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# THE DOCUMENT ANALYSIS OF GRADUATE THESES ON THE SUBJECT OF THREE-DIMENSIONAL VIRTUAL ENVIRONMENTS IN TURKEY

**Gamze Mercan[1], Pınar Köseoğlu[2]**

*Bilimsel Araştırma Makalesi*

**Abstract**

This research aims to examine the graduate theses on the subject of three-dimensional virtual environments, which is one of the outputs of rapid developments in the field of Information and Communication Technology (ICT), based on their demographic characteristics, research topics, research methodology, findings chapter, discussion and conclusion chapter, and suggestions chapter. This research is conducted with the document analysis method, one of the qualitative research methods. The documents analyzed in the research consist of 15 graduate theses, 11 master theses, and 4 doctoral dissertations, which were published in the National Thesis Center of Turkey between January 2010 and August 2020 on the subject of three-dimensional virtual environments. Analytical themes were used to analyze the data obtained in the study in relation to descriptive analysis and descriptive themes obtained as a result of the deductive analysis. As a result of the research, it was found that there were a limited number of graduate theses on three-dimensional virtual environments.

**Keywords:** document analysis; three-dimensional virtual world; graduate theses.

# TÜRKİYE'DE ÜÇ BOYUTLU SANAL ORTAMLAR KONUSU ÜZERİNE YAPILMIŞ LİSANSÜSTÜ TEZLERİN DOKÜMAN İNCELEMESİ

**Öz**

Bu araştırmanın amacı, Bilgi ve İletişitim Teknolojileri (BİT) alanındaki hızlı gelişmelerin çıktılarından biri olan üç boyutlu sanal ortamlar konusu üzerine yapılmış lisansüstü tezlerin demografik özellikleri, araştırma konuları, araştırma yöntemleri bölümü, bulgular bölümü,

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tartışma ve sonuç bölümü ve öneriler bölümüne göre incelenmesidir. Araştırmanın yöntemi, nitel araştırma yöntemlerinden doküman incelemesidir. Araştırmanın çalışma dokümanını Ocak 2010- Ağustos 2020 yılları arasında üç boyutlu sanal ortamlar konusu üzerine yapılmış Ulusal Tez Merkezi'nde yayımlanan 11 yüksek lisans ve 4 doktora tezi olmak üzere toplam 15 lisansüstü tezden oluşmaktadır. Araştırmada elde edilen verilerin analizinde, tümevarımsal analiz sonucu elde edilen betimsel analiz ve betimleyici temalarla ilişkili olarak analitik temalar da kullanılmıştır. Araştırma sonucunda, üç boyutlu sanal ortamlar konusunda yapılmış lisansüstü tezlerin az sayıda olduğu saptanmıştır. İlgili alanyazında üç boyutlu sanal ortamların uygulamasına yönelik yapılacak yeni çalışmalarda araştırmacılara konuyla ilgili uygulamalarda ışık tutacağı ve eğitim bilimleri ve teknolojileri alanına kaktı sağlayacağı düşünülmektedir.

**Anahtar Kelimeler:** doküman incelemesi; üç boyutlu sanal dünya; lisansüstü tez.

## Geniş Özet

Bilgi ve iletişitim teknolojileri (BİT) ile entegre olmuş alanlarda yapılan araştırmalarda tasarlanan öğretim ortamları, öğrencilere günlük yaşantılarındaki bir durumu güvenli ve etkin bir şekilde öğrenebilecekleri ve çeşitli roller alabilecekleri sanal bir ortam sunmaktadır. İlgili alan yazımda öğretim programına uygun tasarlanan öğrenme ortamlarında; öğrencilerin ilgi, sahiplik ve sorumluluk kazanmalarında ve öğrenme motivasyonlarını arttırmada etkili olduğu saptanmıştır (Bogusevschi, Muntean ve Muntean, 2020; Suprapto, Chaidir ve Ardiansyah; 2020; Silva, ve diğerleri, 2019; Altan, 2011; Barab ve diğerleri, 2010; Tüzün, Yılmaz-Soylu, Karakuş, İnal ve Kızılkaya, 2009; Tüzün, Arkün, Bayırtepe-Yağız, Kurt ve Yermeydan-Uğur, 2008; Barab ve diğerleri, 2007).

Bu araştırmanın amacı, Bilgi ve İletişim Teknolojileri (BİT) alanındaki hızlı gelişmelerin çıktılarından biri olan üç boyutlu sanal ortamlar konusu üzerine yapılmış lisansüstü tezlerin demografik özellikleri, araştırma konuları, araştırma yöntemleri, bulgular bölümü, tartışma ve sonuç bölümü ve öneriler bölümüne göre incelenmesidir.

Araştırmada BİT alanında üç boyutlu sanal ortamlar konusu üzerine yapılmış lisansüstü tezlerin konusu, yöntem, sonuç, öneri ve sınırlılıklarına göre ayrıntılı olarak ele alınması amaçladığından nitel araştırma yöntemlerinden doküman incelemesi kullanılmıştır. Araştırmada Türkiye'de üç boyutlu sanal ortamlar konusu üzerine Ocak 2010- Ağustos 2020 tarihlerinde yapılmış lisansüstü tezlerin incelenmesi amaçlandığından Yükseköğretim Kurulu Başkanlığı (YÖK) Ulusal Tez Merkezi'nin veri tabanı kullanılarak 1 Eylül 2020'de tarama gerçekleştirilmiştir. Tarama sonucunda Ocak 2010- Ağustos 2020 tarihleri arasında belirlenen ölçütler doğrultusunda; 11 yüksek lisans tezine ve 4 doktora tezine ulaşılmıştır

Araştırmanın veri toplama aracı olarak Çağlı (2019) ve Orakcıoğlu (2019)'un yüksek lisans tezlerinde kullandığı doküman incelemesi başlıkları ele alınarak araştırmacı tarafından birleştirerek kullanmıştır. Bu başlıklar lisansüstü tezlerin demografik özellikleri (tez türü, yıl, üniversite, yayın dili, tez danışmanlarının unvanları, enstitü türü, anabilim dalı), tezlerin araştırma konuları, araştırma yöntemleri, bulgular bölümü, tartışma ve sonuç bölümü, öneriler bölümüdür.

Araştırmada belirlenen ölçütlere göre 11 yüksek lisans tezi ve 4 doktora tezi olmak üzere toplam 15 lisansüstü teze ulaşılmıştır ve ele alınan tezlerin analizinde betimsel analiz kullanılmıştır. Buna göre kodlamaların betimsel analizinde ilgili alanyazındaki kuramsal çerçeveden yararlanmıştır. Buna göre, edilen kodlar benzerlik ve farklılıklarına göre

karşılaştırılarak hiyerarşik bir ağaç yapısı oluşturacak şekilde gruplandırılarak betimleyici temalar oluşturulmuştur.

Araştırma kapsamında incelenen yüksek lisans tezlerin oranının doktora tezlerine göre daha yüksek olduğu saptanmıştır. Yıla göre yüksek lisans tezlerinin dağılımının 2010, 2012, 2013 ve 2019 yıllarında yüksek olduğu, doktora tezlerinde ise 2016, 2017, 2018 ve 2019 yıllarında eşit olarak dağılımının olduğu görülmüştür. Bu durumun sebebinin son yıllarda eğitimde bilgi işlem teknolojilerinin entegrasyonu sonucu ortaya çıkan yeni öğrenme yaklaşımları olduğu söylenebilir. Üç boyutlu sanal ortamlarla ilgili yapılan yüksek lisans tezlerinin en çok Hacettepe Üniversitesi'nde yapıldığı; doktora tezlerinin ise en çok Atatürk Üniversitesi'nde yapıldığı saptanmıştır. İlgili üniversitelerdeki öğretim üyelerinin çalışma alanları olması sonuçlarla örtüşmektedir. İncelenen lisansüstü tezlerin yayın dilinin tamamına yakınının Türkçe olduğu, ancak yüksek lisans tezlerinden yabancı dil öğreniminde üç boyutlu sanal ortamların kullanıldığı araştırmanın yayın dilinin Almanca olduğu görülmüştür. İncelenen yüksek lisans tezlerinin tez danışmanlarının unvanlarının en çok Doktor Öğretim Üyesi / Yardımcı Doçent Doktor olduğu; doktora tezlerinde ise Doçent Doktor ve Profesör Doktor unvanlarının eşit oranda olduğu belirlenmiştir. Enstitü türüne göre yüksek lisans tezlerinin en çok fen bilimleri enstitüsünde yapıldığı, doktora tezlerinde ise tamamının eğitim bilimleri enstitüsünde yapıldığı saptanmıştır. Son yıllarda Bilgisayar ve Öğretim Teknolojileri Eğitimi Anabilim Dalı'nın eğitim bilimleri enstitüsüne bağlı programlar arasında yer almasından kaynaklanmaktadır.

Araştırma kapsamında incelenen yüksek lisans tezlerinin araştırma konularının dağılımına bakıldığında üç boyutlu sanal ortamlarda yeni tasarımların geliştirilmesi ve üç boyutlu sanal ortamlarla ilgili öğrenci deneyimleri/görüşleri hakkında olduğu saptanmıştır. Doktora tezlerinde ise; üç boyutlu sanal ortamlarda yeni tasarımların geliştirilmesi hakkında olduğu saptanmıştır. Çağdaş bir yaklaşımla, çağımızın gerektirdiği teknolojik imkanlardan yararlanmanın önemli olduğu günümüzde eğitim alanında üç boyutlu sanal ortamlarda geliştirilen eğitim içeriklerinin diğer öğretim yöntemlerinden faklı olarak öğrencilerin aktif öğrenmelerine katkı sağlamalarına yardımcı olabilecek alternatif bir öğretim yöntemi olduğunu gösterir niteliktedir. Yüksek lisans tezlerinde en çok işlenen ikinci konu ise öğrencilerin üç boyutlu sanal ortamlarda hakkındaki görüş ve deneyimlerini ortaya çıkarmaya yönelik olup, farklı bir öğrenme yöntemi olarak hedef kitlede bulunan öğrenci ya da öğrenicilerin düşüncelerini ortaya çıkarmak hedeflenmiştir.

Araştırma kapsamında incelenen yüksek lisans ve doktora tezlerinin örnekleme yöntemine göre, en fazla amaçlı örnekleme yöntemi olduğu saptanmıştır. Doktora tezlerinde ise en çok karma araştırma yöntemleriyle yapıldığı görülmektedir. Yüksek lisans ve doktora tezlerinin araştırma modellerinden nicel araştırma modellerinden en fazla gerçek deneysel desen kullanıldığı saptanmıştır. Yüksek lisans ve doktora tezlerinin nitel araştırma yöntemlerinden durum çalışması/örnek olay deseni; karma araştırma yöntemlerinden açımlayıcı sıralı desenin kullanıldığı saptanmıştır. Yüksek lisans ve doktora tezlerinin nicel veri toplama araçlarından en fazla anketin kullanıldığı; nitel veri toplama araçlarından ise en fazla görüşme formu kullanıldığı görülmüştür.

Yüksek lisans tezlerinde kullanılan nicel analiz tekniklerinden en fazla iki yönlü kovaryans analizinin (ANCOVA) olduğu; nitel analiz tekniklerinde ise betimsel analiz ve içerik analizin aynı oranda kullanıldığı saptanmıştır. Doktora tezlerinde ise en fazla tek faktörlü varyans analizi (ANOVA) kullanıldığı; nitel analiz tekniklerinde en fazla içerik analizinin kullanıldığı saptanmıştır.

Araştırma kapsamında incelenen yüksek lisans tezlerin %86,66'lık ortalama ile doktora tezlerinde ise bulgular bölümünün %100 ortalama ile bilimsel araştırmaların bulgular bölümünde olması gereken temel unsurları içerdiği görülmüştür. Araştırma kapsamında incelenen yüksek lisans tezlerinin %36,36'sında araştırmanın sınırlılıkları tartışılırken %63,63'ünde araştırmanın sınırlılıkları tartışılmamıştır. İncelenen doktora tezlerinin de tamamında bulgularını alanyazınla desteklemiş, ancak sınırlılıkları tartışılan araştırmaların %50'sinde araştırmanın sınırlılıkları tartışılırken %50'sinde araştırmanın sınırlılıkları tartışılmamıştır. Çalışma kapsamında incelenen doktora tezlerinin öneriler bölümü tamamında tamamında bulunurken, yüksek lisans tezlerinin %80,50'sinde bulunmaktadır.

## Introduction

With the increase in the use of graphical features of virtual worlds, examples of virtual reality (VR-Virtual Reality) systems and three-dimensional virtual worlds, which are described as immersive, started to increase rapidly after the 1990s. In this process, 3D virtual worlds such as Worlds Inc, Active Worlds, which have 3D graphical features, whose contents are created by their users and allow socialization, were developed. Furthermore, spatial audio communication features started to be used in 3D virtual worlds such as Onlinve!, Traveler, and Second Life (Dionisio et al., 2011; Livingstone et al., 2008). In the 2000s, advanced tools (graphic design, programming language use, etc.) were offered for the content creation (designing environments or objects, customizing avatars) in 3D virtual worlds by users. 3D virtual world users took part in the content creation more often, and since 2007, open-source virtual world systems were created where they can contribute to improving the features of the 3D virtual world. Solipsis and OpenSimulator are examples of open-source three-dimensional virtual worlds (Dionisio et al., 2011). After the 2010s, software, and hardware virtual reality technologies have been integrated into 3D virtual worlds.

Various virtual communities, such as 3D virtual worlds, online games, and social networks, include purpose (interaction purpose), setting (fully virtual or partially virtual), platform (synchronous, asynchronous, or both), population (small or crowded group structure, or strong, weak, and stressed group character) and profit return criteria. Thus, it is easier for various organizations or individuals to determine which features of virtual communities are suitable for them (Porter, 2004). For 3D virtual worlds, besides the basic criteria of purpose, environment, platform, population and profit returns, their main focus also constitutes another classification dimension. Accordingly, education (design, health, language education, etc.), theme (music), communities (such as China, Japan), child-oriented and self-determined 3D virtual world types were determined. Active-Worlds, Forterra education, vSide theme, HiPiHi, Cyworld network, Whyville, and Habbo are examples of child-oriented virtual worlds, and Kaneva and Second Life are of self-determined virtual worlds (Messinger et al., 2009). Self-determined virtual worlds are one of the most important types compared to the others since the property rights and economic activities provided in some virtual worlds in this category affect the consistency of individuals with real-world goals in many areas such as business life, entertainment, content design, communication, and social interaction (Messinger et al., 2009). The first and most important 3D virtual world in this category is Second Life.The teaching environments designed in research offer students a virtual environment where they can learn an authentic situation safely and effectively and act in various roles. The relevant literature determined that the learning environments designed

in accordance with the curriculum are effective in attracting attention, ownership, and responsibility and they increase learning motivation (Bogusevschi, Muntean & Muntean, 2020; Suprapto, Chaidir, & Ardhurst; 2020; Silva et al., 2019; Altan, 2011; Barab et al., 2010; Tüzün, Yılmaz-Soylu, Karakuş, İnal & Kızılkaya, 2009; Tüzün, Arkün, Bayırtepe-Yağız, Kurt, & Yermeydan-Uğur, 2008; Barab et al., 2007). In summary, 3D multi-user virtual worlds can be considered as alternative platforms that can support hybrid and distance education applications.

Based on this background, this study aims to synthesize the graduate theses on the subject of three-dimensional virtual environments based on demographic characteristics, research topics, research methodology, findings chapter, discussion and conclusion chapter, and suggestions chapter. With regards to the research objective, answers to the following questions were sought:

- What are the demographic characteristics of the graduate theses (year, university, thesis type, publication language, titles of thesis advisors, type of institute, department)?
- What are the research topics of graduate theses?
- What are the research methods (sampling method, research model, data collection tools, data analysis techniques) used in graduate theses?
- How is the findings chapter of graduate theses in the context of the basic elements available in scientific research?
- How is the discussion and conclusion chapter of graduate theses in the context of the basic elements available in scientific research?
- How is the suggestions chapter of graduate theses in the context of the basic elements available in scientific research?

Since there was no previous document analysis research conducted about the three-dimensional virtual environments in Turkey, this study is expected to shed light on new research for the use of three-dimensional virtual environments and contribute to the field of educational sciences and technologies.

## Method

### Research Model

The document analysis method was used in this research. Document analysis includes analysis of written sources/materials containing information about cases or phenomenon intended to be examined within the scope of the research (Yildirim & Şimşek, 2018). In this method, the researcher's goal is to reveal the objectives of academic studies conducted mostly in relation to the topic they choose, what theoretical framework and the method it is based on, and the results of the research (Hammad & Hallinger, 2018).

The researcher can benefit from the theories in the relevant literature as well as use the categories they develop in a qualitative analysis in which the document analysis is used (Yecke, 2005). However, in both cases, categories that provide data for analysis should be created in advance for the research purpose because these categories constitute the basic parts of document analysis. The graduate theses analyzed based on the research purpose were investigated regarding the research subject, method, result, suggestion, and limitations.

**Research Document**

As this research aims to investigate the graduate theses conducted about three-dimensional virtual environments in Turkey between January 2010 and August 2020, the document reviews were carried out on September 1, 2020, using the database of the Council of Higher Education Thesis Center. The review criteria of the graduate theses included in the study are as follows: search terms were selected as "three dimensional," search field was chosen as "title," search type was selected as "includes," the other term to be searched included "virtual," the discipline to be searched was chosen "all," and year interval was selected between 2010 and 2020. Besides, the thesis type was first picked "master theses" and then "doctoral dissertation," and the access type was selected as "authorized." The group, language, and university sections were left blank. As a result of the search, the following theses were accessed between January 2010 and August 2020 in line with the criteria determined.

- 11 master theses,
- 4 doctoral dissertations.

Table 1 presents the general characteristics of 11 master theses and 4 doctoral dissertations examined within the scope of the research.

**Table 1.** General Characteristics of Graduate Theses Examined in the Research

| No | Author | Year | Thesis Title | Type of Thesis |
|---|---|---|---|---|
| 1 | Bülent Ermiş | 2010 | The point of views of the 6th class students about the "three-dimensional virtual museum visit" activity in the visual arts lesson | Master Thesis |
| 2 | Fatih Özdinç | 2010 | Utilization of three-dimensional multi-user virtual environments for orientation purposes | Master Thesis |
| 3 | Barış Çukurbaşı | 2012 | Five stage model application in three dimensional virtual environments | Master Thesis |
| 4 | Dilek Doğan | 2012 | The effect of using maps in three-dimensional multi-user virtual environments on the duration of task completion | Master Thesis |
| 5 | Ulaş İlic | 2013 | Three dimensional virtual environment application in foreign language education | Master Thesis |
| 6 | Bahattin Selim Pamukcu | 2013 | Development of 3-d online virtual learning environments that support collaborative learning and evaluation of usability | Master Thesis |
| 7 | Denizer Yıldırım | 2013 | Utilization of three-dimensional multi-user virtual environments for cooperative team works | Master Thesis |
| 8 | Ömer Koçak | 2016 | The effects of three dimension cartoons on preschool children's concept development of position on the space | Doctoral Dissertation |
| 9 | Neslihan Sönmez | 2016 | Determining social and sociomathematical norms in 3d virtual learning environments: Mathlife case | Master Thesis |

| | | | | |
|---|---|---|---|---|
| 10 | Murat Çoban | 2017 | Effects of earthquake education via three-dimensional earthquake game on primary school students' academic achievement, motivation, and views | Doctoral Dissertation |
| 11 | Şirin Küçük Avcı | 2018 | The impact of three dimensional virtual environments and augmented reality applications on learning achievement: a meta-analysis study | Doctoral Dissertation |
| 12 | Yasemin Topuz | 2018 | The comparison of virtual reality and desktop three-dimensional materials in anatomy teaching in terms of academic performance and cognitive load | Master Thesis |
| 13 | Dilek Doğan | 2019 | Instructional design process in three-dimensional multi-user virtual environments based on problem-based learning approach | Doctoral Dissertation |
| 14 | Zeynep Siyamoğlu | 2019 | Determining student preferences for character design in three dimensional educational virtual environments | Master Thesis |
| 15 | Yusuf Akyıldız | 2019 | Determination of the contribution of a digital 3d learning game in German as a foreign language class to teacher training candidates and their opinions | Master Thesis |

**Data Collection Tool**

The document analysis titles used by Çağlı (2019) and Orakcıoğlu (2019) were adapted and re-used by the researcher as the data collection tool of the research. These titles are presented below:

- Demographic features of graduate theses (thesis type, year, university, publication language, titles of thesis advisors, type of institute, department),
- Research topics of graduate theses,
- Research methods of graduate theses (research sampling method, research model, data collection tools, data analysis techniques),
- Findings chapter of graduate theses (answering research questions in the findings chapter, presenting the findings in the form of charts or graphics, and explaining the presented charts or graphs),
- Discussion and conclusion chapter of the graduate theses (the findings of the research should be supported by the literature, sufficient explanations were given for each finding, the appropriateness of the comments made to the findings, and the discussion of the limitations of the study),
- The suggestions chapter of graduate theses (suggestions based on research results and suggestions for further research).

**Data Analysis**

A total of 15 graduate theses, including 11 master theses and 4 doctoral dissertations, were accessed regarding the criteria determined in the research, and descriptive analysis was used in the analysis of the theses reviewed. Accordingly, the study used the theoretical

framework in the relevant literature in the descriptive analysis of the coding (Miles & Huberman, 2015). Then, the codes were compared according to their similarities and differences, and descriptive themes were formed by grouping them to form a hierarchical tree structure. Each created group is called a theme. Each theme is discussed in a grouped way to include its definitions and meanings (Thomas, & Hardene, 2008).

## Findings

The findings of the demographic characteristics of the graduate theses examined within the scope of the research are given in Table 2.

**Table 2.** Findings Regarding the Demographic Features of the Graduate Theses in the Research

| Demographic Features | | | Frequency (f) | Percentage (%) |
|---|---|---|---|---|
| Thesis Type | Master Thesis | | 11 | %73,33 |
| | Doctoral Dissertation | | 4 | %26,66 |
| Year | Master Thesis | 2010 | 2 | %13,33 |
| | | 2012 | 2 | %13,33 |
| | | 2013 | 2 | %13,33 |
| | | 2016 | 1 | %6,66 |
| | | 2018 | 1 | %6,66 |
| | | 2019 | 2 | %13,33 |
| | Doctoral Dissertation | 2016 | 1 | %6,66 |
| | | 2017 | 1 | %6,66 |
| | | 2018 | 1 | %6,66 |
| | | 2019 | 1 | %6,66 |
| University | Master Thesis | Gazi University | 2 | %13,33 |
| | | Hacettepe University | 3 | %20 |
| | | Balıkesir University | 1 | %6,66 |
| | | Ege University | 1 | %6,66 |
| | | Karadeniz Technical University | 1 | %6,66 |
| | | Marmara University | 1 | %6,66 |
| | | Trabzon University | 1 | %6,66 |
| | | Uludağ University | 1 | %6,66 |
| | Doctoral Dissertation | Atatürk University | 2 | %13,33 |
| | | Hacettepe University | 1 | %6,66 |
| | | Necmettin Erbakan University | 1 | %6,66 |
| Publication Language | Master Thesis | Turkish | 10 | %66,66 |
| | | German | 1 | %6,66 |
| | Doctoral Dissertation | Turkish | 4 | %26,66 |
| Titles of Thesis Advisors | Master Thesis | Assistant professor doctor | 5 | %3,33 |
| | | Associate professor | 4 | %26,66 |
| | | Professor doctor | 2 | %13,33 |
| | Doctoral Dissertation | Associate professor | 2 | %13,33 |
| | | Professor doctor | 2 | %13,33 |

| | | | | |
|---|---|---|---|---|
| Institute | Master Thesis | Institute of education sciences | 4 | %26,66 |
| | | Institute of science | 6 | %40 |
| | | Institute of graduate education | 1 | %6,66 |
| | Doctoral Dissertation | Institute of education sciences | 4 | %26,66 |
| | | Computer education and instructional technology | 7 | %46,66 |
| Department | Master Thesis | Fine arts education | 1 | %6,66 |
| | | Primary education | 1 | %6,66 |
| | | Art and crafts education | 1 | %6,66 |
| | | Foreign language education | 1 | %6,66 |
| | Master Thesis | Computer education and instructional technology | 3 | %20 |
| | | Educational sciences | 1 | %6,66 |
| Total | | | 15 | %100 |

According to Table 2, 73.33% of the graduate theses are master theses, and 26.66% are doctoral dissertations. The years with the highest frequency for the master theses were respectively: 2010 (13,33%), 2012 (13,33%), and 2019 (13,33%). Furthermore, the years with the highest rate of doctoral dissertations were respectively: 2016 (6,66%), 2017 (6,66%), 2018 (6,66%), and 2019 (6,66%). The table also indicates that the university where the master theses were commonly conducted is Gazi University (13,33%). Additionally, the university where the doctoral dissertations were commonly conducted is Atatürk University (13,33%). The master theses and doctoral dissertations show that the research language that was mainly used in the theses is Turkish. The master theses suggest that the titles of the thesis advisors were mainly Assistant Professor (33,33%). Furthermore, doctoral dissertations indicate that the titles of the thesis advisors were generally Associate Professor (13.33%) and Professor Doctor (13.33%). The master theses show that the type of institute was mainly the Institute of Science (40%). Besides, doctoral dissertations suggest that the type of institute was the Institute of Educational Sciences (26.66%). Lastly, the master theses and doctoral dissertations indicate that the department where the theses were mostly conducted was the Department of Computer Education and Instructional Technology.

The findings of the research topics of the graduate theses in research are given in Table 3.

**Table 3.** Findings of the Research Topics of the Graduate Theses in the Research

| | Research Topics | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Master | Student experiences / opinions about three dimensional virtual environments | 4 | %23,52 |
| | The use of 3-dimensional multi-user virtual environments in orientation education | 1 | %5,88 |
| | The effectiveness of applications in three-dimensional virtual environments | 5 | %29,41 |
| | Development of new designs in three-dimensional virtual environments | 5 | %29,41 |
| | Determining the factors facilitating the use of three-dimensional virtual environments at the design stage and the factors preventing easy use and proposing solutions | 1 | %5,88 |
| | The usability of three-dimensional multi-user virtual environments for collaborative teamwork | 1 | %5,88 |
| Total | | 17 | %100 |
| Doctoral Dissertation | Development of new designs in three-dimensional virtual environments | 2 | %25 |
| | The effectiveness of applications in three-dimensional virtual environments | 1 | %12,50 |
| | The effectiveness of applications in three-dimensional virtual environments | 1 | %12,50 |
| | Student experiences / opinions about three dimensional virtual environments | 1 | %12,50 |
| | Comparison of teaching in three-dimensional virtual environments and other teaching methods | 1 | %12,50 |
| | Experiences / opinions of designers about three-dimensional virtual environments | 1 | %12,50 |
| | A design model proposal to guide those considering designing in three-dimensional virtual environments and who want to use these environments for educational purposes | 1 | %12,50 |
| Total | | 8 | %100 |

According to Table 3, the research topics that had the highest frequency for the master theses were respectively: the effectiveness of applications in three-dimensional virtual environments (29.41%), development of new designs in three-dimensional virtual environments (29.41%), and student experiences/opinions about three-dimensional virtual environments (23,52%). Likewise, the research topic that had the highest frequency for doctoral dissertations was the development of new designs in three dimensional virtual environments (25%).

The findings of the research methods (sampling method of the research, research model, data collection tools, data analysis techniques) of the graduate theses examined are given in Table 4.

**Table 4.** Findings Regarding Research Methods of the Graduate Theses in the Research

| | | Research Methods | | Frequency (f) | Percentage (%) |
|---|---|---|---|---|---|
| Master | Sampling method of the research | Convenience sampling | | 2 | %2,77 |
| | | Sampling to access all | | 3 | %4,16 |
| | | Purposive sampling | | 5 | %6,94 |
| | | Random sampling | | 1 | %1,38 |
| | Research model | Quantitative | Descriptive | 1 | %1,38 |
| | | | Quasi-experimental design | 1 | %1,38 |
| | | | True experimental design | 2 | %2,77 |
| | | Qualitative | Survey model | 1 | %1,38 |
| | | | Case study | 3 | %4,16 |
| | | | Design case research method | 1 | %1,38 |
| | | Mixed | Explanatory sequential | 2 | %2,77 |
| | | | Concurrent | 1 | %1,38 |
| | Data collection tools | Quantitative | Questionnaire | 7 | %9,72 |
| | | | Test | 3 | %4,16 |
| | | | Inventory | 1 | %1,38 |
| | | | Scale | 3 | %4,16 |
| | | | Form | 1 | %1,38 |
| | | Qualitative | Interview form | 4 | %5,55 |
| | | | Observation | 2 | %2,77 |
| | | | Portfolio | 1 | %1,38 |
| | | | Diary | 1 | %1,38 |
| | | | Focus group meeting | 1 | %1,38 |
| | | | Reflections | 1 | %1,38 |
| | | | Field notes | 1 | %1,38 |
| | | | Semi-structured interview | 1 | %1,38 |
| | | | Screen image recordings | 1 | %1,38 |
| | | | Open ended questions | 1 | %1,38 |
| | Data analysis techniques | Quantitative | T-test | 1 | %1,38 |
| | | | Two-way analysis of covariance (ANCOVA) | 2 | %2,77 |
| | | | Descriptive statistics | 4 | %5,55 |
| | | | One-way analysis of variance (ANOVA) | 2 | %2,77 |
| | | | Fisher's exact probability test | 1 | %1,38 |
| | | | Levene's test | 1 | %1,38 |
| | | | LSD test | 1 | %1,38 |
| | | Qualitative | Descriptive | 4 | %5,55 |
| | | | Content | 4 | %5,55 |
| Total | | | | 72 | %100 |
| Doctoral Dissertation | Sampling method of the research | Convenience sampling | | 1 | %2,85 |
| | | Purposive sampling | | 2 | %5,71 |
| | Research model | Mixed | Explanatory | 1 | %2,85 |

| | | | | | |
|---|---|---|---|---|---|
| | | | sequential | | |
| | | | Exploratory sequential | 1 | %2,85 |
| | | Qualitative | Systematic synthesis / meta-analysis | 1 | %2,85 |
| | | | Formative | 1 | %2,85 |
| | | | Demographic data | 1 | %2,85 |
| | | Quantitative | Test | 2 | %5,71 |
| | | | Scale | 2 | %5,71 |
| | | | Form | 1 | %2,85 |
| | | | Interview form | 3 | %8,57 |
| | | | Document (article) | 1 | %2,85 |
| | Data collection tools | | Questionnaire | 1 | %2,85 |
| | | | Report | 1 | %2,85 |
| | | | Reflection report | 1 | %2,85 |
| | | Qualitative | Journal | 1 | %2,85 |
| | | | Field notes | 1 | %2,85 |
| | | | Personal web pages | 1 | %2,85 |
| | | | E-mail and instant messaging tools | 1 | %2,85 |
| | | | One-way analysis of variance (ANOVA) | 2 | %5,71 |
| | | Quantitative | Two-way analysis of covariance (ANCOVA) | 1 | %2,85 |
| | Data analysis techniques | | Descriptive | 1 | %2,85 |
| | | | Kruskal Wallis | 1 | %2,85 |
| | | | Mann-Whitney *U* | 1 | %2,85 |
| | | | Kappa test | 1 | %2,85 |
| | | | Content | 2 | %5,71 |
| | | Qualitative | Descriptive | 1 | %2,85 |
| | | | Embedded theory | 1 | %2,85 |
| Total | | | | 35 | %100 |

According to Table 4, the sampling method that had the highest frequency for the master theses was purposive sampling (6,94%). The highest frequency for the quantitative research models for the theses was true experimental design (2.77%). The highest frequency for the qualitative research models for the theses was case study (4.16%). Besides, the highest frequency for the mixed research models for the theses was explanatory sequential (2.77%). The highest frequency for the quantitative data collection tools for the theses was survey (9.72%). Additionally, the highest frequency of qualitative data collection tools for the theses was interview form (5.55%). The highest frequency of quantitative data analysis techniques

for the theses was descriptive statistics (5.55%). Lastly, the highest frequency of qualitative data analysis techniques for the theses were descriptive statistics (5.55%) and content analysis (5.55%).

According to Table 4, the sampling method that had the highest frequency for the doctoral dissertations was purposive sampling (5,71%). The highest frequency for the mixed research model of the quantitative research models for the dissertations were explanatory sequential (2.85%) and exploratory sequential (2.85%). Besides, the highest frequency of the qualitative research models for the dissertations were systematic synthesis/meta-analysis (2.85%) and formative research model (2.85%). The highest frequency of quantitative data collection tools for the dissertations were test (5.71%) and scale (5.71%). Additionally, the highest frequency of the qualitative data collection tools for the dissertations was interview form (8.57%). The highest frequency of quantitative data analysis techniques for the dissertations was the one-way analysis of variance (ANOVA) (%5.71). Lastly, the highest frequency of qualitative data analysis techniques for the dissertations was content analysis (5.71%).

The findings of the findings chapter of the graduate theses are given in Table 5.

**Table 5.** Findings of the Findings Chapter of the Graduate Theses in the Research

| | Findings Chapter | | Frequency (f) | Percentage (%) |
|---|---|---|---|---|
| Master Theses | Findings for each research question are reported. | Yes | 11 | %100 |
| | | No | - | - |
| | Findings are presented in the chart-figure form. | Yes | 10 | %90,90 |
| | | No | 1 | %9,09 |
| | Each chart-figure is explained in the text. | Yes | 10 | %90,90 |
| | | No | 1 | %9,09 |
| Total | | | 11 | %100 |
| Doctoral Dissertation | Findings for each research question are reported. | Yes | 4 | %100 |
| | | No | - | - |
| | Findings are presented in the chart-figure form. | Yes | 4 | %100 |
| | | No | - | - |
| | Each chart-figure is explained in the text. | Yes | 4 | %100 |
| | | No | - | - |
| Total | | | 4 | %100 |

According to Table 5, findings for each research question are expressed in 100% of the master theses, and 90.90% of the findings are presented in the form of charts and figures, while the findings are not presented in the form of charts and figures in 9.09%. While each chart-figure is explained in the text in 90.90% of the master theses, each chart-figure is not explained in the thesis in 9.09%.

According to the findings chapter of the doctoral dissertations, 100% of the findings for each research question were reported, 100% of the findings were presented in the form of a chart-figure, and 100% of each chart-figure was explained in the text.

The findings of the discussion and conclusion chapter of the graduate theses are given in Table 6.

**Table 6.** Findings for the Discussion and Conclusion Chapters of the Graduate Theses in the Research

| | Discussion and Conclusion Chapter | | Frequency (f) | Percentage (%) |
|---|---|---|---|---|
| Master Theses | The findings are supported by the literature. | Yes | 11 | %100 |
| | | No | - | - |
| | A sufficient explanation is given for each finding. | Yes | 11 | %100 |
| | | No | - | - |
| | Conclusions are based on the findings. | Yes | 11 | %100 |
| | | No | - | - |
| | The author discusses the limitations of the research. | Yes | 4 | %36,36 |
| | | No | 7 | %63,63 |
| Total | | | 11 | %100 |
| Doctoral Dissertation | The findings are supported by the literature. | Yes | 4 | %100 |
| | | No | - | - |
| | A sufficient explanation is given for each finding. | Yes | 4 | %100 |
| | | No | - | - |
| | Conclusions are based on the findings. | Yes | 4 | %100 |
| | | No | - | - |
| | The author discusses the limitations of the research. | Yes | 2 | %50 |
| | | No | 2 | %50 |
| Total | | | 4 | %100 |

According to Table 6, the findings of 100% of the master theses are supported by the literature, sufficient explanations are made regarding each finding, and the conclusions are conducted based on the findings. However, while the limitations of the research were discussed in 36.36% of the master theses, they were not discussed in 63.63%.

According to the discussion and conclusion chapter of the doctoral dissertations, the findings of 100% were supported by the literature, sufficient explanations were given regarding each finding, and the conclusions were made based on the findings. However, while the limitations of the research were discussed in 50% of the doctoral dissertations, the limitations of the research were not discussed in 50%.

The findings of the suggestions chapter of the graduate theses are given in Table 7.

**Table 7.** Findings of the Suggestions Chapter of the Graduate Theses in the Research

| | Suggestions Chapter | | Frequency (f) | Percentage (%) |
|---|---|---|---|---|
| Master | Suggestions are given based on the research results. | Yes | 8 | %72,72 |
| | | No | 3 | %27,27 |
| | Suggestions for further research are given. | Yes | 9 | %81,81 |
| | | No | 2 | %18,18 |
| Total | | | 11 | %100 |
| Doctoral Dissertation | Suggestions are given based on the research results. | Yes | 4 | %100 |
| | | No | - | - |
| | Suggestions for further research are given. | Yes | 4 | %100 |
| | | No | - | - |
| Total | | | 4 | %100 |

According to Table 7, suggestions were given based on the research results in 72.72% of the master theses, while suggestions were not given based on the research results in 27.27%. While suggestions were given for future research in 81.81% of the master theses, 18.18% did not give suggestions for future research.

In 100% of the doctoral dissertations, suggestions were given based on the research results, and suggestions were given for future research in 100%.

## Conclusion and Discussion

This study reports the general tendency of using three-dimensional virtual environments between January 2010 and August 2020 based on various variables, including the demographical characteristics, research topics, research methods, findings, discussion and conclusion, and suggestions. A total of 15 graduate theses, 11 master theses, and 4 doctoral dissertations, published in the National Thesis Center of Turkey on the topic of three-dimensional virtual environments were included. The results obtained in this regard are as follows:

The percentage of master theses reviewed in the research was higher than that of doctoral dissertation. The reasons for this case can be associated with the limited number of doctoral programs, the more challenging conditions for admission to the doctoral program than those of master's programs, and the shorter duration of master's programs than the doctoral programs (Gökmen et al., 2017; Orakcıoğlu, 2019).

The distribution of master theses by year was more common in 2010, 2012, 2013, and 2019, while the doctoral dissertations were distributed evenly in 2016, 2017, 2018, and 2019. It can be suggested that the reason for this situation is the new learning approaches that have emerged as a result of the integration of information technologies in education in recent years.

The master theses on three-dimensional virtual environments in the field of education were mostly conducted at Hacettepe University, and doctoral dissertations were mostly carried out at Atatürk University. The fact that the field of study of the faculty members at the relevant universities coincides with the results of this research.

Almost all of the graduate theses examined are in Turkish, but among the master theses, there are some theses on the subject of the three-dimensional virtual environments with the publication language of German.

The titles of the thesis advisors of the examined master theses are mostly Assistant Professors. However, the titles of Associate Professor and Professor Doctor are equally distributed in doctoral dissertations.

According to the type of institute, it was observed that most of the master theses are conducted in the Institute of Science, and in the doctoral dissertations, all of them are carried out in the Institute of Educational Sciences. It is due to the fact that the Department of Computer Education and Instructional Technologies is among the programs affiliated with the Institute of Educational Sciences in recent years. With regards to the department, it was determined that master theses and doctoral dissertations were mostly conducted in the Department of Computer Education and Instructional Technology. Regarding the distribution of the departments, the fact that both doctorate and master theses were mostly written within the scope of the Computer and Instructional Technologies Education Department is due to the nature of the field requiring the use of technology, software, and computers.

In terms of the distribution of research topics of the master theses examined within the scope of the study, it was found out that they were about the development of new designs in

three-dimensional virtual environments and students' experiences/opinions about three-dimensional virtual environments. In doctoral dissertations, it was indicated that they were about the development of new designs in three-dimensional virtual environments. This finding shows that the educational content developed in three-dimensional virtual environments in the field of education is an alternative teaching method that can help students to contribute to their active learning, unlike other teaching methods, in today's world where it is important to benefit from the technological opportunities with a modern approach. The second most discussed topic in the master theses is the analysis of the students' opinions and experiences about the three-dimensional virtual environments, and this topic aims to reveal the thoughts of students or learners in the target audience as a different learning method. The research results of Orakcıoğlu (2019) support the results of the research.

According to the sampling method of the graduate theses examined within the scope of the research, the purposive sampling method was the highest frequent sampling method. In this context, it was observed that purposive sampling was the most frequently used sample selection technique, regardless of qualitative or quantitative models.

Considering the distribution of master theses in terms of research methods, it is seen that quantitative research is preferred more, qualitative research is in the second place, and mixed studies are preferred in the last place. The results of the research conducted by Davies et al. (2010), Gökmen et al. (2017), and Orakcıoğlu (2019) support the results of the study. In doctoral dissertations, it is seen that they are mostly conducted with mixed research methods. The reason for this can be stated as the determination of the learning levels of the target audience and the drawbacks that may arise while designing the design-based learning environment, together with the student opinions and experiences (Doğan, 2019; Çoban, 2017; Koçak, 2016).

Among the research models of master theses and doctoral dissertations, it was determined that true experimental design was used the most among quantitative research models. According to the results of the research conducted by Davies et al. (2010), Gökmen et al. (2017), and Orakcıoğlu (2019), the fact that the most preferred design in quantitative research is the survey model does not support the results of the study.

It was determined that the case study design, one of the qualitative research methods, and explanatory sequential design, one of the mixed research methods, were commonly used in graduate theses. The results of the research conducted by Davies et al. (2010), Gökmen et al. (2017), and Orakcıoğlu (2019) support the results of the study.

Among the quantitative data collection tools of master theses and doctoral dissertations, it was observed that the questionnaire was used the most, and among the qualitative data collection tools, the interview forms were used the most. Among the reasons for constructing a quantitative research model as a model in master theses on three-dimensional virtual environments, it can be stated that quantitative research methodology can be applied in a shorter time than qualitative research.

It was concluded that two-way analysis of covariance (ANCOVA) was the most used quantitative analysis techniques used in master theses, and descriptive analysis and content analysis were used at the same frequency in qualitative analysis techniques. In doctoral dissertations, it was determined that one-way analysis of variance (ANOVA) was used the most among the quantitative analysis techniques, and content analysis was used the most in qualitative analysis techniques. The conclusion that similar techniques were used in the

analysis of quantitative data in the studies conducted by Orakcıoğlu (2019), Gökmen et al. (2017), Horzum (2013), and Davies et al. (2010) supports the results of this study. The fact that it was concluded in the study conducted by Gökmen et al. (2017) that content analysis was mostly used for qualitative analysis shows that there has recently been a change in the method of qualitative data analysis.

The findings chapter of the theses were presented in the form of a chart or figure, and each chart or figure was explained in the text. According to this review, it was concluded that the master theses carry the basic elements that should be available in the findings chapter of scientific research with an average of 86.66%. In doctoral dissertations, it was observed that the findings chapter contained the basic elements that should be in the findings chapter of scientific research with an average of 100%.

All of the discussion and conclusion chapters of the master theses examined within the scope of the study supported the findings with studies in the literature, made sufficient explanations about each finding, and wrote their conclusions in accordance with the findings. However, the limitations of the research were discussed in 36.36% of the studies, while the limitations were not discussed in 63.63% of these theses. In all of the doctoral dissertations examined, researchers supported their findings in line with the literature, made sufficient explanations about each finding, and wrote their conclusions in accordance with the findings. Despite that, while the limitations of the research were discussed in 50% of the studies, the limitations of the research were not discussed in 50%.

While it is seen that the doctoral dissertations examined within the scope of the study contain two basic elements that should be included in the suggestions part of scientific researches in all of the suggestions chapter, this frequency decreased to 80.50% in master theses.

## Implications

Implications in the context of this research are expressed below:

- Due to the low number of graduate studies on three-dimensional virtual environments, research incentives specific to this field can be funded by the Council of Higher Education.
- As it is predicted that the number of studies on three-dimensional virtual environments will increase day by day, document review studies can be conducted to examine the studies carried out in different fields and databases. The results of this research can be compared and discussed with the results of the new research.
- It is regarded as important that document analysis and systematic compilation studies using technological developments in the field of education can guide researchers who will conduct research in these fields in the future.

## References

*Sources marked with a star (*) indicate the graduate these included in the document review.*

*Akyıldız, Y. (2019). Bestimmung des beitrags eines digitalen 3d-Lernspiels im Daf-Unterricht zu Lehramtkandidaten und ihren Meinungen (Master Arbeit). Uludağ Üniversitesi, Bursa.

Altan, T. (2011). Teknoloji-zengin eğitsel bir yenilik olarak Quest Atlantis'in örgün eğitime entegrasyonu: Fen ve teknoloji dersi örneği (Yayımlanmamış yüksek lisans tezi). Hacettepe Üniversitesi, Ankara.

Barab, S. A., Gresalfi, M., Dodge, T., & Ingram-Goble, A. (2010). Narratizing disciplines and disciplinizing narratives: Games as 21st century curriculum. International Journal of Gaming and Computer-Mediated Simulations (IJGCMS), 2(1), 17-30.

Barab, S. A., Sadler, T. D., Heiselt, C., Hickey, D., & Zuiker, S. (2007). Relating narrative, inquiry, and inscriptions: Supporting consequential play. Journal Of Science Education And Technology, 16(1), 59-82.

Barab, S. A., Sadler, T. D., Heiselt, C., Hickey, D., & Zuiker, S. (2007). Relating narrative, inquiry, and inscriptions: Supporting consequential play. Journal Of Science Education And Technology, 16(1), 59-82.

Bogusevschi, D., Muntean, C., & Muntean, G. M. (2020). Teaching and learning physics using 3D virtual learning environment: A case study of combined virtual reality and virtual laboratory in secondary school. Journal of Computers in Mathematics and Science Teaching, 39(1), 5-18.

Çağlı, A. (2019). Türkiye'de kuantum öğrenme üzerine yapılmış lisansüstü tezlerin incelenmesi (Yayımlanmamış yüksek lisans tezi). Burdur Mehmet Akif Üniversitesi, Burdur.

*Çoban, M. (2017). Üç boyutlu oyunla yapılan deprem eğitiminin ilkokul öğrencilerinin akademik başarıları ile motivasyonlarına etkisi ve öğrencilerin görüşleri (Yayımlanmamış doktora tezi).Atatürk Üniversitesi, Erzurum.

Çolak, C. (2020). Öğretim uygulamalarında 3B sanal dünyalar: Second life örneği. İçinde, (Ed. E. Keleş & M. Koçak). *Güncel Öğrenme Teknolojileri Ve Materyal Tasarımı* (ss.79-104). Ankara: Pegem Akademi.

*Çukurbaşı, B. (2012). Üç boyutlu sanal ortamda beş aşamalı modelin uygulanması (Yayımlanmamış Yüksek Lisans Tezi). Balıkesir Üniversitesi Fen Bilimleri Enstitüsü, Ankara.

Davies, R. S., Howell, S. L., & Petrie, J. A. (2010). A review of trends in distance education scholarship at research universities in north america, 1998-2007. International Review of Research in Open and Distance Learning. 11(3), 42-56.

Dionisio, J. D. N., Burns, W., & Gilbert, R. (2011). 3D virtual worlds and the metaverse: Current status and future possibilities. *ACM Computing Surveys*, *5*,1 -45.

*Doğan, D. (2012). Üç-boyutlu çok-kullanıcılı sanal ortamlarda harita kullanımının görev tamamlama süresine etkisi (Yayımlanmamış yüksek lisans tezi). Hacettepe Üniversitesi, Ankara.

*Doğan, D. (2019). Üç-boyutlu çok-kullanıcılı sanal ortamlarda probleme dayalı öğrenme yaklaşımına göre öğretim tasarımı süreci (Yayımlanmamış doktora tezi). Hacettepe Üniversitesi, Ankara.

*Ermiş, B. (2010). İlköğretim 6.sınıf öğrencilerinin görsel sanatlar dersinde "üç boyutlu sanal müze ziyareti" etkinliğine ilişkin görüşleri (Yayımlanmamış yüksek lisans tezi). Gazi Üniversitesi, Ankara.

Gökmen, Ö. F., Uysal, M., Yaşar, H., Kırksekiz, A., Güvendi, G. M., & Horzum, M. B. (2017). Türkiye'de 2005-2014 yılları arasında yayınlanan uzaktan eğitim tezlerindeki yöntemsel eğilimler: Bir içerik analizi. Eğitim ve Bilim, 42(189), 1-25.

Horzum, M. B., Özkaya M., Demirci, M. and Alpaslan M. (2013). Türkçe uzaktan eğitim araştırmalarının incelenmesi. İnönü Üniversitesi Eğitim Fakültesi Dergisi. 14(2), 79-100.

*İlic, U. (2013). Yabancı dil öğretiminde üç boyutlu sanal dünyalar uygulaması (Yayımlanmamış yüksek lisans tezi). Ege Üniversitesi, İzmir.

*Koçak, Ö. (2016). Üç boyutlu çizgi filmlerin okul öncesi çocukların mekânda konumla ilgili kavram gelişimine etkisi (Yayımlanmamış doktora tezi).Atatürk Üniversitesi, Erzurum.

*Küçük Avcı, Ş. (2018). Üç boyutlu sanal ortamlar ve artırılmış gerçeklik uygulamalarının öğrenme başarısı üzerindeki etkisi: Bir meta-analiz çalışması (Yayımlanmamış doktora tezi). Necmettin Erbakan Üniversitesi, Konya.

Livingstone, D., Kemp, J., & Edgar, E. (2008). From multi-user virtual environment to 3D virtual learning environment. *Association for Learning Technology Journal*, *16*(3), 139-150.

Messinger, P. R., Stroulia, E., Lyons, K., Bone, M., Niu, R. H., Smirnov, K., & Perelgut, S. (2009). Virtual worlds—past, present, and future: New directions in social computing. *Decision Support Systems*, *47*(3), 204-228.

Miles, M. B., & Huberman, A. M. (2015). Nitel veri analizi (Çev. S. Akbaba Altun and A. Ersoy). Ankara: Pegem Akademi.

Orakcıoğlu, E. (2019). Türkiye'de uzaktan eğitim temalı 2013-2018 yılları arasında yapılan lisansüstü tezlerin incelenmesi (Yayımlanmamış yüksek lisans tezi). Eskişehir Osmangazi Üniversitesi, Eskisehir.

*Özdinç, F. (2010). Üç-boyutlu çok-kullanıcılı sanal ortamların oryantasyon amaçlı kullanılması (Yayımlanmamış yüksek lisans tezi). Hacettepe Üniversitesi, Ankara.

*Pamukcu, B.S. (2013). İşbirlikçi öğrenmeyi destekleyen üç-boyutlu çevrimiçi öğrenme ortamı geliştirilmesi ve kullanılabilirliğinin değerlendirilmesi (Yayımlanmamış yüksek lisans tezi). Gazi Üniversitesi, Ankara.

Porter, C. E. (2004). A typology of virtual communities: A multi-disciplinary foundation for future research. *Journal of Computer-Mediated Communication*, *10*(1), JCMC,10-11.

Silva, M. F., Martins, P. M., Mariano, D. C., Santos, L. H., Pastorini, I., Pantuza, N., ..., & de Melo-Minardi, R. C. (2019). Proteingo: Motivation, user experience, and learning of molecular interactions in biological complexes. Entertainment Computing, 29, 31-42.

*Siyamoğlu, Z. (2019). Üç boyutlu eğitsel sanal ortamlarda karakter tasarımına yönelik öğrenci tercihlerinin belirlenmesi (Yayımlanmamış yüksek lisans tezi). Trabzon Üniversitesi Eğitim Bilimleri Enstitüsü, Trabzon.

*Sönmez, N. (2016). Üç boyutlu sanal öğrenme ortamlarında sosyal ve sosyomatematiksel normların belirlenmesi: Mathlife örneği (Yayımlanmamış yüksek lisans tezi). Karadeniz Teknik Üniversitesi, Trabzon.

Suprapto, P. K., Chaidir, D. M., & Ardiansyah, R. (2020). The use of 3D software on plant anatomy courses for prospective Biology teachers. In Journal of physics: Conference series (p. 012065). IOP Publishing

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Medical Research Methodology, 8(45), 1-10.

*Topuz, Y. (2018). Anatomi eğitiminde sanal gerçeklik ve üç boyutlu masaüstü materyallerin akademik başarı ve bilişsel yük açısından karşılaştırılması (Yayımlanmamış yüksek lisans tezi). Marmara Üniversitesi, İstanbul.

Tüzün, H., Arkun, S., Bayırtepe-Yağız, E., Kurt, F., & Yermeydan-Uğur, B. (2008). Evaluation of computer games for learning about mathematical functions. i-manager's Journal of Educational Technology, 5(2), 64-72.

Tüzün, H., Yılmaz-Soylu, M., Karakuş, T., İnal, Y., & Kızılkaya, G. (2009). The effects of computer games on primary school students' achievement and motivation in geography learning. Computers & Education, 52(1), 68-77.

Yecke, C.,P. (2005). Mayhem in the middle: How middle schools have failed America--and how to make them work. Compact Guides to Education Solutions.

*Yıldırım, D. (2013). Üç-boyutlu çok-kullanıcılı sanal ortamların işbirlikli takım çalışmaları için kullanılması (Yayımlanmamış yüksek lisans tezi). Hacettepe Üniversitesi, Ankara.

Yıldırım, A., & Şimşek, H. (2018). Sosyal bilimlerde nitel araştırma yöntemleri. Ankara: Seçkin Yayıncılık.