in fact, it is transformed form of virtual reality (Azuma, 1997, p. 364). Environment and modelling in virtual reality are created only in the virtual world but in augmented reality, environment is real and modelling is virtual. For example, with augmented reality, 3D image of a historical object can be put on the study table and a historical character can be brought and made speak in the middle of the classroom.

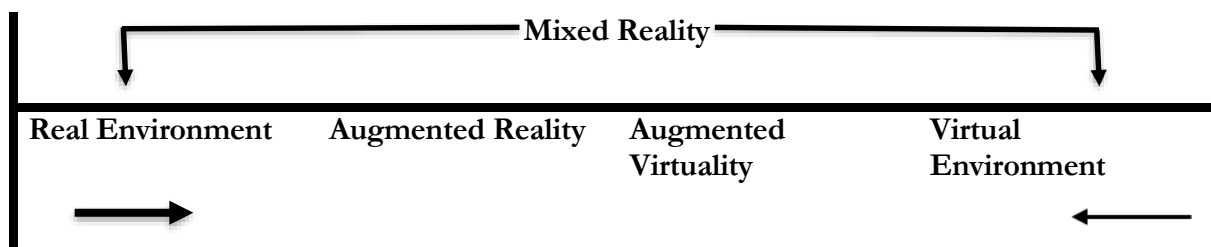


Figure 1. *Reality-Virtuality Continuity (Milgram, Takemura, Utsumi ve Kishino, 1994, p.285)*

Milgram, vd,(1994), aimed at clarifying the concepts between “reality-virtuality continuity” form and virtual and real environment. According to the Figure 1; whereas there is a world which we perceive with naked eye without using any equipment in the section of “real environment”, there is a world which is completely modelled in a digital environment in the section of “virtual environment.” Transits between the worlds have been defined as “mixed reality” where objects of real and virtual environment are presented together. In the case of augmentation in the real world, “augmented reality” occurs but in the case of augmentation in the virtual environment, “augmented virtuality” (virtual reality/VR) occurs. In this context, as you move from the left side of the continuity to the right side, virtual image proportion increases and dependence on the reality decreases. In short, augmented reality is to increase reality perception by means of technology (Graham, Zook and Boulton, 2013, p.467). Augmented reality (AR) applications are created by simultaneously overlapping computed-based videos, 3D text, graphic and similar digital information on the real environment. However, there are certain features so that the application prepared can be AR. Azuma (1997), based on the findings obtained by him in his studies, puts emphasis on the fact that if virtual

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and real objects are integrated in the real environment in any environment or application, these objects are aligned in 3D environment, there is a real-time interaction between real and virtual objects, the environment or the application can be regarded as AR.

3D model of the object planned to be displayed with augmented reality is integrated with the real environment and since this is a technology presenting learning experience, it has begun to be preferred in education. İbili (2013), describes augmented reality applications as one of the promising technologies in education and technology integration. Dunleavy and Dede (2014) suggest that augmented reality applications can be used in designing learning materials and learning environments integrated with reality in learning and teaching processes. Students may acquire learning experience on the real object in real environment through augmented reality applications and understand 3D structures easily. Additionally, it is ideal for developing user-friendly learning environments and may ensure that learning experiences are instantly realized (Narumi, Ban, Kajinami, Tanikawa and Hirose, 2012, p.112).

Augmented reality in terms of increasing permanence of information in the history lesson having verbal and abstract content, making learning concrete, helping prevention of misconception, reliving the lesson from monotony, and making it enjoyable has the potential of decreasing many problems in teaching history lesson. Additionally, its positive effect on extremely important skills such as emotional understanding and empathy in terms of history teaching makes AR applications much more important for history lessons (Alınlı and Yazıcı, 2020, p.103). Materials produced by AR technologies meet with teachers and students via special web page and interactive books designed. Thus, students find the opportunity to closely study the objects which are difficult to be reached in terms of time and financial concerns. Additionally, rare artworks animated with AR technology through cell phone and tablet in the museums are presented to the visitors and students for education.

Considering these facts, history lessons taught with teacher-centred, traditional teaching methods rarely draw the interest of the students and a change and a development are expected to occur in history teaching methods. Now, in history lessons, students are expected to understand them deeply by integrating them with life and to understand and interpret history in the real sense. One of the ways to do this is to allow students to interpret concrete historical concepts by integrating history lesson with technology, to touch historical objects and experience history with interactive activities. For this purpose, developing, trying and evaluating teaching materials by means of AR technologies constitute the main problem of this research. In this context, problem statement of the research has been determined as follows:” what are the opinions of 9th grade students on use and efficiency of teaching materials designed with augmented reality technologies for the subjects of history lesson?”

Purpose and Importance of the Research

With this study, we aim at learning the opinions of 9th grade students using teaching materials designed with the technology of augmented reality regarding functionality and efficiency of such materials. In this context, 9th grade topics were used and 3 activities (Comparison of ikta and feudal systems, rise of Islam and Da Vinci code) were designed and 27 AR materials in total were applied to the students in these activities.

Importance of the research is that it draws attention to the characteristics of AR materials which arouse interest and provide learning in many aspects for history lesson. The fact that there is only one postgraduate thesis and several article studies for AR technologies in history education is not sufficient. Lack of any study regarding use efficiency of AR technologies attaches extra importance this study.

According to the literature review in YÖK database (Council of Higher Education), there are 239 dissertations related to AR material and 104 of these have been found to be related to education and

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teaching field. Considering the distribution based on the field, AR materials were designed mostly in science teaching (45). Then, postgraduate and doctoral dissertation studies were carried out as follows: computer and teaching technologies (33), English (8), social sciences (7), Turkish (6), mathematics (5). Even if one of these dissertations has been carried out on computer and teaching technologies field, its subject is history teaching. Whereas significant differences were found in the academic successes of the students in experimental group according to the results of the thesis under the title of “effect of history books supported by augmented reality on spatial thinking skill and academic success of students” prepared by Gökçe (2022), a significant relationship was not found between spatial thinking skill and academic success. Considering the studies on articles, we observe limited number of research in history teaching field in Turkey. Of these researches; in the article under the title of “effect of augmented reality applications in TR revolution history and Kemalism lesson for 8th grade on academic success of the students and students’ attitudes towards augmented reality applications” prepared by Alınlı and Yazıcı (2020), it is suggested that augmented reality has a positive effect on academic success and attitude; on the other hand, in the article under the title of “a new concept in history teaching: virtual historical space” prepared by Çığır Dikyol ve Şar İşbilen (2019), positive and negative aspects of using virtual historical spaces with AR and VR technologies were discussed. Study under the title of “a review of augmented reality applications for history education and heritage visualization” prepared by Challenor and Ma (2019) in England is one of the effective articles containing examples regarding how AR is used in history education.

Method

In the research, augmented reality technologies and “Type 1” of “developmental research” method at the stage of material development were used so as to be utilized in history teaching. While “Type 1” of developmental research is defined as a systematic study based on designing, developing, and evaluating teaching programs, processes and products, “Type 2” focuses on the process mostly. In developmental research, development process of program or product is also important as well as effectiveness of the teaching program or product developed. Both are taken into consideration in determining effectiveness of the product develop (Richey, Klein& Nelson,2003, p.1124).

Of the qualitative research techniques, case study model has been used at the stage of effectiveness and evaluation of the material developed too. It is research in which qualitative data methods such as qualitative research, observation, interview and document analysis and a qualitative process for displaying perceptions and cases realistically and in an integrated manner in natural environment has been followed. Case studies are research methods which use the questions “how” and “why” as base and allow the researcher to deeply examine a fact or a case that cannot be controlled by the researcher (Yıldırım ve Şimşek, 2008). Data obtained with these two methods are subject to descriptive analysis and 41 codes have been created. Such codes have been reduced to 30 codes in Excel file by taking content integrity into consideration and then, combined under the theme of effectiveness, practicability and proposals and grouped under sub-themes according to positive and negative interpretations.

Application Process

After the activities to be used in the research and the forms to be applied to the students are approved at the meeting no.03 of Gazi University Ethic Board on 08.02.2022, they will be applied with the letter date 27.04.2022 and number 349597 of İzmir Governorship, Provincial Directorate of National Education in the schools determined in such a manner that it does not disturb the education process. Application was performed in the second half-year of 2021-2022 academic year in 4 different high school types and with 9th grade 81 students in total. Application schools were chosen in İzmir according to the consent of the teachers giving lesson in 9th grade level and on the basis that these schools were offering different type of education. These schools were as follows: Bornova Anatolian High School, Buca Mehmet Akif Ersoy Social Sciences High School, Private KOSBİ Zülfü Mevlüt

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Çelik Vocational and Technical Anatolian High School, Private Eraslan High School. Before starting the main application, *Da Vinci* activity was applied as a pilot scheme in KOSBİ Zülfü Mevlüt Çelik Vocational and Technical Anatolian High School, problems encountered in the activity and in relation to the materials were observed, required corrections were made and main application process was planned by getting appointments from the history teachers and school administrations. In the application period, teachers were informed regarding the activities and AR technologies for one week; activity applications continued for 3 weeks and student evaluation form application continued for one week.

Data Collection Tools and Data Analysis

- Student Evaluation Form,
- Augmented Reality Course Observation Form,
- Video records and photographs,
- 3 augmented reality activities

1.Activities: Comparison of ikta and feudal systems: With this activity it is aimed that students compare “ikta” and “feudality” systems based on land and used in two different geographies and two different cultures in the same time period. When creating this activity, Unity program was used, and 4 AR materials were designed by the researchers. In one of these materials, you can see speaking portray of Nizamülmülk talking about ikta system and speaking portray of William I talking about feudality system in the other. Stages followed when creating these materials are as follows:

1. Stage: Representative image of Nizamülmülk in the history textbook of MEB (Ministry of National Education) 9th Grade and anonymous representative image of William I on the net have been animated as if these historical figures were talking by adding mimics through “Mug Live – 3D Face Animator” cell phone application.
2. Stage: Texts of ikta system told by Nizamülmülk and feudality system told by William I have been converted to 2 mp3 audio files via “voicer studio” portal providing service over the Internet.
1. Stage: Visual images animated in Stage 1 and mp3 audio files created in Stage 2 have been combined in “Camtasia Studio 9” program developed by TechSmith company and converted to mp4 video format and 2 files have been obtained.
2. Stage: 2 video files converted to mp4 format have been transferred to “Unity game motor” developed by Unity Technologies program. Representative images of Nizamülmülk and William I have been transferred to Unity as “target image” through “Vuforia engine developer portal” operating in integration with Unity program on the Internet. 2 target images transferred into the Unity program and connected to each other and 2 mp4 video files were integrated with each other and 2 separate “Android Package Kit (APK)” files were created.
3. Stage: “Nizamülmülk APK” file and “William I APK” file were shared with the teachers and students via Drive and uploaded to their cell phones and made available for use in the activity.

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Nizamülmülk Image

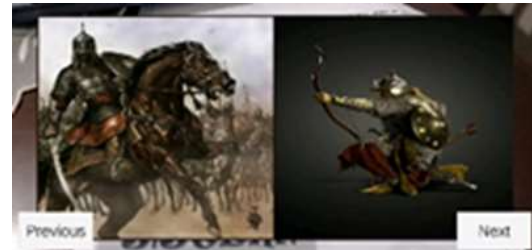
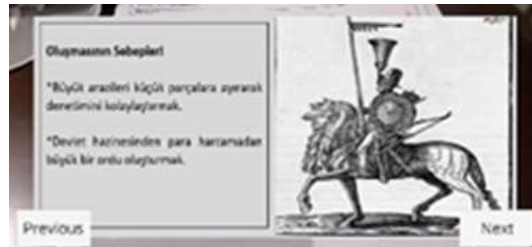


William I Image

Other two AR materials used in this activity is e-book where it includes the images and knowledge related to ikta system and e-book which includes the images and knowledge related to feudal system. When creating this e-book, following stages were used:

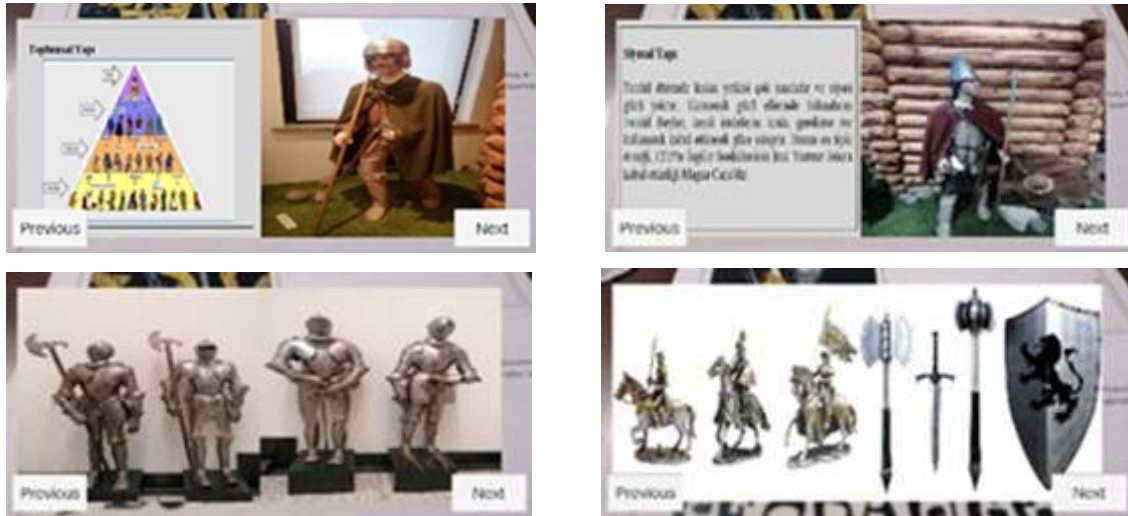
1. Stage: Visual images on ikta and feudality system and not requiring copyright were found and all these visual images in different format were converted to jpeg format and then, imported to the Unity program.
2. Stage: 2 visual images to be used in e-books via “Vuforia engine developer portal” were transferred to Unity as “target image”. 2 “target image” files transferred to the Unity program were integrated with the visual images related to ikta and feudality systems and 2 separate APK files were obtained.
3. Stage: “ikta e-book APK” file and “feudality e-book APK” file were shared with the teachers and students via Drive and uploaded to their cell phones and made available for use in the activity.

Screen shots of e-book sample images on ikta system



Screen shots of e-book sample images on feudality system

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2. Activities: *Rise of Islam:* This activity aimed at showing the changes occurred in Islam and Arab geography to the students. In this activity, 3 3D objects belonging to the Arab culture (Kaaba, mosque and camel) were prepared on 3D modelling pages on the Internet and transferred to Unity program. Then, 3 visual images were transferred to Unity program via “Vuforia engine developer portal” and integrated with the models and APK file was prepared. Additionally, events occurred in Islamic history were transferred to the students by infographics. In this infographic, a video regarding Battle of Badr prepared via 1 AR technology is displayed. Video used in this material and accessible and downloadable by everybody on YouTube and not requiring copyright was transferred to Unity program. After that, 1 visual image was transferred to Unity program via “Vuforia engine developer program via “Vuforia engine developer portal” and integrated with the video and APK file was prepared. “Islam object APK” and “Battle of Badr video APK” files were shared with the teachers and students via Drive and uploaded to their cell phones and made available for use in the activity.

Modelling images for the activity related to rise of Islam



Kaaba modeling



Camel modeling



Mosque modeling



Vide of Battle of Badr

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3. Activities: Da Vinci code: In this activity, empathy skill of students was developed along with the developments in science, technique, and art fields in Europe in the Middle Age. For this purpose, 19 plans drawn by Da Vinci in cultural, scientific, transport and art fields were displayed to the students as 19 AR materials. For this activity, “3Da Vinci” cell phone applications developed by the professionals were downloaded to the cell phones over AppStore and Play Store and used.

Sample modelling images for Da Vinci code activity



Printing machine mod.



Domed building mod.



Tank modelling



Castle modelling

Course activity, AR course observation form and student evaluation form prepared with 3 AR materials appropriate for 9th Grade explained in detail above were subjected to descriptive analysis being one of the qualitative research methods. Purpose in descriptive analysis is to present the findings in such a manner that they have been arranged and interpreted. Data obtained for this purpose are first described systematically and clearly (Yıldırım and Şimşek, 2008). With this method mostly used in analysis of qualitative data, first, analysis units were determined; themes and categories were identified and coded.

After coded results were reviewed again with the relevant themes and categories, they were compared with another data set and their validity and reliability were verified. The first 41 codes were created according to the responses given by the students to 19 questions in total. 4 of these questions were open-ended in the student evaluation form and other 15 questions were asked in 3 AR activities. Afterwards, codes were reviewed, combined and reduced to 30 codes in Excel file based on the main problem and purpose of the research. These 30 codes were grouped as positive and negative under the themes of “effectiveness”, “usefulness” and “suggestions”. Video records were kept in every stage of the research. The reason for this is to consider the likelihood of any occurrence during the observation or not available in the control list. Video records were watched again at the end of the application and positive and negative situations when using the materials were determined and compared with the relevant coding and categories.

Findings

In this section, main problem of the research was described as “what are the opinions of 9th grade students on use and efficiency of teaching materials designed with augmented reality technologies for the subjects of history lesson?” and findings and interpretations on the main problem were included in the scope.

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Research was conducted with the 9th grade 81 students in 4 practice schools and 4 open-ended questions in the student evaluation form and 15 questions in 3 AR activities; that is 19 questions in total were subjected to descriptive analysis and the themes, sub-themes and the codes created with the responses given by the students are provided in table 1.

Table 1: *Descriptive Findings (Codes) of 9th Grade Students for AR Materials*

Themes	Sub-Themes	Codes	Number Of Repetition		
Usefulness	Positive	Functionality / interactive	30		
		Realistic	18		
		Technology use	12		
		Practical/easy application	7		
		Image and 3D model are compatible with each other	5		
		Graphics are easy to understand	4		
		Camera perceives the image rapidly	3		
	Negative	Unrealistic	11		
		Simple/non-quality	6		
		Difficult to use and apply	4		
		3D model is faulty	3		
		3D model is not detailed	1		
		Effectiveness	Positive	Providing 3D detection	27
				Learning with animation/demonstration	26
Permanent learning	21				
Concrete	18				
More effective than reading and listening	16				
More interesting	14				
Relieving monotony	14				
Useful / Beneficial	9				
Creative	8				
Easy learning	7				
Providing an insight to the future	3				
Negative	Not contributing	9			
	Time-consuming	3			
	Distracting	2			
	Not desiring to connect to technology	1			
Suggestions		Animations and graphics should be developed	18		
		Sound and effect should be added	2		
		3D object samples should be increased.	1		

As it is seen in table 1, 30 codes were created from the responses given by the students to 19 questions in total in 3 AR and 1 evaluation forms. These codes were combined under the themes of practicality and effectiveness, and also proposals as the main problem of the research and grouped as positive and negative interpretations. Technical properties of AR materials in practicality theme and advantages and disadvantages occurring when using these materials were grouped as positive and negative based on the interpretations of the students. The most repeated one in positive

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interpretations is that AR materials are functional and interactive. In other words, that the students zoom the object in and out by touching the screen of the cell phone when examining 3D objects, rotating it with full turn, examine the object by zooming it in and examine it even by entering the inside of certain objects attracted their interest. The second mostly repeated student interpretation is that 3D objects are modelled very closely to their real ones. For instance, animated modelling of the printing house displayed in “Da Vinci” application became an effective material indicating how books, magazines and newspapers were copied and reproduced in the middle age and helped the students to study and learn the contribution of the printing house to cultural and scientific development. Technological side and practicality, easy application of the materials were positive interpretations made by the students in terms of its practicality. Based on this fact, it can be stated that students liked using their personal cell phones as a course material. Running the application easily and without any problem over their cell phones and taking part in the lesson in this way, closely studying the models in 3D format attracted their attention and found it practical.

Considering the negative interpretations in relation to its practicality; they suggested that the relevant modelling was not realistic, but it was simple/poor quality, its use and application was difficult, 3D model was faulty, and so on. Participation of the students in these activities with the cell phones with different technical features played a major role in most of these interpretations made in relation to the technical property of 3D material. Modelling is displayed in poor quality on the cell phones with low screen resolution and low camera pixel feature and therefore, images can be distorted. This caused the students who had to participate in the activity with such cell phones to make negative interpretations. As it can be in every activity in which a technological material is used, this situation can be accepted as the disadvantage of AR material. This disadvantageous situation even caused repetition numbers of positive and negative interpretations for realistic side of AR materials to be in maximum levels and close to each other.

In effectiveness theme, students generally made positive and negative interpretations on usefulness of AR material on learning and made certain proposals in this respect. Considering the mostly repeated positive interpretations; students found 3D perception useful for learning. Additionally, they stated that AR materials provided permanent learning by materializing things by means of animation. The fact that students found this method more useful than just listening and reading as traditional methods of history lessons and thus, history lessons become more interesting since this method caused monotony to be non-existent and the materials used were creative is quite remarkable. Considering the technical aspects of certain materials; “speaking portraits of Nizamülmülk and “William I” were found to be creative since students had not seen such a material in courses before. 163 positive interpretations in effectiveness theme indicate that students want to leave traditional methods but see AR materials more in the courses.

Considering the negative interpretations under the effectiveness theme; some students stated that AR material did not make much contribution to learning and the same knowledge could be learned through books or other materials. It was found that these interpretations were generally made by the students in the schools with high academic success. Since these students focus on exams, they regard the materials as waste of time and find reaching the same knowledge through books easier and more effective. On the other hand, the most effective tool for AR activities is cell phones. Distributing the cell phones, starting the application and the activities caused disciplinary problems to occur in the classroom from time to time and classroom order to be disturbed and this was considered to be both time-consuming and distracting for some students.

As for the interpretations made by the students for developing the activity and materials; they proposed that effectiveness of animation and graphics should be developed by adding sound and effects to the materials. Since some materials with animation in Da Vinci activity provide knowledge

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in terms of using the objects, they are more effective and the fact that students wish to see action, sound and effects in other 3D objects is quite normal.

Conclusion and Discussion

In this study, use and effectiveness of the materials prepared with augmented reality technology in the 9th grade history lesson have been evaluated. In this context, 3 course activities have been prepared and 27 AR materials in total have been applied to the students. Totally 15 questions in 3 activities and 4 questions in the student evaluation form were subjected to content analysis and codes were created and these codes were combined under the themes of practicality and effectiveness as the main question of the research and also, proposals.

Totally 79 positive and 25 negative interpretations were generally made by the students in practicality theme; whereas 163 positive and 15 negative interpretations were made in effectiveness theme and 21 interpretations containing proposals were made too. These results indicate that students have found 3D objects quality in terms of practicality, animations of 3D models effective and enjoyed the activity by interacting with the models. After all, participating in history lesson with their cell phones being the most valuable technological device of the 21st century and taking part in the lesson with an application attracted the students' interest. Seeing 3D form of the historical materials which they can see only as visual images in the textbooks or on the internet, examining these materials by rotating them with full turn and zooming them in or out and even entering the inside of some objects became very interesting and enjoyable for the students.

The fact that some objects are animated; for example, watching how the printing house works in motion, examining castle and Kaaba objects by entering the inside of them in such created environment and examining the pages of e-book related to ikta and feudality system with their fingers was found to be effective by the students in terms of practicality and learning.

Number of positive interpretations for both themes was grossly a lot. This indicates that 9th grade history materials prepared with AR technology are interactive and functional in terms of practicality, have ensured easy and practical participation in the lesson via cell phones and permanent learning through 3D perception and materialization and thus, relieved the monotony of the lesson and made it interesting and enjoyable.

Students expressed that the subjects of the lesson were easily remembered since the application was 3 dimensional and appealed to many senses in the lesson taught with AR application and moreover, it relieved the monotony of the lesson and made it more interesting and enjoyable. Accordingly, in their studies in which attention was drawn to AR applications in education environments, Çetinkaya and Akçay (2013) concluded as follows: "students were in interaction and cooperation with each other, learnt the subjects by actively participating in the process and interesting augmented reality applications appealing to different senses have a separate significance in the process of bringing students terminal behaviours." Similar conclusion was also expressed by Alınlı and Yazıcı (2020). In this context, according to the findings of the study they carried out in relation to the effects of AR applications on academic success of students and student attitudes, they concluded as follows: "students are more successful in the lessons taught by augmented reality application than the lessons taught by traditional method; they are more interested in and enthusiastic about participating in the lesson, subjects have become concrete thanks to the visual images and made learning internalized and additionally; the students in experimental group have positive attitudes towards the application."

However, certain problems were detected during the application as a result of the observations made when applying AR activities and after the relevant videos were watched again. First, cell phones of the students were kept locked in the cell phone cabinet in the classroom. Opening the cabinets, distributing the cell phones and starting the activity by opening the application caused waste of time

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and disturbance of classroom discipline. Another problem was that since the students used their personal cell phones, some of the students occasionally opened other applications on their cell phones than AR material. Additionally, it was observed that cell phones of the students did not support the application in the process of the lesson and video quality of 3D material on the phones with low video and screen resolution was low. This situation indicates that integration of the application with the technologies used is insufficient. These problems are frequently encountered during application of technological materials and can be accepted as disadvantageous aspect of the technological material. Considering the studies carried out in relation to the issue; in the study conducted by Koçoğlu, Akkuş and Özhan (2016) in relation to use of the application in social sciences education, technological limitations of this application and disadvantages such as technical problems on these devices were put forward. Still, in the study conducted by Taşkiran, Koral and Bozkurt (2015) on use of AR application for foreign language education, they stated that there were disadvantages arisen from technical reasons.

Suggestions

The results of this study and other studies on AR materials are generally positive. This application can be used easily and practically by integrating it into the curriculum and the books in history and other disciplines. Thus, teachers and students may know this technology more closely and use it in the lessons easily.

Creating materials through AR technology requires a low cost only at the beginning and after the application is prepared, it does not require any other cost. In other words, this technology can be used easily and without any cost for years through the visual images integrated into the textbooks. It is recommended preparing primarily, history textbooks and the textbooks of other lessons with this technology.

It is recommended to review the technical aspects in order to prevent the problems from occurring on technological materials and to design the materials with the help of computer and teaching technologies experts.

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