# THE EFFECT OF INTERACTIVE VIDEO USE ON DISTANCE STUDENTS' PERCEPTIONS OF LEARNING IN A MASSIVE ONLINE PSYCHOLOGY COURSE

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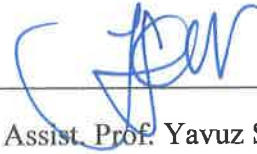IN THE DEPARTMENT OF EDUCATIONAL TECHNOLOGY

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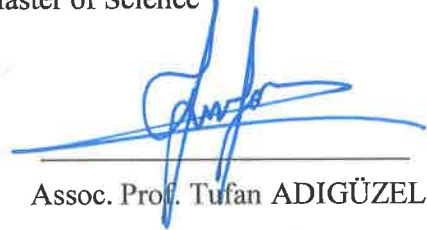
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**ABSTRACT**


THE EFFECT OF INTERACTIVE VIDEO USE ON DISTANCE STUDENTS'
PERCEPTIONS OF LEARNING IN A MASSIVE ONLINE PSYCHOLOGY
COURSE



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Videos were introduced to education in the 1960s with televised education. Since then
they have been one of the most used types of multimedia due to their attractive and
multi-sensory nature. However, the effectiveness of the use of video has started being
questioned by researchers since videos put the learners in a passive position without
providing them enough opportunities of interaction which is seen as the basis of all
educational processes considering that engaging with material is what changes
learners' attitudes and understandings. Interactive video is one of the new tools
available with enhanced technology which enables the learner to interact with video
content as opposed to traditional video where the learner is expected to watch only and
learn passively. In this study, the effects of interactive videos on students' perceptions
of their learnings were examined in a distance-delivered course. The participants of
the study were 391 students at a private university in Istanbul, who enrolled in a non-
departmental elective psychology course delivered fully online. Khan Academy style
videos were recorded for the course which was delivered asynchronously from
university's learning platform. Half of the videos were converted into interactive
videos by adding multiple choice questions and both interactive and standard videos

were provided to students on a weekly basis. Both qualitative and quantitative data were collected from students. Students' opinions about the effect of interactive videos on their learning were gathered by a perception scale. A focus group session was also conducted to give more insight of students' perceptions. In addition to that, the experiences, such as watching rates, and answers to the questions, students had in the videos were examined. A relationship between videos' duration and the number of students who completely watched the video was also analyzed. The results showed that majority of the students found interactive videos helpful and engaging in their learning process and the video watching rates dropped as the length of the video increased.

Keywords: Interactive Videos, Distance Education, Perception, Interaction, Multimedia

# ÖZ

## ETKİLEŞİMLİ VİDEO KULLANIMININ BİR KİTLESEL ONLINE PSİKOLOJİ DERSİNDEKİ ÖĞRENCİLERİN ÖĞRENME ALGILARINA ETKİSİ

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Video, hem işitsel hem de görsel duyulara hitap etmesi sebebiyle uzaktan öğrertim sistemlerinde sık kullanılan multimedia araçlarından birisi olmuştur. Fakat videonun öğreneni öğretim sürecinde pasif bir hale getirmesi ve etkileşimden yoksun yapısı sebebi ile bir "televizyon etkisi" yaratması, öğretimdeki etkisinin ve işlevinin tartışılmasına sebep olmaktadır. Bilgisayar ve video teknolojilerinin daha etkili bir video ortamı oluşturmak ve öğrenenin aktif katılımını sağlamak amacı ile geliştirilen etkileşimli video teknolojisi, uzaktan öğretimde öğrencilerin video ile daha iyi öğrenmelerine ve içerik ile bağlanmalarının artmasına sebep olabilir. Bu bağlamda, bu araştırmada etkileşimli videoların öğrencilerin öğrenme algıları üzerine olan etkisi uzaktan öğretim yolu ile verilen bir psikoloji dersinin video içeriğinin yarısının web tabanlı bir uygulama yardımı ile içerisine sorular eklenmesi suretiyle araştırılmıştır. Dönemin sonuna doğru öğrencilerin etkileşimli videoların öğrenmelerine etkisi hakkındaki görüşlerini içeren nitel veriler toplanmıştır. Buna ek olarak videoların içerisindeki sorulara öğrencilerin verdiği cevaplar öğrencilerin dönem içerisindeki ilerlemelerini görmek adına incelenmiştir. Elde edilen bu nicel veriden videoların süreleri ve videoları tamamen izleneyen öğrenci sayısı arasında bir ilişki bulmak amaçlanmıştır

Araştırma sonuç olarak, katılımcıların büyük çoğunluğunun etkileşimli videolarla öğrenmenin standart videolarla öğrenmeye nazaran kendilerine daha fazla yarar sağladığına inandıklarını ve etkileşimli materyalin kendilerinin online derse bağlanmalarını arttıtrdığını düşündüklerini

ortaya koymuştur. Bununla birlikte video süresi uzadıkça videoların tamamını görüntüleyen öğrencilerin sayısının azaldığı tespit edilmiştir.

Anahtar kelimeler: Etkileşimli Video, Uzaktan Eğitim, Algı, Etkileşim, Çoklu Ortam

## ACKNOWLEDGEMENTS

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## Introduction

### 1.1 Theoretical Framework

All aspects of life are changing because of the continuously developing technology by adopting the latest innovations. Education is not an exception in this change atmosphere. Educational institutions are trying to adopt the technological advances in order to keep up with this global change culture and to answer the needs of increasing student numbers. Since distance education is a direct outcome of the combination of education and technology (Keegan, 1995), this discipline is naturally one of the most popular topics for higher education institutions.

The term distance education emerged in the middle 1800's. A course that was designed to teach stenography to the students who were away from the instructor was taught, using the postal service of United States as the delivery service (Matthews, 1999). Then, radio and television took the place of post office respectively and finally once internet became widely available it has been a way to communicate, interact and share resources. Considering the availability of internet and technological devices to use it such as smartphones, tablets and computers, educational institutions started to use distance education not only to deliver education to those who are physically away but also as a way to compensate increasing student numbers, reduce educational outcomes and support face to face education.

Having technology ready to use, institutions try to offer their materials to their students in the most efficient and attractive way possible. Multimedia which is defined as "providing multisensory experiences, such as sound, visuals animation and interaction with the media" by Porter (2004) is among the most used tools in distance education. Video, which is a form of multimedia that addresses to visual and auditory senses has always been a tool distance education specialists relied on since the days of televised education because of its more engaging and attractive nature compared to text-based materials (Wetzel, Radtke, & Stern, 1993). However, the effectiveness and instructional functions of videos in distance learning environments are being

questioned due to their structure that gives the learner a passive role which is only watching the video without participating, thus creating the TV effect (Stoddard & Marcus, 2010). In addition to that, the latest research shows that video watching rates in courses delivered with distance education are misleading and student engagement in video content is very low (Guo, Kim, & Rubin, 2014). Considering that learning is more meaningful when the learner actively involves in it (Stice, 1987), the TV effect and low engagement in videos are something educational technologists want to prevent from happening (Stoddard & Marcus, 2010). In order to do that, getting learner interact with the material is an effective way. As stated by Moore (1989), the interaction between the learner and the content is as important as the interaction between learner-learner and learner-instructor in distance education settings. Also, according to the constructivism theory, learning occurs when a student constructs the knowledge for himself by playing an active role in the learning process (Ormrod, 2004). These reasons forced institutions to search for a new way of presenting video materials to students, that will keep them active throughout the learning process and engage them more compared to a standard video. Interactive video which is defined as "combining computer and video technologies to provide for an active video environment in which users can control and select options based on a given application" by Schlosser and Simonson (2006) is a result of that search.

Although it is much easier to make interactive videos nowadays thanks to advanced computer and web technologies, the use of interactive videos in education has started in the 1980's. Since then they are being used extensively in distance education, especially in massive open online course (MOOC) platforms which use generally video as main content. Main purposes behind using interactive videos are keeping students engaged with the material by asking questions during the video, providing them frequent and instant feedback, giving learner a multidirectional navigation chance to break the steady flow of information (Rasteiro, Cardoso, Gomes, & Santos, 2013) and improving self-paced learning by giving students more control over the material.

In this research, interactive video and its use on distance education environments were examined. In consideration of the literature review on the topic,

the video materials of an online psychology course delivered by a university in Turkey were converted into interactive videos containing embedded questions and taught to students for one semester. Through the end of the semester, the effect of interactive videos on students' perception on learning was measured. The results were interpreted along with the data drawn from the interactive videos containing results of the students' answers to the questions and video viewing numbers.

## 1.2 Statement of the Problem

Distance education is always known to be a barrier breaker in terms of time and space by allowing people to get education who are not able to be physically present in a traditional classroom environment due to several reasons. Multimedia is heavily what most of the distance education programs depend on, in order to minimize the gap between the instructor and learner (Kurbel, 2003). However, without interaction, it would not be as effective as it is intended to be. As Wetzel et al. (1993) stated, the higher interaction in the multimedia tool is linked directly to the higher levels of academic success. The fact that interactive video is the combination of multimedia and interaction, makes it an optimum medium for presenting educational material

Videos have been found to be useful tools to present information in a more engaging and aesthetically appealing form (Donkor, 2010; Giannakos, Chorianopoulos & Chrisochoides, 2015; Mayer, 2009) and they are still being used commonly in many distance education systems all around the globe due to their natural characteristics that both stimulate visual and auditory senses (Shephard, 2003). Also, it is proven that video media have the ability to increase both academic achievement and learner retention (Geri, Students' Adoption of Online Video-Based Distance Learning, 2011). One of its major drawbacks is the inability of the viewer to completely interact with the video and the lack of user control (Laurillard, 2002). Due, to the nature of humankind, lack of socializing and interaction in standard videos prevents them from reaching their full potential (Guri-Rosenblit, 2005). Salmon (2004) also stated that engaging students and helping them retain information is a substantial difficulty in distance education due to the lack of interaction. In addition to those reasons, inefficiently produced videos make it harder for students to engage with the material and learn by themselves in distance education settings (Guo, et al., 2014).

In the literature review on the topic, it is obtained that the numbers of video play rates were misleading in terms of student engagement and making students engage with the video depends on multiple variables such as video length, video production style and interaction (Guo, Kim, & Rubin, 2014). According to the research of Guo et al. (2014), who examined the video watching sessions of students in four most popular courses delivered by one of the leading massive online open course platforms to measure the effect of video production on engagement, many students who started to play the video navigated to another page without watching more than five seconds of the video. This result shows that merely considering video play rates as an indicator of student engagement is not correct In this present study, the answers of the students to the questions in the videos were used as an indicator to understand how long the videos were watched. The interactions between the students and the videos can provide an understanding about learners' video watching habits as well as the relationship between the video's duration and its watching rate.

Although there are many types of research in the literature, not so many of them are based on interactive videos, not especially in Turkey. The ones that are about interactive videos are research mostly trying to assess the effect of interactive videos on academic achievement and success. In this research, a less-examined aspect of interactive videos were presented which is their effect on perceptions of students' own learnings.

## 1.3 Purpose of the Study

Having technology readily and widely available in hand, educational institutions used and adopted it in every aspect of education they could, without actually thinking or analyzing how it would affect learning and putting technology before education and pedagogy (Harris, 2005). This approach which is defined as technocentrism by Papert (1990) is making the mistake of believing that every educational problem can be solved by using solely technology. The same mistakes

were also made in instructional video productions for distance education settings. Videos were shot too long and careless about the environment they were recorded (classroom, studio etc.) without considering the optimum student

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engagement conditions (Guo et al., 2014). In addition to that students were pacified during the learning process by not given the opportunity to interact with the videos. But especially with the increasing number of massive open online courses in the last five years, video again has gained popularity and research have been conducted on how videos can be used more effectively on distance education and how videos can be made more student-centered (Guo et al., 2014). Findings of such studies have formed a basis for all distance education providing institutions to improve their video-based learning materials and put more emphasis on student-centered learning approaches.

In this study, it was aimed to find to what degree students believe interactive videos affect their learning process in terms of engagement and performance compared to standard videos by converting half of the lecture videos of an online course into interactive videos based on the findings of the latest video production research in the literature. The main purpose was to find the effect of interactive videos on students' perceptions of their own learning. Along with that, the relationship between the video duration and engagement was also discussed.

## 1.4 Significance of the Study

The present study demonstrates an example of the transition of a face to face course into an online interactive video based course, which was described as a complex process that involves the transition of essential elements of teaching such as lecturing, interaction, designing matereials and assessment into digital platforms (Redmond, 2011). In this context, this research focused on the interaction and designing materials aspects in an attempt to understand their effects from the students' perspectives. The process of this transition has been explained and discussed elaborately which can be considered another contribution to the literature.

There is a lack of research on the effects of interactive videos on students learning perceptions in the literature. This study can provide an insight about the topic

from students' perspective in terms of how interactivity in videos makes a difference in the learning process, to what extent having control on the material is important and how video production techniques affect the learner. The study also

provides an insight on how much students were able to become digital learners by gaining the distance education culture.

## 1.5 Research Questions

In the research, half of the standard video content of an introductory level online massive Psychology course were converted into interactive videos by embedding multiple choice questions at the end of every chapter, providing feedback and shared with students. Towards the end of the semester, students' opinions about how interactive videos affected their learning process were collected which constituted the qualitative part of the study and used to find the answer to the first question. The quantitative data came from students' answers to the questions in the videos and they were analyzed in consideration of the literature review, in order to answer the second question:

1. What is the effect of interactive video use on students' perceptions of their learning?

2. What is the relationship between video's duration and videos' watching rate?

## 1.6 Operational Definitions

*Multimedia:* Digitally combining graphics, texts, animation, video, audio, still images and video in order to provide learners high levels of interaction and control (Tarawneh, Tarawneh, & Alzboon, 2011).

*Interaction:* Learner's degree of engagement with the components that form an educational setting such as other learners, instructor, course content and technological medium used in the course (Thurmond, 2003).

*Interactive video:* Combining computer and video technologies to provide for an active video environment in which users can control and select options based on a given application (Schlosser & Simonson, 2006)

*Playback controls*: Player controls, to change or adjust the process of watching film

*Graphics tablet and stylus:* An input device consisting of a flat, pressure-sensitive pad which the user draws on or points at with a special pen called stylus, to guide a pointer displayed on the screen.

**Chapter 2**

**Literature Review**

## 2.1 Distance Education

Social, cultural and educational parts of life are changing and getting better in terms of time, space and communication thanks to the advance in high technology and globalization (İşman, Dabaj, Altınay, & Altınay, 2004). With the developments in information and communication technologies (ICT), which has a significant potential to reform the world economy, management and study environments, the higher education institutions are challenged to change as well (Guri-Rosenblit, 2005). Traditional teaching and learning methods would not be effective to overcome the limitations of time and physical space without this high technology (İşman et al., 2004). According to Peters (as cited in Keegan, 1995) who stated that technology and distance education is directly related, the improvement in the technology gave birth to distance education.

Garrison and Shale (1987) stressed in their theory that noncontiguous interactive communication and use of technology is a must to formulate distance education. Holmberg (1989) on the other hand, adds lifelong learning aspect of distance education to his definition and stated that the fact that distance education is provided through technological communication systems without any limitations of time and space makes it more attractive for adult learners who have daytime jobs. Keegan (1995) defined distance education as the outcome of the separation of instructor and learner, which relieves the learner from the necessity of traveling to "a fixed place, at a fixed time, to meet a fixed person in order to be trained.", emphasizing that distance education is free from time and space. According to Roblyer and Edwards (2000) distance education is the way of gaining information and skills at a distance via mediated information and instruction, using available technology. Simonson, Smaldino, Albright, and Zvacek (2006) added interactivity to the definition, describing distance education as an institution-based, formal form of education where interactive telecommunication systems are utilized to connect instructors, learners and resources.

According to Gunawardena and McIsaac (2004), distance education which is

once thought as an unconventional way of delivering education by using new technology is now an important aspect of mainstream education as well. According to Redden (2009), by 2020, the estimated 200 million higher education students will take many of their courses via distance education. Besides that, it is a convenient way to bring education to particular groups such as learners with disabilities and adults with day jobs (Holmberg, 1986). In parallel to that, Richards and Ridley (1999) stated that distance education has also a role to create equal opportunity in education by giving the members of society, who are not able to attend a traditional educational institution because of their financial considerations or family situations a chance to get education.

Wetzel et al. (1993) state that distance education has been used widely since the early 1960s with the introduction of televised education. However, the focus on distance learner has started to change only in the 1990s, when the success of distance education has been proven (Moore & Thompson, 1997). In the following years, it is acknowledged that distance learners have different characteristics than traditional learners and should behave differently to succeed (Chute, Thompson, & Hancock, 1999). Since distance education occurs without the physical presence of an instructor, distance learners must possess behaviors such as self-monitoring, self-discipline, self-management and self-regulation, in order to be successful (Cheurprakobkit, Hale, & Olson, 2002). Cheurprakobkit et al. (2002) stated that in distance learning environments, the ability of learners monitoring and regulating their own learning is vital. In addition to that, Wood (2005) stated the learners who are successful in face to face classes may not necessarily be successful in online learning environments due to the different skills needed to succeed in online environments. She also concluded that learners are responsible for their own learnings. According to Pintrich (1995) a successful distance learner should have the 3 components of self-regulated learning, which are; (a) actively controlling their behaviour by monitoring their progress and creating a strategy to help them with the tasks, (b) completing tasks or goals on time and (c) controlling his/her actions.

Many of the distance education definitions include four main concepts which can be seen in Figure 1 (Schlosser & Simonson, 2006). First of these concepts is that distance education is institution-based meaning that it is offered by a school, university

or a nontraditional institution such as a business company or corporation. The second one is the physical separation of the learner and the instructor. The separation is both in time and space. Interactivity is the next component that comprises distance education. The three types of interactivity in distance education is learner-learner, learner-instructor, and learner-content (Moore M. G., Three types of interaction, 1989). The last concept is sharing the resources with students using information and communication technologies.
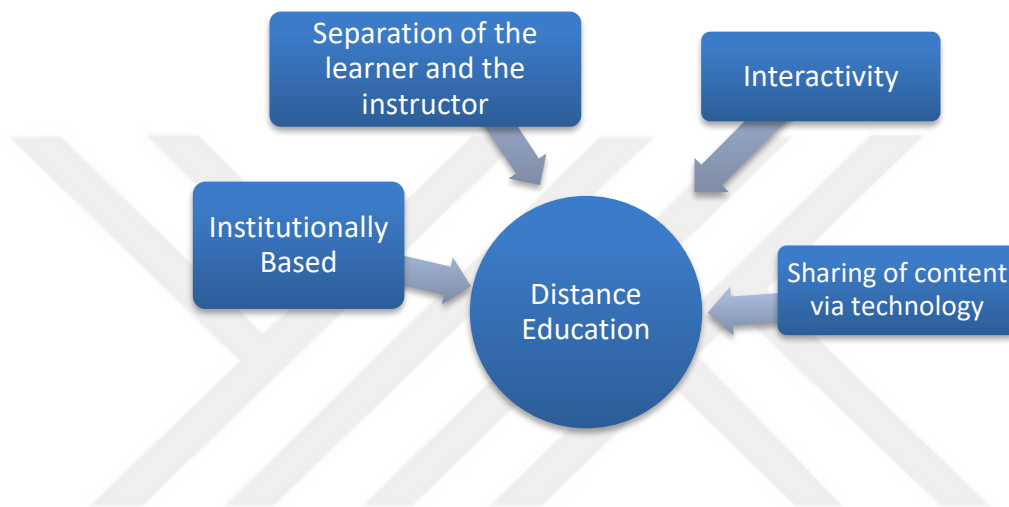


*Figure 1.* Components that form distance education *(Simonson, Smaldino, Albright, & Zvacek, 2006).*

In a research conducted by Marcus (2003) the advantages of distance education are summarized as flexibility of the time and material, ease of accessibility of the material, visibility of multimedia and availability of the data. Again from the same study, the disadvantages of distance education are stated as the absence of a learning atmosphere, lack of self-motivation, less efficient discussion sessions compared to a face to face class and lack of interaction.

**2.2 Multimedia in Distance Education**

Multimedia, which can be defined as digitally combining graphics, texts, animation, video, audio, still images and video in order to provide learners high levels of interaction and control (Tarawneh et al., 2011), has become an essential part of distance education (Friedland, Hürst, & Knipping, 2007). In educational sciences,

multimedia is described as a method that combines at least two of the general media types such as audio, text, and video in order to create a more educational and complete effect on the learner (Heinich, Molenda, Russel, & Smaldino, 1996). Some researchers added interactivity to the definition such as Schlosser and Simonson (2006) who described multimedia as the integrated use of sound, data, visual images, motion, text, and graphics where the user has the ability to interact with the display. Porter (2004) also included interaction to her definition stating that multimedia is the sort of media which provides multisensory experiences like visuals, animations, sounds, and interaction with the media.

Since multimedia has the advantage of supporting many modes of learning by using different and multiple media types (Parfitt, Jo, & Nguyen, 1998), it has been used in distance education settings widely to engage the distant learners who are likely to lose their self-motivation through the learning process (Marcus, 2003). With the improvements in technology and availability of technological devices, usage of multimedia increased rapidly since the early 1990s (Jalobeanu, 2003). Thanks to these improvements such as computer technologies, internet and computer software, multimedia became available to use for distance education on a large scale (Heinich et al., 1996). This situation makes it possible to create more diversity in learning strategies in distance education settings, without having a teacher present, by combining multimedia and distance learning (Genden, 2005).

When multimedia is examined in terms its impacts on distance education, it is possible to find research that state both its positive and negative effects in the literature. According to Heinech et al. (1996), in terms of making information accessible to more learners who process information in different ways, using a multisensory system may be more beneficial. Javidi and Sheybani (2004) stated that distance students' learning and retention can be increased with the help of effective multimedia use where the interaction between learners, instructor and content depends on technology. In a research Mayer (2003) found that learners can transfer recently learned materials into long-term memory more easily when multiple channels - such as visual and auditory - used to process new information. He referred to this phenomenon as the "Multimedia Effect" which is gained by using multimedia. It is found that incorporating multimedia

content into online learning has the potential to create a student-centered learning setting (Hooper & Reinartz, 2002). The research conducted by Richards, Dooley, and Lindner (2004) also supports that finding and states that multimedia used distant learning settings give the student the opportunity to become more active in the process. However, it is found that poorly designed multimedia contents may result in cognitive overload making the conveying of information more complex (Lowe, 2005). Therefore the interface design and the media that will be used in the multimedia must be carefully chosen and planned (Tiene, 2005). In addition to that, designing effective multimedia material is a time consuming and financially overwhelming process (Taranweh et al., 2011). Considering that situation, Ellis and Cohen (2001) stated in their research the benefits and costs should be regarded carefully when designing multimedia. Willis (1996) ranked instructor as the most important factor in terms of creating the multimedia materials and facilitating interactive environments in the distance education settings.

## 2.3 Video as a Multimedia

Video in educational sciences is described as the combination of motion picture and sound that provides a powerful medium to explain concepts while instructing students with content that provides multiple senses (Vural, 2013). Video has been broadly used in distance education since the invention of television due to its engaging and attractive nature compared to text-based materials (Wetzel et al., 1993).

Since video has been used in education for more than 50 years, there are a lot of studies in the literature examining its effect on learning (Bravo, Amante & Michela Encahe, 2011; Barnes, 1997; Brecht, 2012; Hung, 2005; Karppinen, 2005; Rockman, Miller, & Boyar, 1997). According to a study, students who watched an educational show on (Karppinen, 2005) television about science were able to make more complex and profound explanations on scientific concepts than those who did not watch the show (Rockman et al., 1997). Barnes (1997) stated in his study that eighth-grade students whose in classroom activities were supported with educational television performed better than the control groups in terms of academic achievement, writing assignments, and problem-solving skills. Brecht (2012) stated in his study that using video lectures may help improve the initial learning of the students as well as their

academic achievement. Findings of another study also indicate that students who received video instruction outperformed the control group that received instruction through text materials in problem-based instruction (Choi & Johnson, 2007). Videos are proven to help improve reasoning and problem-solving skills of learners and reduce cognitive load for beginner level students when used as informal supplements to instruction (Merrill, Reiser, Ranney, & Trafton, 1993). Baron (1989) who refers to the attribute of television of making learning platforms accessible to students states that video, in some situations, can be better than a field trip because it can be replayed as often as the student desires. Another study also found that learning with video can help students improve their academic performances due to the fact that students can view multiple times the parts they feel they have troubles (Cascaval, Fogler, Abrams, & Durham, 2008). In addition to that, in another study, it is found that the performance and retentions of learners can be improved with implementing video technology into courses (Craig, Gregory, El Haggan, Braha, & Brittan-Powell, 2009). Bravo et al. (2011) researched a different aspect of videos on students which is motivation. They concluded that using videos in education has a positive effect of enhancing students' learning motivation.

Hung, (2005) who says in his study learning with video material is an important aspect of learning with technology, states that video can also be used as a tool to support project-based learning. According to Bates (1983) video has a crucial role in the higher order skills which are stressed in important aspects of learning and teaching. Moore (1993) states that video is a good multimedia tool to expand the instruction in the way of making real-life events present that is hard to see under normal circumstances, communicate through visually and graphically and demonstrate close-up techniques but he specifies that video is an unsuitable material to serve as the only material to learn from. He bases this statement on that video is not suitable to present analytic and reflective thoughts.

**2.3.1 Engagement in videos.** The growing interest in e-learning has brought the need to provide learners a configurable infrastructure that includes learning materials, tools, and services in one single package (Zhang, Zhou, Briggs, & Numaker, 2006). Video, being a rich and powerful multimedia in e-learning due to its

attractiveness, has become an important tool (Wieling & Hofman, 2010). Although video has been used in education since the days of televised education (Wetzel et al., 1993), it is now more popular than ever in e-learning thanks to the countless massive open online courses (MOOC) which uses video as their main content. (Aubert, Prie, & Canellas, 2014). According to the data from YouTube, videos of Khan Academy which is a non-profit organization to provide education on the internet, has been watched more than 300 million times. These high numbers made video-lecture providers to think about the production of videos, which are proven to affect the engagement of learners (Guo et al., 2014).

Newmann (1992) defined student engagement as students making a psychological effort and investment in learning, as in understanding the content and internalizing the knowledge in their own lives. According to Coates (2007), it is the quality of effort that students commit themselves to educational activities that directly affects the learning outcomes. Another definition states that engagement, which is linked to multiple positive outcomes such as high academic achievement and student satisfaction, is the extent which the learners are engaged with their educational activities (Chen, Gonyea, & Kuh, 2008). In online courses, it is proposed that student engagement depends majorly on instructor's interaction with the learner and the existence of an active online environment (Mandernach, 2009). Meyers (2008) emphasized that students feel more engaged and interconnected to course when the instructor creates a safe and welcoming community in online courses. It is hard to measure engagement in terms of learning, especially when the term is defined as a range of behaviors that are exhibited by learners (Bulger, Mayer, Almeroth, & Blau, 2008). According to Douglas (2008), it is not appropriate to take online class attendance as a measurement of engagement because it only indicates participation, not necessarily the quality of participation. In addition to that Guo et al. (2014) state that measuring student engagement by its true means is impossible without questioning and direct observation, which is infeasible in distance education courses. Therefore they used the attempts of students to the questions in the videos and the amount of time students viewed the video as indicators of engagement.

According to a broad research made in one of the largest MOOC platforms, Guo et al. (2014) found that there are six main video production styles in distance education. These are;

- **Classroom Lecture:** It is the type of video where the lecture of an instructor is recorded in a classroom, usually on a blackboard, with students.
- **Studio:** Lecture of the instructor is recorded in a studio without any audience.
- **"Talking Head" Videos:** Instructor's head is recorded while lecturing on a medium close-up angle, directly looking into the camera and usually sitting at his/her desk.
- **"Khan Academy" Style Videos:** A video production format popularized by Khan Academy where the handwriting and the sound of the instructor are recorded on a digital tablet.
- **Code:** The type of video where the screen of an IDE or text editor is recorded while the instructor is typing computer code and lecturing.
- **Slides:** In this video type presentation slides are viewed with instructor's voice-over.

According to Guo et al (2014), out of these six production styles, it is found that talking head style videos are more engaging than the rest because having a human face present provides a more personal and intimate feel. It is noted in the study that talking head videos make students feel like the video is being directed at them instead of a crowd.

The second more engaging video style is found to be khan academy style videos which make instructors feel like they situate themselves into the learners place and see themselves as the same level as the learner rather than talking to the student in the lecturer mode. However it is also stated that producing such videos requires planning before production, and instructor to have clear and understandable handwriting, good drawing skills, and proper layout planning in order to keep the canvas simple and not overcrowded. In other words, it is important to consider the cognitive load presented on the multimedia (Mayer & Moreno, 2003).  According to a

study, in Khan Academy like instructional videos, handwriting is found to be more "personal", therefore preferred over the typeface by the students. But students also stated that handwriting - especially when the canvas is full of scribbles as the video proceeds - can sometimes be hard to read (Cross, Bayyapunedi, Cutrell, Agarwal, & Thies).

In terms of the effect of video type to academic success, in a research, it is found that talking head videos increased the academic achievement of students more than Khan style videos and books (Ilioudi, Giannakos, & Chorianopoulos, 2013). In the same research, it is also found that students who learned the material with books enjoyed the process more than the ones that learned with video.

Video type is not the only factor that affects student engagement. According to a study, 55.2% of students who started watching a video leave the video before it finishes due to several reasons one being the length of the video (Kim, Seaton, Mitros, Gajos, & Miller). Research also reveals that most of the dropouts occur in the first 3% of the duration of the video. Researchers state that as the videos go longer in duration the dropout rates reach to 71%. According to Guo et al. (2014), the most important aspect that effects student engagement in instructional videos is the duration of the video. Student engagement is found to be optimum in the 6th minute, regardless of the length of the video. In the study, the videos between 1-3 minutes long had the highest engagement rates while students only watched the half of the videos that were longer than nine minutes. Figure 2 shows the graphic of normalized student engagement by the length of the videos for both Talking head videos and slide-based videos.
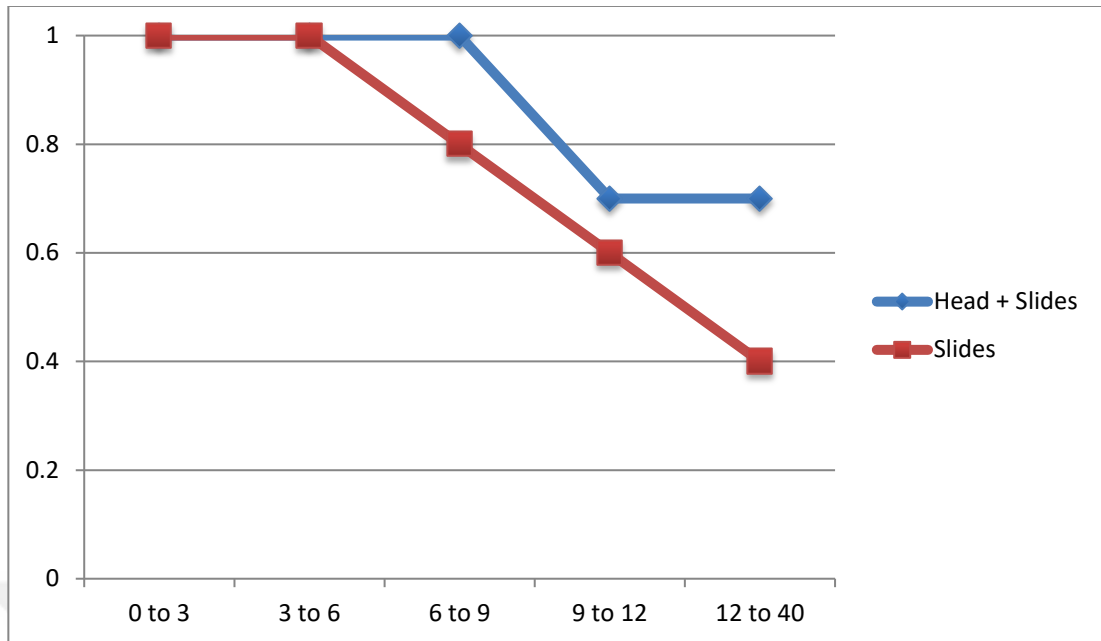
*Figure 2.* Graph showing the normalized student engagement by video duration for two different video types (Guo et al., 2014)

Although videos constitute a huge part of the content used in distance education courses (Guo et al., 2014), Zheng et al. (2006) stated that solely adding video as learning material is not always effective for teaching. They concluded that without interaction, videos are not engaging enough and students have very limited control over the video. In addition to that, Kinzie (2010) stated learners tend to perform better and actively engage when they are provided with interactive materials. Learners being actively engaged with material means that, they process it more deeply which leads to better retention of the knowledge (Craik & Lockhart, 1972).

## 2.4 Interaction

Interaction can be defined as the learner's degree of engagement with the components that form an educational setting such as other learners, instructor, course content and technological medium used in the course (Thurmond V. A., 2003). For Wagner (1997), interaction is the outcome that occurs when events and objects mutually affect and influence each other. Importance of interaction in both education and distance education courses have been acknowledged generally by many researchers (Andrusyszn, Iwasiw & Goldenberg, 1999; Moore, 1992; Northrup, 2002;

Shale & Garrison, 1990; Thurmond & Wambach, 2004). Shale and Garrison (1990) see interaction as the most fundamental aspect of education. Moore (1992) states that high interaction between learner and instructor can lead to a smaller transactional distance as well as the interactions students have with their classmates and their instructors. He also concluded that learning is a product of these instructions. Andrusyszn et al. (1999) state that distance learners' learning experiences improve as their interaction increases. According to Northrup (2002) interaction helps increasing student satisfaction and keeping students interested in the course materials in distance education settings. According to Bouhnik and Marcus (2006) the extent to how much students benefit from the learning process and their positive academic achievements are dependent on the success of the interaction in the distance education course. They also concluded that to emphasize the importance of interaction in distance education, failing of the interaction results as dissatisfied students in distance education. Gunawardena and McIsaac (2004) sum it all up and say that interaction is the essential process of putting together the little pieces of information in order to create new knowledge to emphasize its importance in learning.

**2.4.1 Distance education interaction model.** Moore provided an in-depth point of view to the interaction in distance learning. In his model of distance education interaction, Moore (1989) proposed three different types of interactivity that take place in distance education environments. These distinct interaction types are:

- **Learner-Content Interaction:** This type of interaction takes places when learner encounters with a new information within a content and creates new knowledge as a result of it.
- **Learner-Learner Interaction:** This type of interaction occurs among students and it includes interactions such as collaboration, teamwork, discussion. It is found that learner-learner interaction can decrease the feelings of isolation and it can create a learning community sense in distance education courses (Pallof & Pratt, 1999).
- **Learner-Instructor Interaction:** The type of interaction takes place between the learner and the faculty which helps to reinforce student understanding of the content and lessens the effect of transactional distance.

Moore (1989) stated that committing only one type of media and interaction type in a distance education setting is the sign of weak design. Therefore he suggested that planning of having all three kinds of interaction in a distance education setting is vitally important. Bouhnik and Marcus (2006) also stated that none of the interaction types mentioned in the model can function one without the other, independently and they are closely related.

Tuovinen (2000) proposed another type of interaction, based on the framework Moore (1989) provided, which is instructor-content interaction. According to him, giving the instructor the chance of interacting with the material during the course makes the learning material much more up-to-date and therefore motivating for the learner. His total interaction model which includes the four types of interactions and their relations to each other can be seen in Figure 3.
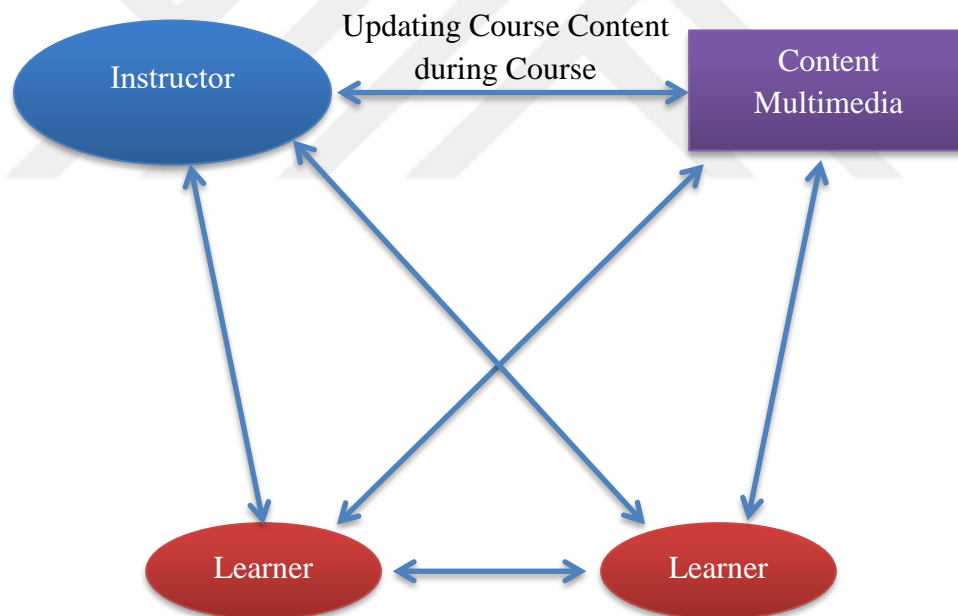


*Figure 3.* Components of the total interactions model and their relationships *(Tuovinen, 2000)*.

Moore (1989) stated that learner-content interaction is doubtlessly the most essential and crucial component of his model and any kind of educational setting. He concluded that without learner-content interaction there would be no education.

According to him, it is the basis of all educational processes because engaging with the material is what changes learners' attitudes and understandings.

According to Bouhnik and Marcus (2006), before the printing technology, the only way to interact with the content was solely possible by in a face to face, direct learner-pupil framework and which allowed transferring of knowledge from the instructor to pupils. However, with the invention of printing technology which resulted in mass-produced paper, getting interact with the content from a distance was made possible. Proceeding years made interacting with the content from a distance even easier with radio and television broadcasts. And presently, with the recent technologies available, it is not only easier but it is now also possible to interact with the content in a two-way direction in distance education environments (p. 301).

Tuovinen (2000) also explains the types of learner-content interactions in distance learning settings in his study as the one-way learner-content interactions, and the two-way learner-content interactions (Tuovinen, 2000). In the one-way learner-content interaction, the interaction is from the content to the leaner (see Figure 4). This means that the content being presented to the learner is only for their consumption. Learners are not allowed to affect or change the content with their inputs which makes it hard for students to internalize the materials they are given (Tuovinen, 2000).



*Figure 4*. One-way learner-content interaction *(Tuovinen, 2000)*.

Although the interaction is one way, using multimedia tools which appeal to multiple senses, can increase learning performance, since it is known that working memory has two separate spaces to process visual and auditory information (Baddeley, 1992). This means that learners can still increase their capacities of learning and problem-solving skills when the information is presented in two modes instead of one alone, even if the interaction is one-way (Mousavi, Low, & Sweller, 1995). The study

of Sweller and Chandler (1994) supported this finding, stating that using multimodal presentations help learners to understand especially when the subject to be learned is complex and has high interactivity.

The second type of interaction between learner and content, which is the one that is desired in distance education settings, is two-way learner-content interaction (see Figure 5) where learners can influence and change the content with their inputs thanks to interactive multimedia (Tuovinen, 2000). According to Bollinger and Wasilik (2009), two-way interactive contents are more efficient to use as online learning materials while they are also more satisfying and engaging for students compared to static contents.

Sims (1994) created a multimedia design model which has six levels that are ranging from almost no two-way learner-content interaction to high levels of two-way learner-content interaction. The first level has no interaction from learner to content but only the presentation of the content to the learner. On the second level, learners can navigate through the content within the pre-defined choices they are given. On the third level, users can update information into the multimedia program. On the fourth level, learners are able to manipulate the program with their inputs to achieve a certain goal. On the fifth level, the multimedia program serves a simulated real-life environment where the learner can participate in. On the sixth level, learner is presented a hyperlinked information network where he/she can navigate at free will. And on the last level, learners can experience a microworld application of the content where they can operate in a meaningful and job-related context. Sims (1994) concluded that the constructive activity of the learner increases as the two-way learner-content interaction level rises up to seven, thus the designer should provide the learner the highest level of two way interactivity possible. In addition to Sims (1994), Schwier (1993) recognized the importance of highly structured and two-way interactive multimedia learning environments in his taxonomy of multimedia interactions. Neo and Neo (2009) also stated in their study that the interactive multimedia has a positive effect on students' learning process in terms of enjoyment, satisfaction and motivation.

*Figure 5.* Two-way learner-content interaction *(Tuovinen, 2000).*

## 2.5 Interactive Video and Related Research

The studies related to interactive videos in the literature are mainly focused on the effects of interactivity on academic achievement, video watching rates and engagement. There are also some studies investigating the effect video playback controls on learning as well. Although these controls are not considered interactivity in the context of this research, they provide an important aspect of video watching habits of the students. In this section, nine of those studies will be briefly mentioned.

Stoddard and Marcus (2010) state in their study that the effect and instructional functions of standard videos in distance education courses are started to be questioned due to their nature that passivates the learners by only giving them the chance of watching the video. This situation, which is referred to as the TV effect, prevents students from actively involving in and engaging with the learning material, which is directly associated with meaningful learning (Stice, 1987). In addition to that, giving learners only simple playback controls over the video makes it such a passive learning experience for learners (MacWilliam, Aquino, & Malan, 2013). Interactive video, which is a form of multimedia that combines video and computer technologies to create an active video environment where learners can control and select options based on a given set of instructions (Schlosser & Simonson, 2006), can help enhance the impact of learning with video by providing learners branched, non-linear navigation system through the video, allowing them to test their own knowledge with embedded questions into the video and providing immediate feedback (Schwan & Riempp, 2004).

Guo et al. (2014) conducted a study to find the factors that affect student engagement with video learning material. They conducted the research in one of the

largest MOOC platforms on the web. Data were collected from the most popular 4 courses from the platform that have the highest number of users. They examined nearly 7 million video watching sessions that lasted longer than 5 seconds. The amount of time students watched the video and students' attempts to the questions within the videos were considered as the indicators of engagement. As result, It is found that video production type and video duration have an effect on learners' engagement. Talking head style videos were found to be the most engaging type of video production style, followed by Khan Academy style videos. Finally, it was found that student engagement is at its optimum level on the 6th minutes of the video and it starts to decrease as the duration gets longer.

Geri, Winer, and Zacks (2017) conducted an experimental research on 59 videos on a MOOC platform to find whether interaction made any difference in the engagement rates and attention spans of the viewers. They first presented the videos without any interaction, and after some time they incorporated assessment questions into videos. After a while, they compared the analytics of the before and after interaction versions of the videos. The results showed that the attention span expanded in the interactive videos which resulted in 20% more viewing time compared to standard videos.

Zhang et al. (2006) searched the effects of interactive videos on students' satisfaction levels and learning outcomes in distant education courses. They created 4 learning environments for their empirical study; (a) online learning environment with interactive videos, (b) online environment with non-interactive videos, (c) online environment without video and (d) traditional classroom. After the pretest, 138 students were randomly assigned to these learning environments and given 50 minutes to view the materials about the same subject. Post-test results showed that the use of linear instructional video in education does not always have a positive effect on learning and interactive video which gives the learner the chance of individual control over the video may cause better learning outcomes. After those findings, Zhang et al. (2006) concluded that interactivity can be valuable to improve learning effectiveness and academic achievement.

Bogan (1984) created an interactive video environment where the videotaped lectures of an economy course were divided into 5 minutes long chapters and each chapter was followed by a question about that chapter. Students received immediate feedback after having their answers submitted and they were allowed to move on to the next chapter if their answer is correct and they were directed to the previous chapter to watch again if their answer is wrong.With this self-paced system, 80 students watched and participated in the interactive videos. On the last days of the semester, students were given a questionnaire which was about their opinions on interactive videos. Results showed that sixty-seven percent of students found interactive videos more useful than standard videos and seventy percent found them more enjoyable than any other kind of studying.

MacWilliam, Aquinoand Malan (2013) developed a new video player for delivering the video lectures of an introductory level computer sciences course, which allows instructors to embed assessment questions into the video and students to search content within the video transcripts for easier navigation. The video player was also able to keep track of every response and interaction between the student and the video. These data showed that only twenty-eight percent of the students engaged with the assessment questions. Students who incorrectly answered the question in the first attempt often kept trying until they have found the right answer which caused that eighty-four percent of correct answers were reached at first three attempts. MacWilliam et al. (2013) concluded that low student engagement with assessment question may be caused from the fact that they were not graded for credit.

Schwan and Riempp (2004) conducted an experimental research using interactive videos to teach participants how to tie four different nautical knots. Control group watched standard videos of instruction telling how to tie knots while experimental group was given interactive videos which provided learners a more enhanced navigation and dynamic visualisation options. After viewing the videos, the participants were interviewed about their learning experiences and tested their skills of tying the four knots. The results showed that the experimental group members were able to tie the knots more successfully and it is noted that control group members needed significantly more time to tie the knots. According to Schwan and Riempp

(2004), this is due to the fact that interactive video helps learners to distribute their attention and cognitive resources better.

Nagahama and Morita (2017) conducted a research on 59 university students to find out whether playing the video at different speeds such as; 1X, 1.5X or 2X would make a difference in the learning process. The videos consisted of a presentation slide and the teacher's talking head video on the top left corner. The results of the comprehension test and surveys suggested that viewing videos at 1.5X speed can be more efficient for learning compared to normal speed. The eye-tracking tests also revealed that majority of the students spent only 10% of their video watching time focused on the instructor's video.

Vural (2013) searched the effect of question embedded interactive videos on student achievement. A quasi-experimental design was used to compare the effectiveness of interactive videos and question embedded interactive videos. The participants are divided into two groups, one group was given the question embedded videos and the other was given the interactive videos about the same subject. At the end of the instruction, post-test was applied to participants and results were used to compare the achievements of the groups. As a result, it is found that question embedded videos promote student learning compared and improve the amount of time the learner interacted with the video. Despite these findings, Vural (2013) stated that simply incorporating interactive videos into distance education may not affect the quality of the learning.

# Chapter 3
## Methodology

In this part, the model of the research, the structure of the course whose content was converted into interactive video, the web application used in the process of making the videos interactive, the participants of the study, the instruments used in collecting the data and the details of analysing of the data were explained elaborately.

### 3.1 Research Design

In this study, a mixed-method research design was used to collect, analyze and mix both quantitative and qualitative data in order to attempt to explain and understand the relationship between the participants' perceptions and their progress throughout the semester with the videos (Creswell, 2012). The reason behind choosing mixed method was that it provides a better understanding of the research questions than any kind of data type by itself only (Cresswell, 2008) and due to the fact that the pragmatist paradigm it embraces which helps to solve real-world problems in a practical way instead of dealing with the nature of knowledge with positivist and constructivist paradigms (Feilzer, 2010). In addition to that, only including one type of data into the research can be insufficient to understand and explain the research in social, human and educational sciences (Creswell, 2003). Although both types of data were used in mixed-method research, they tend to be closer to either qualitative or quantitative research approaches in nature, depending on the data collected for the study (Newman & Benz, 1998).

In this study, a total of three data sources were used to find out answers to two research questions which are; (RQ1) "What is the effect of interactive video use on students' perceptions of their learning?" and (RQ2) "What is the relationship between video's duration and videos' watching rate?" Both qualitative and quantitative methods were used to collect data from two of the data sources. The design of the study in terms of which data source was used to answer research questions and how the data from such sources were analyzed can be seen on Table 1.

Table 1

*Research Design of the Study*

| Research question | Data source | Data type | Data analysis |
| --- | --- | --- | --- |
| RQ1 | Perception scale and focus group | Qualitative | Descriptive and content analysis |
| RQ2 | Interactive video data | Quantitative | Correlation analysis |

## 3.2 Setting and Participants

The study was conducted at a foundation university in Istanbul, Turkey, in the spring semester of 2014/2015 academic year. The participants were 391 students who took the introductory level psychology course offered by the Faculty of Economics, Administrative and Social Sciences in a fully distance education format. The course was a must-course for the students of the Faculty of Communication, but any student of the university was able to take the course as a non-departmental elective course. The majority of the students (325) were from the Faculty of Communication and the rest of them were from the following faculties from most to least; Faculty of Economics, Administrative and Social Sciences (39), Faculty of Architecture and Design (14), Faculty of Law (8) and Faculty of Educational Sciences (5).

The Faculty of Communication offered the course to the second-graders, so most of the participants were mostly second-grade students. However, there were also a few first and third-grade students were enrolled in the course as well. The learning platform of the university has been used in all levels of the institution, from prep school to graduate schools, hence the participants were familiar with the system and they had experiences learning with an asynchronous course structure. The instructor of the course had also been teaching the course via online learning platform for three semesters before the study, using the platform for sharing materials, online assessment and announcements.

**3.3 Procedures**

**3.3.1 The structure of the course.** The study was implemented into an introductory level psychology course that is worthy of five ECTS credits in a foundation university in Istanbul. The course had been offered every semester by the faculty of Economics, Administrative, and Social Sciences in a traditional face to face setting in the classroom until the fall semester of 2014. In the traditional settings, the instructor usually used presentation slides to lecture and sometimes facilitate a discussion with the participation of the students. From the fall semester of 2014, the course started being offered with distance education asynchronously meaning that learners and the instructor do not have to be online on the platform at the same time. In order to create attractive content for students, distance education unit of the university and the instructor of the course decided to make Khan Academy like video recordings for the course. The reason for using Khan Academy style videos were; (1) these types of videos have been found to be more engaging than classroom lecture videos and slide presentation videos (Guo et al., 2014), (2) such types of videos eliminate the possibility of instructor's discomfort while being video recorded (Marchand, Pearson, & Albon, 2014). Presentations of the instructor were converted into a digital whiteboard application format. Using the whiteboard application, a graphics tablet, and a stylus, the instructor recorded the screen and her sound.

Before the actual recording process, a set of trial recordings were shot in order to make the instructor get used to the process and the tools she needed to use. In those test recordings, it was noticed that the instructor barely used the stylus to make drawings instead, she opted to highlight existing text in the slides. The expert on the educational technologies field and the instructional designer of the distance education unit informed and tutored the instructor that the impact of the images and drawings have been found to be superior compared to plain texts in terms of learning outcomes (Clark & Lyons, 2004), and visualization can help to improve students' understandings of abstract concepts (Haugwitz, Nesbit, & Sandmann, 2010). In addition to that, the instructor was asked to rearrange her slides to include less text and more white space for drawings. After a few more test recordings, the instructor was ready to record the course videos.

In the videos, instructor went over each slide one by one while lecturing, using the stylus, sometimes highlighting a text in the slide, writing a sentence or a phrase with her own handwriting, and sometimes drawing images that would make it easier for students to understand abstract concepts (Screenshot can be seen in Figure 6). Total of 41 video lectures covering all of the topics of the course syllabus were recorded in this way and uploaded to the university's learning platform. Videos were divided into 14 folders across by 14 weeks in the semester. In the learning platform, it was set that each folder would get activated at the beginning of the corresponding week and remained active (available to students) until the end of the semester.
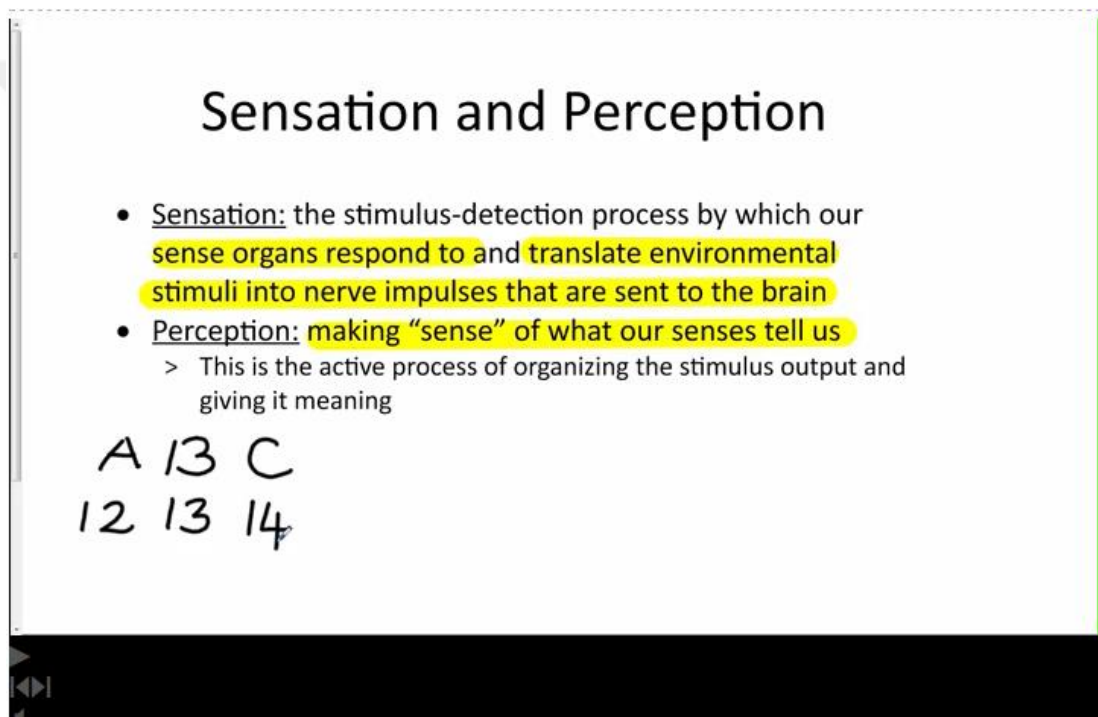


*Figure 6.* Screenshot of the instructor highlighting text on the slide and using her handwriting.

**3.3.2 Interactive video web application** With the beginning of the spring semester of 2014/2015 academic year, half of the videos of the course were converted into interactive videos, using a web application. The browser-based web application required no technical skills to create interactive videos and was able to track every interaction between the student and video such as how many times the video was played by a particular student, number of answer attempts made to a question, right

and wrong answer counts. The application allowed use of two different question types; open answer and multiple choice. Considering the fact that the course was a massive online course with more than 300 participants, the open answer questions were not used since it would take too much time and effort to control the answers. Instead, multiple-choice questions were opted where the application could automatically assess the answers and give feedbacks.

Every week, half of the video content that would get activated for students was converted into interactive video. This way, students had the chance to experience learning with both interactive and standard videos through the semester. The videos that would get converted to interactive videos were selected randomly, based on no particular criteria.

The students of the course had no idea about the ongoing study. They were not promised or given any extra scores for answering the questions in the video. Because of the inability of the learning platform, there was no synchronization between the online interactive video software and the learning platform. In order to track the progress of each student through the semester, students were prompted a textbox at the beginning of each video, where they were asked to enter their student ID numbers in a textbox. Since this step was not mandatory, most of the students skipped it or entered wrong and arbitrary values.

**3.3.3 Question placement and navigation.** With the help of the instructor of the course, the videos were divided into meaningful chapters. After each chapter of a video, the multiple-choice questions which were selected/prepared by the subject matter expert were placed related with the topics covered in the respective chapter (see Figure 7). When the student submitted his/her answer, a standard feedback was given to the student whether he/she got the right answer or not. Students were given countless attempts to answer the questions. So, when a student's answer to a question was wrong, he/she could try until the correct answer was found or see the right answer by clicking the "Show Answer" button on the feedback window. The software offered common video playback controls in the video player such as; play, pause, rewind, fast forward and the playbar. It did not have the option of playing the video in different speeds.

Using a feature of the interactive video application, the playbar and playback controls were disabled with the exception of pause button to make sure that students do not skip the questions when they pop up at the end of each chapter using these controls.

In the process of making video interactive, the last question of each video was placed at the last second of videos deliberately. In the study, students answering the questions was considered as an indicator of engagement. Since it is impossible for participants to skip questions due to the absence of playbar, the student who answered the last question of the video has been considered as he/she watched the video completely and engaged with the video.
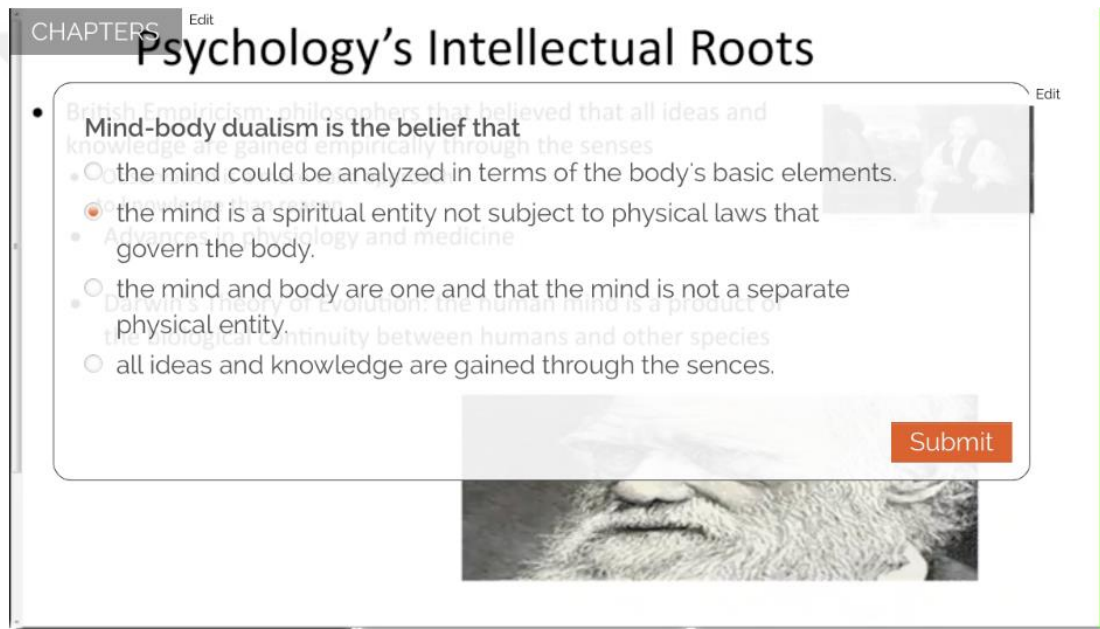


*Figure 7*. Screenshot showing the question embedded into the video.

**3.3.4 Auto-navigating videos.** One interactive video, every week, was set as to make the student navigate to the beginning of the last chapter if the answer of the student for the question was wrong and the "Show Answer" button was disabled. So, the student who answered the question wrong, had to watch the last chapter all over and answer the same question again until she/he found the correct answer.
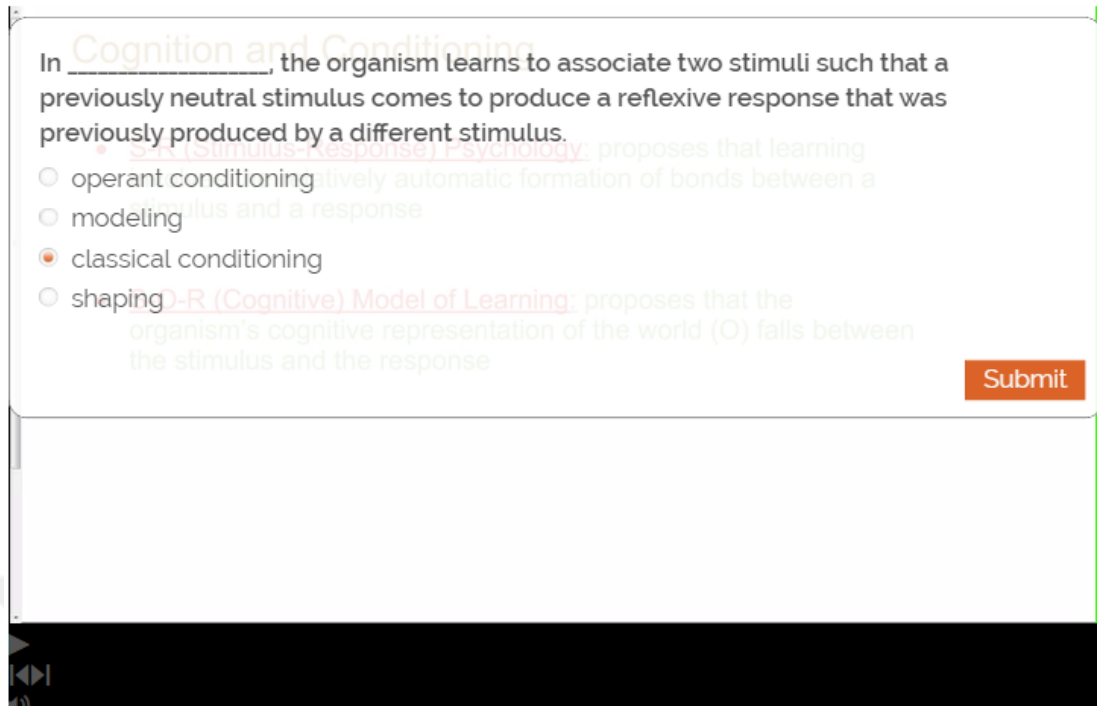
*Figure 8.* Screenshot showing the question embedded into the auto-navigating video which takes the student back to the beginning of the chapter if the answer is wrong.

**3.4 Data Collection Procedures**

In this mixed method study, data were collected from three different sources; (a) Interactive Video Perception Scale (Appendix A) which is a survey consisted of open-answer questions and designed to measure the perceptions of students about learning with interactive video, (b) the focus group discussion notes and (c) the interactive video data obtained from the interactions between the students and video which constituted the quantitative data of the study. The data coming from the first two tools consisted the qualitative data of the study and used to answer the first research question. Data obtained from the last tool were quantitative and used to find answer to the second research question.

**3.4.1. Interactive video perception scale.** Use of interactive videos in distance education settings are relatively new and not so common compared to standard videos. This situation makes it hard to find a reliable and valid tool to assess and measure the effectiveness of it or its effect on perception. But there are a lot of likert scales, quantitative tools to measure different aspects of video in education which are tested

for validity and reliability. Because of the lack of a proper and reliable tool to measure the effect of interactive videos on learners' perception, in this study a qualitative scale which is comprised of 10 open-ended questions and one Yes/No question was designed and applied to the participants (Appendix A). Before the creation of the scale, opinions of an expert from the field of educational psychology and technology with 20 years experience were taken about how to measure perception in an online learning setting. With the consultation of the expert a detailed literature review has been conducted about the topic and the following works in Table 2 have been examined to use some of their items as questions or as answer options with a little bit of modification;

Table 2

*Studies Examined While Forming the Qualitative Interactive Video Perception Scale*

| Name of The Study | Author(s) |
| --- | --- |
| Learning from Online Video Lectures | (Brecht, 2012) |
| Online and Traditional Lectures: Evaluating Effects of Social Presence and Learner Control | (Bowers, Freyman, McLellen, Paxton, & Spiegel, 2013) |
| Assessing Student Performance and Perceptions in Lecture Capture vs. Face-to-Face Course Delivery | (Euzent, Martin, Moskal, & Moskal, 2011) |
| Student Perceptions of the Use of Instructor-Made Videos in Online and Face-to-Face Classes | (Rose, 2009) |
| Student Perception of Lecture Video Use as a Means to Increase Time for in Class Problem Solving Applications. | (Dolan, Prodanov, & Taufik, 2011) |

A few options for every question were also created as possible answers to the questions, considering the high probability of students not answering open-ended questions with their own sentences. It is also known that, providing answer options for

open-ended questions increases the chances of capturing a broader range of data (Singer & Couper, 2017). At the beginning of the test, it was stated to students that they were allowed to choose as many options as they wish for one question. Under the options for every question, there was also an "Other" textbox to be used for submitting an answer with her/his own sentences, if none of the options was able to describe the answer of the student. he scale was created in an online survey site and shared with participants from the learning platform. Participants were also notified that participation was voluntary and results would only be used for academic purposes. 110 participants took the survey anonymously.

**3.4.2. Focus group.** Focus group is a group interview conducted with approximately six to twelve participants and a moderator to facilitate the discussion with pre-determined questions. The main purpose of the focus group studies is getting the perceptions and opinions of participants on a particular subject by creating a controlled discussion environment where the comments of participants stimulate new ideas for both the participants and the researcher (Höjler, 2008). Focus group studies can also be used to better interpret the previously obtained quantitative data (Höjler, 2008) and help understand the results of surveys (Morgan, 1996). In this study, the data from the focus group constituted the qualitative part of the study together with the data from the perception scale

In this study, the focus group was used to support the data from the previously made scale and to get more in-depth information about participants' perceptions about interactive videos. With the consultation and opinions of an expert on the field of educational technology, five questions parallel to the ones in the scale were determined which can be seen in Table 3 below. A message was sent from the learning platform to all of the participants of the course about when and where the focus group would take place. The purpose of the study was also briefly explained in the message. Seven students replied to the message stating that they would voluntarily participate. However, during the focus group study, it was understood that one of the students has never watched an interactive video during the semester so he was not able to answer the questions. The focus group session which almost took about 30 minutes was conducted with the remaining six students in Turkish and audiotaped. During the

session, the researcher acted as a moderator and facilitator to make the discussion flow without getting interrupted. An abridged transcript was prepared which is an approach that relies on listening to the recorded audio to transcribe the relevant and useful sections of the discussion (Krueger, 1998). The transcription was then translated into English by the researcher. Temple and Young (2004) state, provided that the researchers consider themselves as neutral and objective message conveyers, the translation can be done by the researchers, as long as they can overcome the technical difficulties of translation. In addition to that, Young and Ackerman (2001) mention the benefit of translating the qualitative data by the researcher himself, claiming that the researchers are experienced in the research area, they can also check the validity of interpretations during the translation process.

Table 3

*Questions Asked in the Focus Group Discussion*

| Questions |
| --- |
| 1) What can you say if I ask you to compare a face to face course and a video-based online course? |
| 2) What is your opinion on comparing interactive and standard videos? Do you think they helped you learn better compared to standard videos? |
| 3) What do you think about the absence of the player bar in the videos? |
| 4) What is your opinion about the difficulty levels of the questions in the video? |
| 5) What is your opinion about the videos that navigated you to the beginning of the previous chapter when you could not find the correct answer? |

**3.4.3 The interactive video data.** The web-based interactive video software that was used to make the videos interactive is capable of tracking and logging every interaction between the student and video such as how many times a particular student

attempted to answer a question, on which attempt he/she found the correct answer, how many times a student started the video or how many times the play button is clicked, and the progress of each student through the videos (considering that the student entered his/her id number correctly in the beginning of the video). These data exported from the software constituted the quantitative data of the mixed method research. The quantitative data coming from the software for each interactive video and their description can be seen in Table 4.

Table 4

*Quantitative data obtained from the interactive video software*

| Video Length | Number of questions | Interactions | Video play |
|---|---|---|---|
| The duration in minutes | The number of questions that particular video contains | The number of answer attempts for each question in the video | The number of times the "Play" button was clicked |

**3.5 Data Analysis Procedures**

In this section, the analysis process of the data collected from (a) Interactive Video Perception Scale, (b) focus group interview and (c) interactive video software was discussed. The qualitative data coming from the first two sources were blended before analyzing. Researchers have acknowledged the benefits of mixing multiple qualitative data sets (Bazaley, 2009; Doyle, 2003; Small, 2011) stating that by mixing multiple qualitative data, the researcher can develop a new understanding of the participants' perspective and may contribute to the richness of the findings. For the quantitative part, IBM SPSS Statistics 20.0 software was used in the analyzing of quantitative data obtained from the third data source.

**3.5.1 Analysis of the qualitative data.** Before the analyzing process, the qualitative data obtained from the perception scale and the focus group session was blended into together to form an enriched dataset (Small, 2011). In order to do so, the focus group study which was conducted in Turkish and then translated to English by

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the researcher was recorded with an audio recorder and then transcribed using the abridged transcript method. The transcription was comprised of complete thoughts and useful information without the slang and non-standard grammar. To this transcription, the answers of the participants of the perception scale also added to create one dataset from two different data sources. Content analysis method was used to analyze the data which contains the steps to code the transcript, derive themes from coded text and then grouping the related themes together to interpret the findings (Strauss & Corbin, 1990). The answers from participants were examined and coded to categorize parallel and connected thoughts to make the qualitative data manageable (Taylor-Powell & Renner, 2003). The recurring codes were then organized and grouped together into six coherent themes that summarize and bring meaning to the text which makes it possible to interpret the data (Ratcliff, 2002).

In the analyzing process of the qualitative data descriptive statistics was also used. Although the use of numbers/numerical data is controversial in qualitative studies, researchers like Hammersley (2008) and Becker (1990) have supported the use of quasi-statistics in qualitative research in order to make statements like "more", "usually" and "some" more precise. By using the descriptive statistics in the qualitative research, the researcher can; (a) generalize the qualitative data based on solid evidence, (b) identify the diversity of opinions in the dataset, (c) detect patterns that are not apparent in the unquantized qualitative data and (d) provide evidence for the interpretations he/she made to counterclaim that the data is cherry-picked (Maxwell, 2010). So in that manner, descriptive statistics were used in the analyzing of the qualitative data in this study to provide frequencies and reflect how often the thought patterns and opinions were mentioned by the participants.

**3.5.2 Analysis of the quantitative data.** The quantitative data from the interactive video software were analyzed with both descriptive analysis and pearson correlation test. Descriptive analysis was used to give an insight about the participants' interactions with the video and their progress throughout the semester. Guo et al. (2014) used interactions between the video and the user as a means to measure the engagement and as an indicator of watching rate. Likewise, in the present study, the variable of the number of students that answered the last questions in the video has

been considered as an indicator of engagement. Correlation analysis is useful when the researcher wishes to determine whether there is a relationship between two variables (O'Brien & Scott, 2012). The Pearson correlation test has been proven to be effective on showing the strength of the linear association between two continuous vairables (Hauke & Kossowski, 2011). Therefore, Pearson correlation test was used to measure and interpret the relationship (Büyüköztürk, 2005) between two variables; (a) the duration of the video and (b) the number of students that answered the last question in the respective video to find out whether there was a relationship between the duration of the video and the number of students who watched the video until the end.

## 3.6 Trustworthiness of the Study

Due to the absence of a reliable and valid perception scale that measures the effect of interactive videos on perception, an open-ended question scale was designed with the opinions of an expert on the field, that is based on previous scales that measure the effect of instructional videos on perception where students can submit their own answers to questions. According to Höjler (2008) and Ouimet, Carini, Kuh, and Bunnage (2001), focus groups can be used to establish the validity and reliability of the qualitative data. In order to back-up the scale, a focus group study was applied. The transcription of the focus group discussion has been sent to the participants for validation and confirmation received.

## 3.7 Limitations

One main limitation of the study was that the absence of the logs of standard videos' play rates makes it impossible make a comparison between the interactive and standard videos. In addition to the limitation above, Guo et al. (2014) state that actual engagement in the videos can only be measured with direct observation and questioning which is almost impossible and infeasible in massive courses to achieve. So they take interactions between the viewer and the video as an indicator of engagement. In the present study, a similar assumption was also made that the student who answered the last question in a video is considered that he/she completely watched and engaged with the video.

# Chapter 4
## Results

In this section of the study, the results of the research questions were presented which are (a) "What is the effect of interactive video use on students' perceptions of their learning?" and (b) "What is the relationship between video's duration and videos' watching rate?" The qualitative and the quantitative data collected from there data sources were analyzed in order to find answers to the research questions respectively. In this section of the study, the results were presented in two parts; (a) the results obtained with the analysis of the qualitative data which are a blend of the data gathered from the perception scale and the focus group session, and (b) the results acquired from the analysis of the quantitative data which are consisted of the correlation between the video length and the number of students that answered the last question in the video.

## 4.1 Results of the Qualitative Data Analysis

The qualitative data from the focus group and the perception scale were blended together to form the qualitative aspect of the study, in order to find the answer to the first research question which is "What is the effect of interactive video use on students' perceptions of their learning?".

In the focus group session, the participants were asked five questions similar to the ones in the scale. Although there were seven students participating in the session, only six of them were able to contribute to the discussion in all of the questions, since one of them has never watched any interactive video. The focus group session was conducted in Turkish. The session was translated into English while being transcribed by the researcher. To the transcription, the answers from the perception scale were also added. Following the content analysis method's steps, the transcription was coded to group similar and frequently mentioned ideas and comments together to form six coherent themes. In addition to these themes, there were some uncommon opinions as well which were out of the scope of existing themes. Although they were not frequent enough to form a new theme, they are mentioned under the theme title that is most appropriate. The themes can be seen on Table 5.

Table 5

*The table showing six themes derived from the focus group session and interactive video perception scale.*

| Themes emerged from the qualitative data |
|---|
| The convenience of video-based online course |
| Lack of learner to learner and teacher to learner interaction |
| Positive opinions towards interactive videos |
| Necessity of playback controls |
| Questions are nice to have |
| Auto-navigation is irritating |

**4.1.1 The convenience of video-based online course.** When transcribed data were examined it is obtained that participants mainly stated they had positive experiences with the video-based online course. The asynchronous nature of the online course and the flexibility it offers in terms of time and space seem to have an impact on the opinions of the participants. Of 116 students, 41 mentioned that they found the online course more adjustable to their needs in terms of quiz and midterm submissions. One participant stated his opinions on the online video-based course in terms of its flexibility as "*In the online course, I do not have to come to school and be in the classroom for a given time, which is a good thing for me.*" was the exact sentence one participant used to state his idea on the topic. Another participant also mentioned that self-paced learning was also an aspect of the flexibility of online learning saying that "... *because I like the freedom it provides to me. I can take my exam whenever I feel myself ready, I can learn and view course material whenever I feel like I can understand the best.*" One last student also agreed with the opinion stating that "*There is no such thing as missing a class which is a good thing for someone like me who usually has a problem with attendance.*". There were also 32 participants who stated

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that the self-paced learning aspect of the online course was an upside compared to a face to face learning setting. One student provided a different approach to the theme, stating that the context of a psychology course is not suitable for an online course setting and it should be given in a face to face classroom.

**4.1.2 Lack of learner to learner and teacher to learner interaction.** Another frequently stated opinion by multiple participants was the physical absence of an instructor in the learning environment and how easy it was to interact with the instructor in the classroom compared to distance course. The opinion of "being unmotivated due to the absence of the instructor" was repeated 35 times by participants. In general, participants seem to be bothered by the lack of one to one interaction they are accustomed to finding in a traditional face to face classroom setting. One of the participants stated about this issue saying "*I like the idea of having a teacher in class. Having someone present to lecture me and asking me questions from time to time motivates me".* Another participant agreed and complained about the lack of interaction between learner to learner by stating *"In the classroom, I have the chance to ask the teacher something I missed or did not understand. Other than that, I can ask my questions to my classmates as well".* Participants also seem to miss the benefit of being in a social environment that of the classroom. 29 participants stated that they missed the opportunity to collaborate with their classmates.

One participant stated one of these benefits saying;

*Sometimes while we are in class one of my classmates asks a question to teacher. A question that I would never come up with. But since I am present at the same place with them I get to hear the question and the answer. This is an opportunity we don't have at online courses.*

Another student also mentioned that they could not benefit from the experiences of the teacher in an online class as they would do in a face to face setting;

*If I had an alternative, of course, I would choose face to face course because as a student I benefit from lecturers' experience. and it is more attractive than video. Also, it can be more interactive with lecture, I can ask whatever I do not understand.*

Despite these opinions, one of the students stated that video can simulate the presence of the instructor and a classroom environment by saying *"... but I have to say that having these videos helped me to feel like there was a teacher lecturing to me and the questions in the video created a sort of classroom-like environment."* Apart from these two opinions, one of the participants mentioned that online courses are easier to succeed saying that "*I have taken many online courses in this university and have never failed to pass the course once. So I think that online courses are easier compared to face to face courses.*"

**4.1.3 Positive opinions towards interactive videos.** Participants had a common opinion about the interactive videos being more demanding than regular videos. 29 participants stated their opinions in this direction that they spent more time on the interactive videos. In addition to this, 30 participants mentioned that standard videos were easier and more straightforward to watch compared to interactive ones. However, participants reflected their positive opinions about interactive videos and watching interactive videos required more cognitive effort, stating *"The interactive videos really demanded more time and much effort compared to standard ones. So in a manner, they were quite challenging to watch.".* Although stating that interactive videos demanded more cognitive work, the participant added " *... but I believe they helped me to learn better in the long run*". In addition to that, 39 other participants stated that interactive videos made them learn the material better. Another outstanding characteristics of the interactive videos according to the participants was their entertaining aspect. 27 students stated that learning with interactive videos was more enjoyable compared to standard videos. One of those participants reflected this with her own words as; "*I have never thought that I would enjoy watching course videos. The questions in the videos made it like a game to watch and participate in. I was literally waiting for those questions to pop up*" and another one added; "*The interactive videos in the course made me feel more motivated to watch the videos every week.*".

Another opinion that was mentioned by 22 participants was the possible effect of interactive videos to the participants' grades, due to the questions in the videos. One participant stated the following about the situation "*The questions in the videos were quite similar to the ones we were asked in the quizzes and midterm. So, by watching*

*the videos for preparing for the exam not only I covered the previous chapters, but also had a practice exam for the assessment coming*" while another mentioned the use of self-assessment of interactive videos "*I had the chance to test myself after watching the videos and realize my strong and weak sides. And the fact that I was given the chance to answer until I got the right answer helped me more about this.*".

One participant mentioned that the part that asked the student ID before every video caused some stress on him. Also, the participant mentioned that because of his irrelevance to the course content, the extra effort interactive videos demanded made him feel daunted with the following sentences;

*I only took the course as a general elective because I thought that it was going to be an easy one since it is an online course. But that was not the case. The videos were not like the ones before and it made me stressed that we had to enter our ID numbers while watching them. I thought that we were going to be graded based on our responses. The interactive videos might be good and beneficial for the ones who are into the subject of the course but they meant extra work and time loss for me.*

Finally, 69% of the students also stated that they would take another course incorporating interactive videos if they had the chance.

**4.1.4 Necessity of playback controls.** The absence of the playbar and playback controls such as pause, fast-forward and rewind in the interactive videos seemed to have a negative effect on the participants, hence the issue was mentioned 50 times by participants. The absence of the playbar and other playback controls like re-wind and fast-forward was not welcomed by any of the participants. One participant described how the lack of video controls was not welcomed by any of the students as "*the only negative side of the interactive videos*" and continued "*... when preparing for exam and I have a specific topic to study, I have to start the video and wait until that part comes. Sometimes I even did not watch the parts until the specific topic I want to study came*". Another participant agreed and added "*The video starts and finishes by itself. The fact that I don't have any control over it is annoying*". There was also a suggestion to make the videos better. One participant said that "*I would rather having a playbar if possible to navigate easily. Or a speed changer could work as well to make the video*

*play faster. That's how I watch the educational videos on YouTube*". Another participant also contributed; "*Interactive videos are very hard to use especially if you want to skip forward the video*"

Another participant took a different approach to the interactive videos by complaining that they are not downloadable and lack the playbar unlike standard videos; "*I much prefer the standard videos, it is easier to download them and they have the time bar which I think is crucial*"

On the other hand, this situation does not seem to bother some participants. 30 students stated that they did not feel like using the playbar since they like to watch the videos in their natural flows.

**4.1.5 Questions are nice to have.** Although some participants found the questions a bit difficult, in general, they were pleased to have questions to refer to or practice while studying for the exams "One participant found them hard but he concluded "... *but I think it was a good practice for exams* " while others said there were both easy and hard questions and they stated that " *The good thing about the questions was having a question bank to prepare for the quizzes and midterm* " regardless of the difficulty of the questions. A participant also classified some questions as "hard to miss" explaining the reason as "*Some questions were exactly asking what the teacher was talking about 10 seconds ago.*" Another participant stated that the questions in the videos should be optional stating that "*I think it would be better to have an option in the beginning of the video, asking the student if she/he wants to activate the questions. So, if you just want to watch the video without getting interrupted by the questions, you can only watch the videos.*" In addition to that 22 participants stated that the questions in the videos helped them get better scores in the exams.

**4.1.6 Auto-navigation is irritating.** A frequently complained topic by multiple participants was the interactive videos which navigated the students to the beginning of the last chapter when they fail to answer the question correctly. Participants generally have found this situation irritating. 41 participants stated that they did not like the situation and they would like to move on even if their answer was

wrong. Another opinion close to this repeated by 35 participants, was "feeling forced to find the right answer". One of them, for whom these kind of videos are "*the worst part of the course*", stated that "*It is so much time consuming to progress through the video, considering that we can not fast forward or jump to a specific time*". Another one also stated that she used external resources to find the answer of a question she did not know the correct answer in order to proceed through the video. But she also concluded, "*I did not like it but it might have helped me to learn better because I had to look it up on the internet to find the right answer so I could keep on watching*".

However, there were 32 participants who found this situation beneficial as well. Those participants generally stated that this situation made them watch the chapter more carefully and helped them to answer the question correctly the next time. One of those participants stated that his opinions have changed about this kind of videos from negative to positive after realising that it helped him to find the right answers to the question by stating the following; "*Although I still don't like it, I noticed that it was making me do what I was supposed to do when I answered a question wrong, which is going back to the previous chapter and watch it again. Without these videos, I would have never gone back and watched the chapter I answered wrong again by myself*". Another one also thinks that this situation made him watch the videos more carefully but still thinks that "*the going back*" should be optional.

## 4.2 Results of the Quantitative Data Analysis

During the semester, 21 of the video lectures of the course were converted into interactive videos by embedding multiple choice question into them, with the help of a web-based application. The data drawn from the application representing the durations, total number of questions embedded into each video, the number of student that answered the last question in the video and total video play numbers can be seen in Table 6. Total video play represents the number of how many times the play button was clicked.

Table 6

*The table showing the descriptive statistics of videos through the semester.*

| Video Name | Video Duration | Total Number of Questions | Number of Student Answered Last Question | Total Video Play |
|---|---|---|---|---|
| Chapter 1-1 | 13:47 | 3 | 35 | 310 |
| Chapter 1-3 | 07:05 | 3 | 34 | 168 |
| Chapter 1-5 | 11:24 | 5 | 34 | 159 |
| Chapter 2-1 | 14:41 | 3 | 25 | 140 |
| Chapter 2-3 | 13:38 | 1 | 28 | 92 |
| Chapter 2-6 | 23:20 | 4 | 19 | 95 |
| Chapter 5-1 | 14:33 | 6 | 17 | 112 |
| Chapter 5-3 | 07:04 | 1 | 31 | 78 |
| Chapter 5-5 | 14:55 | 4 | 25 | 75 |
| Chapter 7-1 | 22:52 | 5 | 23 | 83 |
| Chapter 7-5 | 19:45 | 4 | 21 | 73 |
| Chapter 7-8 | 19:54 | 3 | 18 | 62 |
| Chapter 8-1 | 18:11 | 3 | 22 | 68 |
| Chapter 8-2 | 16:49 | 5 | 17 | 60 |
| Chapter 10-1 | 14:00 | 3 | 24 | 68 |
| Chapter 10-3 | 11:33 | 2 | 20 | 48 |
| Chapter 10-4 | 20:39 | 4 | 17 | 53 |
| Chapter 11-1 | 16:05 | 4 | 10 | 44 |
| Chapter 11-2 | 20:45 | 3 | 10 | 48 |
| Chapter 13-1 | 20:41 | 4 | 5 | 28 |
| Chapter 13-3 | 07:43 | 2 | 7 | 30 |

Since the contents of the course get activated to students from the learning platform on a weekly basis and remained open until the end of the academic semester, it is natural that the videos presented to students in the first weeks of the semester have more video plays and more students that answered the last question. The videos on Table 6 are lined chronologically, the one that was presented to students on the first week is on top and the one that was presented to the student the last week is on the bottom. It can be seen that Chapter 1-1, which is the first video that was presented to students in the first week of the semester, has 310 video plays and 35 students answered the last questions, while Chapter 13-3, that is the video presented to students

one week before the data were collected, has 30 video plays and only seven students answered the last question. In order to eliminate this situation and normalize the results, Table 7 is created, which shows the same data for every video but for a time period of a week that starts with the activation of the video to students.

Table 7

*The table showing the normalized descriptive statistics of videos for one week*

| Video Name | Video Duration | Total Number of Questions | Number of Student Answered Last Question | Total Video Play |
|---|---|---|---|---|
| Chapter 1-1 | 13:47 | 3 | 9 | 138 |
| Chapter 1-3 | 07:05 | 3 | 11 | 61 |
| Chapter 1-5 | 11:24 | 5 | 11 | 60 |
| Chapter 2-1 | 14:41 | 3 | 11 | 74 |
| Chapter 2-3 | 13:38 | 1 | 14 | 46 |
| Chapter 2-6 | 23:20 | 4 | 7 | 39 |
| Chapter 5-1 | 14:33 | 6 | 9 | 73 |
| Chapter 5-3 | 07:04 | 1 | 13 | 42 |
| Chapter 5-5 | 14:55 | 4 | 9 | 44 |
| Chapter 7-1 | 22:52 | 5 | 11 | 53 |
| Chapter 7-5 | 19:45 | 4 | 10 | 55 |
| Chapter 7-8 | 19:54 | 3 | 12 | 49 |
| Chapter 8-1 | 18:11 | 3 | 8 | 35 |
| Chapter 8-2 | 16:49 | 5 | 6 | 35 |
| Chapter 10-1 | 14:00 | 3 | 11 | 36 |
| Chapter 10-3 | 11:33 | 2 | 9 | 30 |
| Chapter 10-4 | 20:39 | 4 | 6 | 26 |
| Chapter 11-1 | 16:05 | 4 | 7 | 33 |
| Chapter 11-2 | 20:45 | 3 | 6 | 42 |
| Chapter 13-1 | 20:41 | 4 | 5 | 28 |
| Chapter 13-3 | 07:43 | 2 | 7 | 30 |

The relationship between a video's duration and the number students that answered the last question of the same video was calculated using Pearson correlation coefficient. Two variables were found to be significantly ($p = .05$) negatively correlated with a correlation coefficient of $r = -.44$. Meaning that as the duration of the video increased, the number of the students that answered the last question decreased.

**Chapter 5**

**Discussion and Conclusions**

This study aimed to investigate two research questions; (1) the effect of interactive video use on distance students' perceptions of their learning in an introductory level massive online psychology course and (2) the effect of video duration on video's watching rate. In order to find students' perceptions, a qualitative scale was created consisted of 11 open-ended questions. In addition to the scale, a focus group session was also conducted with the participation of six students to get more insight on the matter. Both the scale and the focus group revealed that the students have positive opinions on the interactive videos helping them learn better. To answer the second question, it is assumed that the students who answered the last question in the video watched and engaged with the video. The pearson correlation test between variables of video's duration and the number of students who answered the last question of the video resulted in negative correlation, meaning the longer a video was the less the amount of views it received. The details of the outcomes are discussed in detail in this section.

**5.1 Discussion of Findings for Research Questions**

The main research question investigated in this study is how students think the interactive videos affected their learning. Regarding this question, with the help of focus group session and the interactive video perception scale, an array of positive opinions was gathered from students about their thoughts of how interactive videos influenced their learning throughout the semester. From their opinions in the focus group, it is understood that although the lack of control over the content due to the missing playback controls displeased them, they enjoyed the fact of being actively involved in the learning process which was something new to them in the online platform used at the institution. In addition to that, students reported that having the interactive videos incorporated in their courses helped them achieve better results and learn better in general.

According to constructivists, self-directed and interactive learning where the learner has the opportunity to interact with the content can improve the learning

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outcome (Tsay, Morgan, & Quick, 2000). Zhang et al. (2006) also add to the literature that multi-directional interactivity in multimedia has positive effects on grades and learner satisfaction. The interactive video scale and the focus group revealed parallel results to the literature. Students reported that interactive videos helped them learn the material better while keeping them interested and engaged with the material compared to learning with standard videos. In addition to that, 69% of students reported that they would like to take another online course that incorporates interactive videos. The reason that students favored interactive videos over to standard ones with stating finding the former more engaging and helping them to learn better may be due to the positive effect of the interactive multimedia has on students' learning process in terms of enjoyment, satisfaction, and motivation (Neo & Neo, 2009).

Although there are not many studies on how interactivity in the videos affect the student achievement, Vural (2013) in his study concludes that embedding questions in the videos may promote students' academic achievement and increase the time they spend on the material. The results from the perception scale and the focus group also suggest that the questions in the interactive videos made students spend more time on learning the material and promoted their learning. Another result from the focus group related to the questions was that students were pleased to have questions available to them at any time which may also have caused their motivation to increase, thinking that they would get asked similar or same questions in the mid-term or final exams (Vural, 2013).

Stoddard and Marcus (2010) define the TV effect as; merely using standard videos in online environments that gives the learner a passive role to just watch the video without participating like a television and it must be avoided since it is not necessarily effective in terms of learning and engaging. In regard to this, students reported that they found the interactive videos enjoyable almost like a quiz game, in which they can compete with themselves and friends, assess their own learning by finding their strong and weak sides on the topic and get the chance to review them again which also according to them, made them spend more time on the online course. The fact that learners made a psychological effort and investment in learning to

understand the topics and to internalize the knowledge (Newmann, 1992) may suggest that they actively engaged with the content and the TV effect has been avoided.

There were some negative and skeptical thoughts were mentioned by students, labeling the interactive videos as being "not easy to watch" although not as much as the positive opinions towards interactive videos being helpful to learn better and more engaging. According to Donkor (2011), a possible way to explain the discontent with video-based learning is the technical qualities of the videos. The technical aspects of the video material such as audio, resolution, images affect the learners' attitudes towards video-based learning accordingly. However, the result of the interactive perception scale shows that majority of the students find the technical qualities of the videos satisfactory. On the other hand, cognitive load theory could also explain this dissatisfaction. In the videos, the instructor used pre-prepared slides usually only containing the topic of the lecture and a few bullets related to the subject. In the meantime, she was making annotations on the white space of the slides with the help of the stylus and the graphics tablet while narrating and explaining the topic at the same time. The annotations were usually consisted of highlighting a piece of text already on the slide, making simple drawings or writing a piece of text down. In addition to these, the students received a multiple-choice question at the end of every chapter related to the topic that has just been covered by the instructor. All of these forms of information such as narration, texts on the slides, annotations and questions may have caused the redundancy effect to form on the students which has been explained as the phenomenon of learning being hindered when additional and mainly identical information is presented to students in two or more forms compared to the presentation of less information (Sweller, 2005). Cognitive load theory suggests that images and narration that are being presented simultaneously with redundant on-screen text has the possibility to increase the cognitive load which can result in impeding the learning process (Moreno & Mayer, 1999). With the addition of questions, all of those texts, annotations, and narrations may have increased the cognitive load for those students.

Another issue that might have contributed to the opinion of interactive videos not being easy to watch may be due to the video player of the interactive video

application. An opinion stated by students frequently was the inconvenience of not having any control over the flow of the video, due to the disabled playbar and playback controls. This situation was deliberately created by the researcher to make sure that students are answering the questions without skipping them using these controls. According to literature, learner control is an important aspect of instructional design which allows the student to dynamically observe their understanding of incoming information (Williams, 1996). Instructional video in that manner is no exception and should offer the learners the flexibility of rewinding, fast-forwarding or jump to a specific point in the playbar to meet their needs (Bassili & Joordens, 2008). In addition to these standard controls, a few students said they wished they had playback speed control to play the videos 1.5X or 2X faster than their regular speed, which has been proven to have the possibility of being more effective in learning in some cases (Nagahama & Morita, 2017), however the interactive video application did not feature such capability. The fact that students did not have these controls on the videos might have negatively affected students' perceptions about interactive videos.

Another closely related issue about controlling the flow of the video was the auto-navigating interactive videos where students were automatically navigated to the beginning of the chapter in case their answer to the question was wrong. Although when creating an interactive video-based learning environment, requiring students to complete a task such as filling a gap or answering a multiple-choice question to move on to the next chapter in order to keep their interest up is recommended (Zellner & Vural, 2010) majority of the participants of this study found the auto-navigation bothersome, describing the situation as "disturbing" and "feeling forced to go back". This situation may be explained with the theory of multimedia learning which was provided by Mayer (2001) that suggests giving the learners control over the presentation of the multimedia can result in improved learning outcomes and alleviated cognitive load. To be more precise, the segmenting principle from the theory suggests that people learn better from a multimedia material when it is presented in manageable and user-paced segments. It is also proven that multimedia that is presented without any control can cause decreased understanding (Tabbers & Koejier, 2009).

Both the scale and the focus group session reflected that students were not contented with the absence of a teacher figure being present, resulting to a lack of teacher-learner interaction. Moreover, it is also reported learner-learner interaction was found to be scarce and insufficient by students. Although there are a lot of factors that may affect the interaction in an online course such as course structure, size of the class and prior online learning experiences (Charalambos & Stock Mcisaac, 2009), it usually comes down to the existence of an active online environment where learners can feel themselves connected both with each other and with the instructor and as part of a community (Mandernach, 2009). A part of this discontent with the lack of interaction could be related to the type of video production used in the study. The use of "Talking Head" style videos, in which the instructor's head is recorded close-up while lecturing, have been found to be more engaging compared to the Khan Academy style videos used in this study, since the human face conveys a more personal and sincere feel (Guo et al., 2014).

Another reason stated by multiple students was that they felt unmotivated in general with the interactive video-based course. The fact that the questions in the videos were not graded may have affected some students motivations in the negative direction since grading has been considered one of the greatest motivational factors at universities (Reddan, 2013). Especially high achieving students may be influenced by that situation since it is known that they feel disadvantaged in the non-graded exams considering that their success is not reported to faculty or graduate school (Biggs, 1992). It is also known that this situation in interactive videos also may have caused the engagement rates to drop (MacWilliam et al., 2013). Biggs (1993) and Redden (2009) also stated this issue in their studies that non-grading exams can cause demotivation in learners.

Although only stated by one participant, giving a psychology course with distance education has been found wrong and mentioned as an excuse for negative perception against the interactive videos. The participant mentioned the context of the psychology course is not suitable for an online course setting and a verbal course like psychology should only be given face to face where the instructor and the students can interact and discuss. According to Barış and Çankaya (2016) general opinion of the

faculty members on this topic is; theoretical and verbal courses are "accepted" as feasible to give with distance education, while courses require practice and interactions are not. It is worth mentioning at this point that Schwan and Riempp (2004) found the opposite result in their experimental study where the experimental group learned how to tie a knot with interactive videos in an online setting perfomed better then the face to face control group. The course subjected to this study, in this manner was giving the theoretical basis of the science of psychology. The reason for the student's statement may be caused by the lack of the asynchronized interaction opportunities in the online course. According to Willis (1996), the success of the distance education hugely depends on the efforts of the instructor since the instructor is the one that plans the syllabus, develops the materials, makes the assessment and fosters the interaction regardless of the technological tools used. The instructor of the course may not have created an efficient online discussion and interaction environment to satisfy those students.

The second research question of the study was to find the effect of videos' durations to their watching rates. Although with the new technologies it is possible to find out how many times a video has been watched, the watching rates of the videos have always been a misunderstood data since it only shows how many times a new session has been started/ended and not necessarily how many watchers actually engaged with the video. However, actual engagement with videos is considered not possible to measure without direct questioning and observation (Guo, et al., 2014). So, in this manner, in this study, the students who answered/interacted with the last question of the video was considered he/she watched and engaged the entire video.

The pearson correlation test between the variables of students who watched the video and the video duration found to be significantly negatively correlated. Also, students were asked on the interactive video perception scale about their opinion on how long should the videos on online courses. The answers ranged from 1 to 90 minutes the mean of the answers was 10 minutes. The result of the correlation test is parallel with literature. Guo et al. (2014), found in their research which investigated 6.9 million video watching sessions from one of the most popular MOOC sites, that shorter videos are more engaging compared to longer ones, six minutes being optimum

length for engagement. In another study, it was also found that the dropout rates increased as the videos got longer, meaning participants navigated away from videos before they had finished (Kim, et al., 2014). Although these studies consider six minutes as optimum length for engagement, the addition of interactivity has been proven to increase the attention span of the viewer and improve the viewing time of the video by more than 20% (Geri et al., 2017).

## 5.2 Conclusions

As discussed earlier, although interactive video is not a completely new technology, with the help of available technologies and software it is easier to produce than before. With the increasing number MOOC environments, it is getting more popular. Therefore, it is not easy to find up to date empirical studies about this field of instructional technologies. So, the result and the discussions of this study could be beneficial for the researchers who are willing to make further research in this area and it can also guide instructors who are incorporating interactive videos in their courses.

Concerning the findings of this study, it was found that majority of the participants perceive interactive videos as helpful and engaging materials that help them learn better, spend more time on the course and increase their motivations. These findings are also supported by the statements of the students in the focus group in the related theme "Positive opinions towards interactive videos". However, the results reflected some critical opinions for interactive videos as well. The most prominent one being the discomfort caused by the lack of having any control over the videos. This situation along with the auto-navigating videos caused a frustration in students since they did not provide them any flexibility to fast-forward or jump to a specific point to meet their needs - all of which controls have been found to be important in terms of meaningful and self-paced learning (Bassili & Joordens, 2008).

The other finding of the study was the negative correlation between the video length and the number of students who watched the video. This finding also is consistent with the literature which says that the shorter videos are more engaging compared to others (Guo et al., 2014) and as the videos get longer, the number of dropouts increases (Kim, et al., 2014). However, it should be mentioned that

interaction in the videos can increase the attention span of the users which may promote the viewing time.

In conclusion, the findings of the present research show that majority of the participants of the study considered taking another online course that incorporates interactive videos. In addition to that, they favored interactive videos over to standard ones, finding interactive ones more engaging, entertaining and helping them learn better. The study also shows and supports the previous results from the literature that video production and presentation techniques such as giving the students efficient control on the material and adjusting the length of the video have an important role in the video-learning environments.

## 5.3 Recommendations

Considering the findings of this study, a few suggestions for the future research may be proposed. The first suggestion would be conducting a research that examines the effect of interactive videos on students with giving them full control over the multimedia. This could be done in an environment where learners are not concerned with getting grades and where they enroll the course with their own wishes with an intrinsic motivation to learn. In an environment like this, the effect of the interactive videos on students could be seen without being negatively affected by the lack of control they have on the media.

Another suggestion about future studies is directly related with the limitation of this study. Considering the fact that this and many more studies on the field was conducted on massive courses with too many students enrolled, measuring to which degree the participants actually engaged with the video is practically impossible, since engagement can only be measured with observation and direct questioning (Guo et al., 2014). A study can be done on a minimal scale where the participants can be observed and questioned about the videos they watched, to find out actual engagement on videos which may eliminate the need to rely on interactivity to deduce the engagement.

One more suggestion could be the incorporation of gamification elements into the interactive videos. Using these elements such as points, leaderboards or badges which have been proven to increase motivation, engagement and the feeling of

competency (Thom, Millen, & DiMicco, 2012) may help students to pay more attention to interactive videos by making them more attractive. This might increase the participation rates to the interactive videos which can result in as a bigger and more complex data for future studies.

Regarding the last suggestion of the study for future research, a similar research can be conducted using the eye-tracking technology to get a better understanding of where the viewers focus while learning and interacting with an interactive video. We know from literature that only 10% of the viewing time students focused on the talking head video of the instructor (Nagahama & Morita, 2017). Using such technology in an interactive video can provide insight on students' behaviors and what kind of interactions attract them as well.

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# APPENDICES

## A. Interactive Video Perception Scale

Content Related Questions

1. What is your opinion on the amount of content each video covered?
   ☐ Videos had just enough information considering their durations.
   ☐ I watched videos more than once because some videos had so much information.
   ☐ Some videos covered so much content I was not able to finish watching them at one sitting
   ☐ Videos should have had less information. I had troubles catching up.
   ☐ Videos could have had more information.
   ☐ Other

2. What do you think about the pace of the lecture in the videos?
   ☐ The lectures were so slow-paced, I got bored.
   ☐ I could have used a speed changer to make some videos play faster like 1.5X or 2X
   ☐ The lecture in some videos were high-paced so I had to pause the video to take notes
   ☐ Other

3. What do you think about the difficulty levels of questions in the interactive videos?
   ☐ The questions were really hard. I had to retry most of the times to find the right answer
   ☐ I had difficulty only in some of the questions.
   ☐ Some questions were too hard, I was discouraged to move on
   ☐ I had to use an external resource (book, internet etc.) to find the right answer for some questions.
   ☐ The questions were too easy, I was able to answer correctly even without watching the videos properly
   ☐ The answer of some questions were too obvious since the question appears right after the related material.
   ☐ The questions were easy.
   ☐ Other

4. What is your opinion about the relevance of the questions to the content?
   ☐ The questions were irrelevant to the content so I got most of the questions wrong.
   ☐ Some of the questions were irrelevant to the content while others were fine.
   ☐ I was not able to find the answer of some questions in the video. So I had to check another source (book, internet vs.)

☐ I did not really pay attention to the questions. I just chose a random answer to move on.

☐ Some questions were from some parts of the video that were not emphasized enough.

☐ The questions were relevant to the content being lectured.

☐ Other

5. In your opinion, how long should the videos be in the online courses?

☐

6. What are your opinions on comparing a face to face course and a video based online course?

☐ Materials in the video based online course made me engage the course better

☐ Absence of the presence of an instructor in the online course made me feel unmotivated

☐ In the online course, I missed the opportunity to collaborate with my classmates.

☐ I was able to learn on my own pace with the online course.

☐ Online course was more flexible in terms of quiz and midterm submissions.

☐ Other

7. What is your opinion on the sound and resolution quality of the videos?

☐ I sometimes had hard times to see instructor's drawings due to low resolution.

☐ Sound of the instructor was high and clear enough in the videos.

☐ In some videos, sound level of the instructor was low or the sound quality was bad.

☐ Resolution of the videos was good enough to see all the images and text.

☐ Other

8. What do you think about the absence of the play bar in the interactive videos?

☐ It was not a problem on the first time I watched the video. But it was annoying when I watched the same video one more time.

☐ I did not feel any need to use the playbar. I like watching videos with their natural flows

☐ When I wanted to watch a particular part of the video I had to wait until that moment came. I wish I could skip the parts I did not want to watch.

☐ It was not a big problem. I would not have used it anyway.

☐ Other

9. In some of the interactive videos, you were automatically directed to the beginning of the last chapter when your answer for the question was wrong. What is your opinion about that?

☐ I did not like it. I wish I was able to move on even if my answer is wrong.

☐ I liked it. It made me watch the last chapter again and helped me to find the right answer.

☐ This situation made me watch the videos more carefuly

☐ I felt I was forced to find the right answer.

☐ I got the right answers of the questions from my friends who watched the same video before me to avoid this situation.

☐ It was a time loss for me.

☐ Other

10. Comparing the interactive and standard videos
    ☐ Interactive videos made me learn the material better.
    ☐ I spent more time on the course while watching interactive videos
    ☐ I found learning with interactive video more enjoyable
    ☐ Standard videos were so straightforward
    ☐ Interactive videos helped me more to get good grades in the exams.
    ☐ Watching standard videos were easier.
    ☐ Interactive videos made me feel confident about what I know
    ☐ Interactive videos encouraged me to learn by myself.
    ☐ I feel like interactive videos enhanced my performance
    ☐ Other

11. If you have the opportunity, will you take another course that uses interactive videos?
    ☐ Yes
    ☐ No

## B: Focus Group Questions

1. What can you say if I ask you to compare a face to face course and a video-based online course?
2. What is your opinion on comparing interactive and standard videos? Do you think they helped you learn better compared to standard videos?
3. What do you think about the absence of the player bar in the videos?
4. What is your opinion about the difficulty levels of the questions in the video?
5. What is your opinion about the videos that navigated you to the beginning of the previous chapter when you could not find the correct answer?

# C. Curriculum Vitae

**PERSONAL INFORMATION**

Surname, Name: Aktepe, Ahmet

Nationality: Turkish (T.C.)

Date & Place of Birth: December 1, 1989, Istanbul

Email: ahmetaktepe@gmail.com

**EDUCATION**

| Degree | Institution | Year of Graduation |
|---|---|---|
| MA | Bahçeşehir University, Institute of Educational Sciences, Educational Technology | 2018 |
| BA | Yıldız Technical University, Faculty of Education, Computer Education and Instructional Technology | 2012 |

**WORK EXPERIENCE**

| Year | Place | Enrollment |
|---|---|---|
| 2016- | NMQ Digital | B2B Lead Management |
| 2012-2016 | Bahçeşehir University Distance Education Unit | Educational Technologist & system administrator |

**FOREIGN LANGUAGES**

English: Advanced