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# The future of augmented reality and an overview on the to researches: a study of content analysis

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**Abstract** The aim of this study is to define the researches and studies about augmented reality which were done in Turkey and to contribute and guide the researchers for further studies. With this purposes, as a result of literature researches, 36 articles about the researches in augmented reality are examined in details of the criterions. According to the results of the research, most of the works were written in 2016. In these works, it was seen computer was used most with the camera, and three dimensional software (3D) was used. Qualitative research method was applied as the research method and the research design was scanning. The documents were the data collection tool. This research was applied to the undergraduate students and secondary school students, equally. The Distribution of the sources the researchers used was between 1 and 20 sources. With these obtained results, there will be a contribution to the further researchers and field is thought.

**Keywords** Augmented reality · Education · Technology · Content analysis

## 1 Introduction

Technology has reshaped with the contribution of education. While people were trying to find ways to reach knowledge, they ended up finding new methods and technologies to reach the knowledge. From this point of view, it is expected that the people who reaches the knowledge with the help of technology will grow up new generations who will also use it in the same way. Within this context, it has importance in using technology and searching methods for it. By the time the concept of educational technologies began to arise, the computer which had been used as a support at the beginning became an effective tool for education (Tezer and Bicen 2008).

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The concept of educational technologies has expanded in time (Gülcü et al. 2013).These developments were enhanced and designed in accordance with the needs of the education and has become to its shape today. The features of the developments are important in the process of acknowledgment the innovation (Rogers 2003). The phenomenon finding an alternative to the existing methods for education increases the speed and effectiveness of the student in a learning process. To provide this, learning techniques in-class should be shaped in a way that helps the students to have effective experiences (Psycharis, 2008). New approaches and tools have occurred, depended on the developments in the education. Teachers and learners can be more effective in the methods which are supported by technology (Jiang 2014; Bicen and Uzunboylu 2013).It is necessary to provide the teachers to follow and use the developments effectively and make the teachers gain this conscious with workouts.

Augmented reality are the environments in which there is a simultaneously sensory area between the real world and cyber world (Özarslan 2011). Providing opportunities to users to have an interaction with the events, objects and knowledge just as in the real world (Wojciechowski and Cellary 2013) increasing the interaction of the individuals' technological tools which they will use in education and also providing learning in an enjoyable environment to increase the motivation of the opportunities and making the learning process more active and effective are emphasized (Alsumait and Al-Musawi 2013). In most of the departments, education is the first thing that comes into mind when you think about Augmented Reality technologies (Çinar and Akgun 2015).

The target of the education should be supported with the multimedia materials such as pictures, texts, audios, 2D or 3D animations and videos (Wang et al. 2013). Learning process has some difficulties, but with Augmented Reality's remarkable aspect, it is easy to provide the real and detailed systems or visual objects (Hsiao and Rashvand 2011). In the technological learning process, the need of the experiences in learning the real is clear. Education, in which senses are used, are more effective and depended on this idea, to be able to use Augmented Reality more in education, it has been developed day by day (Luckin and Fraser 2011). The potentials which Augmented Reality will provide in education has been searched a lot recently (Kesim and Özarslan 2012). New approaches has been seen more in literature researches so far and it is thought to provide more benefits in education in the future (Martin et al. 2011).

In this study, the researches which are about augmented reality and its usage or search in Turkey are examined in content analysis method. The two content analysis method in Turkey were examined and different criterions and unique perspective were defined to analyse the researches. The aim of this study is to analyse augmented reality studies in content analysis based on unique perspectives and guide the research or researchers for further studies.

With the aim of this study, answers of the questions below are looked for answers:

1. What are the Distributions of the years in which the researches were written?
2. What are the Distributions of devices which were used in the research process?
3. What are the Distributions of the software in the research process?
4. What are the Distributions of the methods in the research process?
5. What are the Distributions of the research design?
6. Which data collection tools are used and what are their Distributions?
7. What are the types of the samples and their Distributions?
8. What are Distributions and number of the sources which were used in the research?

## 2 Method

In this study, content analysis method was used to examine the studies in augmented reality's areas of usage.

The literature research should be examined to define new methods and should have the features to guide the further studies (Cohen et al. 2007).To have the data of the research, articles which were written and published about augmented reality on the web were analysed.

The articles written in Turkey were limited with these concept or words in their titles or key words: Augmented Reality, Education, Technology, and Content Analysis; regardless of their years. Content analysis method is an approach which provides to examine verbal or other materials in a systematic and formal way (Tavşancıl and Aslan 2001). When the information is considered within this context, the 36 articles which were obtained at the end of the scanning from google scholar database process were also examined. They are given in "Appendix". The Distribution of years of articles which were examined in the research were given in Table 1.

### 2.1 The data collection tool

The criterions which were formed after having interviews with the professionals on educational technologies were regulated as the data collection tool form. The order of the criterions of this form is: the year of the article, the devices used in the study, the software used in the study, the method of the article, the research design of the article, the data collection tools, the types of the samples and the number of the sources; respectively.

### 2.2 Data analysis

The data collected from articles which were examined with content analysis method were resolved with descriptive analysis (percentage and frequency). With the generated data and the frequencies which are the frequencies given as answers to the research questions and depended on the percentage, frequencies were calculated. The digital data gained from this calculation were presented by tables.

**Table 1** The distribution of the years of the articles

| Years | (f) | (%) |
|---|---|---|
| 2010 | 1 | 2.5 |
| 2011 | 1 | 2.5 |
| 2012 | 3 | 7.6 |
| 2013 | 2 | 5.1 |
| 2014 | 7 | 17.9 |
| 2015 | 13 | 33.3 |
| 2016 | 9 | 23.0 |
| Total | 36 | 100 |

## 3 Results

With the key words defined by scanning, 36 articles were reached. In accordance with the criterions, 36 articles were included in this study.

The results were interpreted, considering the questions formed in the content analysis process and their order, in the tables.

In augmented reality researches, computers and camera (depended on the computers) were seen to be used a lot, is seen in Table 2. After the computer, "mobile phones" and "tablet PC". "Nova 500" and "Prolab" were used equally (Table 3).

When the software which is used in searching process are considered, the researchers were seen to use three-dimensional-software (3D) more. "Augmented", "QR code" and "others" were also defined to be used. The other software in the table (Java, Adobe flash, Aurasma, Color mix, ARGE3D, SARAS) were used equal (1).

In Table 4, the research method which were gained at the end of scanning were given. According to this table, "Qualitative method" and "Mixed method" were used equally. There were also "Quantitative method" and others.

The research design of the examined studies were given in Table 5. According to the data gained from the studies considered quantitative, qualitative and mixed methods, the research design was used most. In this design, "Full-experimental", "Situation Analysis", "Semi-experimental" and "Content Analysis" were used. Phenomenology and Casual Comparative research were used equally and there was no undefined research design.

In Table 6, the results of the Distributions of the data collection tools in the studies are seen. When the articles were considered, more than one data collection tool were used in some studies. The data were handled separately and the frequencies were defined. The researchers were seen to use documents (15) most, and in survey collection (11), Likert scale (10) and open ended questions (1) were used. In data collection scale, interview (4) was used as structured and semi-structured, equally and it is used as observation.

Table 7 is about the types of the samples attended to the studies. Most of them were university students, also secondary school students (7) and high school students (2) were defined as the types of samples.

The analysis made according to the number of the References used in the examined studies are shown in Table 8. The References were defined to be between 01–20 (8), 21–40 (15) and 41–50 (3), maximum in the articles.

**Table 2** The distributions of the devices used

| Devices | (f) | (%) |
|---|---|---|
| Computers | 8 | 26.6 |
| Camera | 8 | 26.6 |
| Mobile phones | 7 | 23.3 |
| Tablet PC | 6 | 20.0 |
| Nova 500 | 1 | 3.3 |
| ProLab | 1 | 3.3 |
| Total | 30 | 100 |

**Table 3** The distribution of the software used in the study

| Software | (f) | (%) |
|---|---|---|
| (3D) Design software | 7 | 35.0 |
| Augment | 2 | 10.0 |
| QR code | 2 | 10.0 |
| Java | 1 | 5.0 |
| Adobe flash | 1 | 5.0 |
| Aurasma | 1 | 5.0 |
| Color mix | 1 | 5.0 |
| ARGE3D | 1 | 5.0 |
| SARAS | 1 | 5.0 |
| Other | 3 | 15.0 |
| Total | 20 | 100 |

**Table 4** The distribution of research methods

| Research method | Frekans (f) | Yüzdelik (%) |
|---|---|---|
| Qualitative method | 6 | 15.3 |
| Mixed method | 6 | 15.3 |
| Quantitative method | 5 | 12.8 |
| Other | 19 | 56.4 |
| Total | 36 | 100 |

**Table 5** The distribution of the research designs

| Research design | Frekans (f) | Yüzdelik (%) |
|---|---|---|
| Scanning | 12 | 30.7 |
| Full-experimental | 10 | 25.6 |
| Situation analysis | 6 | 15.3 |
| Semi-experimental | 3 | 7.6 |
| Content analysis | 2 | 5.1 |
| Phenomenology | 1 | 2.5 |
| Casual comparative research | 1 | 2.5 |
| Other | 1 | 2.5 |
| Total | 36 | 100 |

## 4 Conclusion and recommendations

In accordance with the criterions defined in 36 articles reached at the end of the research were examined with data analysis method. The studies were seen to focus on scanning and research rather than applied studies. In other words, they were to define the existing situations. Because the scanning method was used a lot, it is weaker to implement. Therefore, augmented reality is seen to remain in research level in our country.

Besides the continuation of the studies for this field, applied studies should be used together with them and they should improve each other. Augmented reality software's search and usage will expedite this process and it will develop the application and expedite applied studies. According to the data collected from the research in Table 4, it was seen

**Table 6** The distribution of the data collection tools

| Research methods | (f) | (%) |
|---|---|---|
| Survey | | |
| Likert scale | 9 | 25.6 |
| Open ended questions | 1 | 2.5 |
| Interview | | |
| Structured | – | 0.0 |
| Semi-structured | 1 | 5.1 |
| Observation | 5 | 12.8 |
| Documents | 15 | 48.7 |
| Total | 36 | 100 |

**Table 7** The distributions of the samples

| The types of the samples | (f) | (%) |
|---|---|---|
| University students | 7 | 17.9 |
| Secondary school students | 7 | 17.9 |
| High school students | 2 | 5.1 |
| Other | 20 | 58.9 |
| Total | 36 | 100 |

**Table 8** The distribution of the number of references

| Number of references | Frekans (f) | Yüzdelik (%) |
|---|---|---|
| 01–20 references | 18 | 48.7 |
| 21–40 references | 14 | 38.4 |
| 41–50 references | 4 | 7.6 |
| Total | 36 | 100 |

that the researchers used Qualitative and Mixed method in their studies. Within these studies, the remarkable data was, in sample table, university students, high school students and secondary school students were the samples; respectively Akça-Üstündag (2009), and Şimşek et al. (2008). Therefore the researchers chose their sample levels mainly from university students. Within the examined studies in this research, it was seen that there were no research or study in primary school students or pre-school students.

However, in the process of making sense of the information, the visual materials, which are used intensely, can be supported with augmented reality and the meaning and its influence can be increased. Also it can give more effective results compared to classical system when their Distributions of ages are considered. The limited Distribution of the samples will also limit the further studies in this field. From this point of view, enlarging the Distribution of the samples is very important. According to Erdoğmuş (2009), this problem derived from the researchers' anxiety to gain the information easily and in a short time. Another point in the sample table is also the researches which were done with the candidate teachers were very few. In one of the studies done by Bal and Bicen (2016) showed that the lessons supported by augmented reality also affected the academic success of the teachers and their opinions towards the lesson changed positively. The basis of the education, which is given to the students, is the teachers. So it is necessary to provide and

improve their knowledge of technological improvements and researches. Teachers must utilize technologies to automate or eliminate time-consuming tasks, they are able to more effectively differentiate the instruction Davies et al. (2013).

## Appendix: Ek 1

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