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INSTITUTE OF SOCIAL SCIENCES  
DEPARTMENT OF PSYCHOLOGY  
MASTER'S IN CLINICAL PSYCHOLOGY**

**THE EFFECTS OF ONLINE LEARNING AND ANXIETY ON MEMORY  
PERFORMANCE**

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**MASTER'S THESIS**

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**ANKARA-2023**

**BAŞKENT ÜNİVERSİTESİ**  
**SOSYAL BİLİMLER ENSTİTÜSÜ**  
**YÜKSEK LİSANS / DOKTORA TEZ ÇALIŞMASI ORJİNALLİK RAPORU**

Tarih: 31/05/2023

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Anabilim Dalı: Psikoloji Anabilim Dalı

Programı: Klinik Psikoloji Tezli Yüksek Lisans Programı

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Tez Başlığı: The Effects of Online Learning and Anxiety on Memory Performance

Yukarıda başlığı belirtilen Yüksek Lisans tez çalışmamın; Giriş, Ana Bölümler ve Sonuç Bölümünden oluşan, toplam 47 sayfalık kısmına ilişkin, 31/05/2023 tarihinde tez danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda belirtilen filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 8'dir. Uygulanan filtrelemeler:

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**ONAY**

Tarih: 31/05/2023

Öğrenci Danışmanı Unvan, Ad, Soyad, İmza:

Doç. Dr. Elvin Doğutepe

## ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude to my thesis advisor, Dr. Elvin Dođutepe, who always guided me and showed her continuous interest and support. She was with me every step of the way, from the decision processes to the thesis defense, even with the data collection process, with her expertise.

Besides my advisor, I would like to thank other members of the thesis defense committee, Prof. Dr. Emel Erdoğan Bakar and Dr. Tuđba Uyar Suiçmez, for their valuable contributions and feedback.

I would like to thank Dr. Özlem Darcansoy İşeri, Dr. Bilgesu Atılgan, Elif Öykü Us Dr. Asuman Alniaçık, Hale Hançer, Eda Çakmak, and Erge Ergüder for their support in the data collection process and everyone who participated in the research. I would also like to thank Dr. Tuđba Uyar Suiçmez for all her contributions and support throughout the psychotherapy supervision and I would like to thank the instructors of Başkent University who contributed to my journey to become a psychologist and then a clinical psychologist.

Most importantly, from the bottom of my heart, I would like to thank Özlem İlkay for all her academic contributions, support in collecting, evaluating, and analysing the data, psychological support, and always being by my side. I could not have undertaken this research without her. I cannot express my gratitude to her enough.

Furthermore, I would like to thank all my friends who were with me in this challenging process with their supportive attitudes and showed their interest, especially "Irregulars" for their support during the data collection process for the pilot study and their genuine friendship.

Finally, I am extremely grateful to my dear mother, Sevim Özgür, for her support throughout my education. All my life you believed in me, empowered me, and showed me your endless love.

## ÖZET

**ALDEMİR, Zeynep İkra. Çevrim İçi Öğrenme ve Kaygının Bellek Performansı Üzerindeki Etkileri. Başkent Üniversitesi, Sosyal Bilimler Enstitüsü, Klinik Psikoloji Tezli Yüksek Lisans Programı, 2023.**

Bu çalışmada, çevrim içi öğrenme ortamında kameranın açık veya kapalı olmasının ve kaygının bellek performansı üzerindeki etkisi incelenmiştir. Araştırmanın örneklemini yaşları 18-41 arası değişen toplam 145 üniversite öğrencisi (129 kadın ve 16 erkek) oluşturmaktadır. Katılımcılar bilgilendirilmiş onam formunu onayladıktan sonra demografik bilgi formunu ve Sürekli Kaygı Envanteri'ni tamamlamışlardır. Bunlara ek olarak olası araştırma oturumlarını kendilerine uygunluk sıralamasına göre sıralamışlardır. Oturumlardaki deneysel koşullar önceden belirlenmiştir ve katılımcıların bu koşullardan haberi yoktur. Sürekli kaygısı yüksek olan katılımcılar araştırmaya dahil edilmemiştir. Araştırma, çevrim içi bir toplantı platformu olan Zoom üzerinden gerçekleştirilmiştir.

Araştırmadaki gruplar kaygı manipülasyonu ve kamera durumlarına (açık ya da kapalı) göre oluşturulmuş olup gruplar; kamera açık-kaygısız, kamera açık-kaygılı, kamera kapalı-kaygısız ve kamera kapalı-kaygılı şeklindedir. Durumluk kaygı yaratmak amacıyla çözümlü ve çözümsüz labirent görevleri kullanılmıştır. Bellek performansını değerlendirmek için Wechsler Bellek Ölçeği'nin Mantıksal Bellek-I alt testi uygulanmıştır.

Çevrim içi öğrenmede kameranın ve kaygının temel etkisi ve aynı zamanda kamera ve kaygının etkileşiminin bellek performansı üzerindeki etkileri MANOVA ile incelenmiştir. Yapılan analiz sonucunda kameranın temel etkisinin bellek performansı üzerinde anlamlı bir etkiye sahip olduğu bulunmuştur. Ancak kaygının temel etkisi ile kamera ve kaygının etkileşim etkisinin bellek performansı üzerinde anlamlı bir etkisinin olmadığı bulgulanmıştır. Grupların ortalama bellek performansları incelendiğinde, kamera kapalı-kaygısız grubun gruplar arasında en iyi bellek performansını gösterdiği görülmüştür. Sonuçlar literatür ışığında incelenmiş ve gelecek araştırmalara yönelik öneriler sunulmuştur.

**Anahtar kelimeler:** Çevrim içi eğitim, kamera, durumluk kaygı, bellek performansı,

Zoom

## ABSTRACT

**ALDEMİR, Zeynep İkra. The Effects of Online Learning and Anxiety on Memory Performance. Başkent University, Institute of Social Sciences, Master's in Clinical Psychology, 2023.**

In this study, the effects of camera (on or off) and anxiety on memory performance in an online learning environment were investigated. The sample of the study consists of a total of 145 university students (129 females and 16 males) aged between 18-41 years old. After the participants approved the informed consent form, they completed the demographic information form and the Trait Anxiety Inventory. They also ranked possible research sessions in order of convenience to them. The experimental conditions in the sessions were determined in advance and participants did not know the conditions. Participants with high trait anxiety were not included in the study. The research was carried out via Zoom, which is an online meeting platform.

The groups in the research were formed according to the conditions of anxiety manipulation and camera (on or off), and they were as follows: camera on-no anxiety, camera on-anxiety, camera off-no anxiety, and camera off-anxiety group. Solvable and unsolvable labyrinth tasks were used to heighten state anxiety. The Logical Memory-I subtest of the Wechsler Memory Scale was used to evaluate memory performance.

The main effect of camera (on or off) and anxiety, and also the interaction effect of camera and anxiety on memory performance in online learning were examined with MANOVA. As a result of the analysis, it was found that the main effect of camera had a significant effect on memory performance. However, it was found that there was no significant effect for the main effect of anxiety and the interaction effect of the camera and anxiety on memory performance. When the average memory performances of the groups were examined, it was seen that the camera off-no anxiety group had the best memory performance among the groups. The results were examined in the light of the literature, and suggestions for future research were presented.

**Keywords:** Online education, camera, state anxiety, memory performance, Zoom

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## **LIST OF ABBREVIATIONS**

DSM-5	Diagnostic and Statistical Manual of Mental Disorders
LTM	Long-term memory
PTSD	Post-traumatic stress disorder
STAI	The State-Trait Anxiety Inventory
STM	Short-term memory
TOTE	Test, operate, test, exit
WMS	Wechsler Memory Scale
WMS-R	Wechsler Memory Scale-Revised

# 1. INTRODUCTION

Information sharing in the digital age has become more accessible thanks to the new communication technologies eliminating the concept of distance. The development of technology in particular the internet had an impact on the areas of education and learning specifically online learning. In the last few years, online learning has been recognized as one of the main topics of education and learning, and online learning applications continue to operate as an alternative to traditional education around the world. The number of people using online learning platforms has been increasing since 2017 (Statista Research Development, 2023). According to the estimations, it is thought that 902.30 million people will use online learning platforms in 2027.

In some cases, education may be designed and planned online from the onset, and students may choose that but sometimes online education is not a choice but a necessity. In times of crisis and disaster, the termination of the regular educational process and the abrupt transition to an unplanned and unscheduled alternative education process is expressed as emergency remote teaching (Hodges et al., 2020). After the COVID-19 pandemic started, schools and higher education institutions were closed and 1,542,412,000 students were affected in 185 countries on 1 April 2020 (Marinoni et al., 2020). This represented 89.4% of registered students at that time. With the pandemic, online learning has become widespread in Türkiye as in many countries. Afterward, two earthquakes with magnitudes of 7.7 and 7.6 occurred in Türkiye, followed by approximately 11,000 aftershocks (The Disaster and Emergency Management Presidency, 2023). In order to ensure the continuity of education, which has been disrupted during all these pandemic and disaster periods, online learning has been started (Council of Higher Education, 2020, 2023). These two situations, the pandemic and the earthquakes, which resulted in the transition to online learning, cause increased anxiety (Saeed et al., 2022; Thapa et al., 2018). For this reason, it is important to examine anxiety in online learning. Another important factor in online learning is having cameras on or off, in other words, whether people can see themselves and others.

In online learning, having the camera on provides better communication, creates an atmosphere of community, enables students to maintain their relations with their friends, and provides discipline for students to concentrate on the lesson (Castelli & Sarvary, 2021; Martin, 2019; Sederevičiūtė-Pačiauskienė et al., 2022). However, in a study, teachers and students reported that when their cameras were on, they felt like they had disclosed their

environment constantly, focused more on their performance and appearance as their self-awareness increased, and felt camera fear during online learning (Chen et al., 2020). There is a model in the literature that supports this result. Baumeister (1984) put forward the model in which people will focus more on their performance when self-awareness increases. Thus, they internally pressure themselves to perform well. As a result, there will naturally be a decrease in performance. Therefore, turning the cameras on in online learning may negatively affect performance. Students' concerns about their own appearance and the appearance of their environment are among the factors that determine whether they turn on the cameras or not (Castelli & Sarvary, 2021).

This study aims to examine the effect of camera (on or off) and anxiety on memory in the online learning environment.

### **1.1. Learning and Memory**

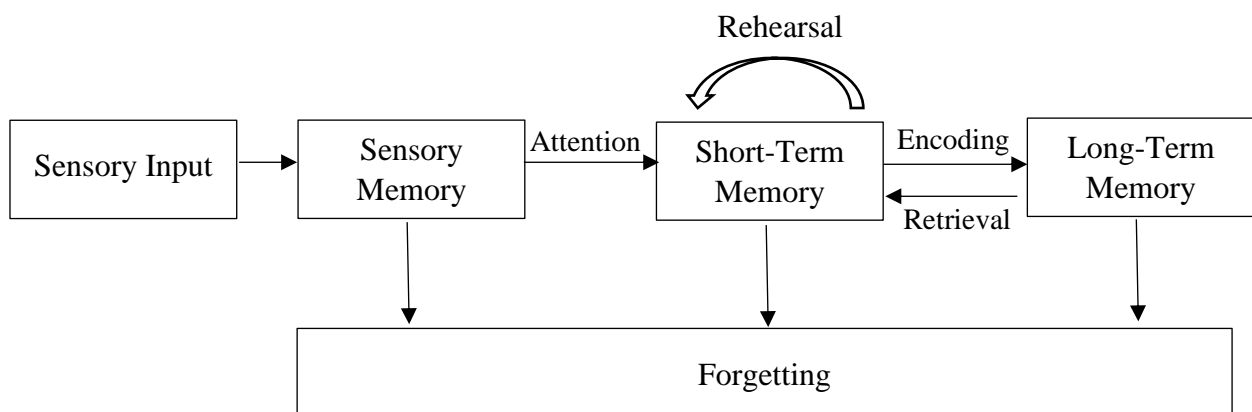
Learning and memory are essential parts of education. Memory is a system that connects our past to the future and stores the information we have learned so that we can use it when necessary. It consists of many processes, such as storing the new information, transferring it to short-term and long-term memory for later storage, preserving it, and recalling it when necessary (Lexcelent, 2019). Memory can be analysed in two ways such as memory structure and memory processes. When memory is considered a structure, it can be thought of as the place where information is stored. When memory processes are examined, they can be expressed as information entry, recognition, extraction, coding, and learning of this information (Atkinson & Shiffrin, 1968). Learning is the acquisition of new information (Morris et al., 2006). In order for learning to take place, the memory must record the information, store it over time, recall it when necessary, and transform it into different information by connecting it with other information (Squire, 2004). Therefore, learning and memory cannot be considered separately.

At the beginning of memory studies, The Atkinson-Shiffrin Memory Model suggested that memory has three components (Atkinson & Shiffrin, 1968). According to this model, new sensory information coming from our sense organs is first entered into the sensory memory for a short time, then decreases and eventually disappears. The second component is short-term memory (STM), which is regarded as the person's working memory. STM selects the necessary inputs from sensory memory and keeps them there for a short time. However, the information is not fully settled yet. Miller (1956) conducted studies to measure the word capacity of STM and stated that the word capacity of STM is plus or minus seven

words. The time capacity of STM is thought to be about 30 seconds (Atkinson & Shiffrin, 1968). However, with the person's effort, the information can be kept here for a while by rehearsing it. Long-term memory (LTM), on the other hand, is a type of memory that provides longer-term storage compared to STM and is assumed to be relatively more permanent (Atkinson & Shiffrin, 1971). A summary of The Atkinson-Shiffrin Memory Model can be seen in Figure 1.

**Figure 1**

*The Atkinson-Shiffrin Memory Model*



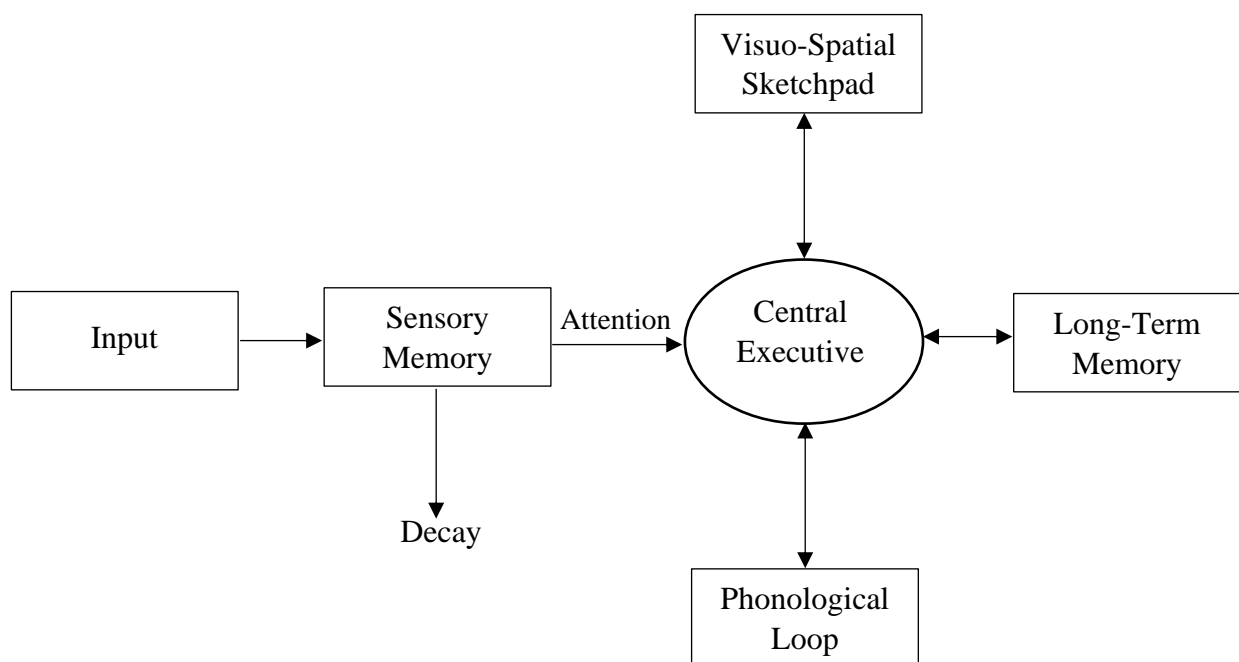
However, ongoing studies on memory have suggested that memory processes are not linear, as assumed in this model. According to Baddeley and Hitch (1974), working memory differs from STM in some ways. While STM is responsible for storing information, working memory is responsible for storing information, processing, and manipulating this information in cognitive tasks such as learning, language comprehension, and reasoning (Baddeley, 1992). As a result of their studies on working memory, Baddeley and Hitch (1974) proposed a working memory model. For this model, working memory consists of two separate subsystems working together with a central controller. The central controller is called the central executive, and the model's core is an attentional controller system. It is responsible for arranging and coordinating information coming from the slave systems which are phonological loop and visuospatial sketchpad (Baddeley, 1983). The phonological loop is defined as the temporary storage of written or spoken information. Additionally, the second subsystem visuospatial sketchpad is responsible for the storing and processing of visual and spatial input temporarily (Baddeley, 2003). These two systems can only process their type of information and send it to the central executive. Central executive allows us to

ignore unnecessary information by selecting, collecting, and processing the necessary information from the slave systems and directs the behavior accordingly (Baddeley & Hitch, 1974).

Apart from these, working memory is also responsible for recalling information from long-term memory (Baddeley, 1983). For example, when a person is asked about the result of a mathematical operation, necessary information is recalled from LTM in working memory. When the calculation process is finished, if there is no need to keep this information in memory, the information is deleted. The working memory model of Baddeley and Hitch (1974) is shown in Figure 2. Baddeley (2000) added the fourth component to the memory model approximately 25 years after the model was first created. The fourth component, the episodic buffer, is responsible for combining information from subsystems with information in long-term memory. The updated version of the model with the episodic buffer is shown in Figure 3. In short, two things can happen due to the information coming to the STM. One of them is that the information is processed in the working memory for a while. As a result, behavior occurs, and then the information is deleted. The other is that the information in the STM is transferred to long-term memory by repetition and coding (Senemoğlu, 2012). Thus, learning takes place.

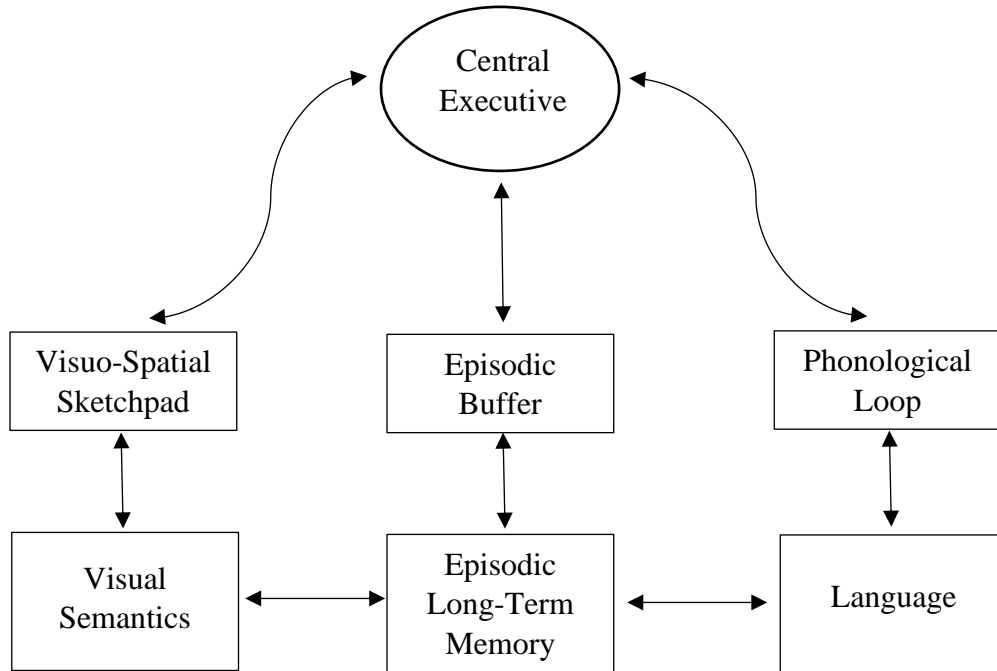
**Figure 2**

*The Working Memory Model*



**Figure 3**

*The Updated Version of the Working Memory Model*



## 1.2. Online Learning

While education in schools mostly continues face-to-face, The World Health Organization (2020, March) announced the COVID-19 pandemic. The most common COVID-19 symptoms are fever, cough, and fatigue (Fu et al., 2020). COVID-19 has deeply affected life. For example, changes were seen in sleeping and eating habits, social life, life quality, mental health, and moreover education life (Park et al., 2021). When the pandemic started, the Council of Higher Education (2020) stated that universities would switch to distance education. Later, a disaster that resulted in the transition to distance education occurred in 2023. Two earthquakes with a magnitude of 7.7 and 7.6 occurred in Kahramanmaraş on February 6, 2023 (The Disaster and Emergency Management Presidency, 2023). After these earthquakes, 11,020 aftershocks occurred and 45,089 people died. Due to the Kahramanmaraş-centered earthquake, the Council of Higher Education (2023) has decided that it is appropriate to complete the spring semester of the 2022-2023 academic year through distance education. Distance education is a form of institution-based education where teachers and students are in different places and interact with each other with communication technologies (Simonson et al., 2015). Distance education applications

offer various advantages to learners. Ally (2008) explains these advantages as eliminating the problem of time, location, and distance, providing the benefit of accessing learning materials whenever they want in the asynchronous learning environment, and providing real-time interaction between the instructor and the learner in the synchronous environment.

With the pandemic period, online learning, which is a part of distance education, started. Online learning is defined as using the internet to gain information, reach educational materials, receive support throughout the learning process, improve understanding, increase the learning experience, and interact with content, instructors, and other learners (Ally, 2004). In online learning, people mainly interact with one another through video conferences over the internet with communication technologies such as computers (Allen & Seaman, 2008). When online learning is compared with face-to-face learning, no significant difference was found (Page & Cherry, 2018) and the frequency of use of online learning is increasing (Yuhanna et al., 2020). With the developing technology, the opportunities offered by online learning to students from all over the world are increasing day by day. Like any form of learning, online learning has its advantages and disadvantages (Alexander et al., 2012).

### **1.2.1. Advantages and disadvantages of online learning**

#### **1.2.1.1. Advantages of online learning**

Online learning has many advantages. The first and perhaps the most important one is that the resources are very easy to access (Yuhanna et al., 2020). Thanks to the internet, students can access not only printed resources but also many videos, audio, graphics, animated, and downloadable resources on the internet. In addition, there is no need to go anywhere to access these resources or buy course materials. For example, if a student forgets to bring the course material to her/his class at school, she/he will have to pass the course without the material that day. However, there is no such problem in online learning. Another significant advantage is its convenience. In one study, researchers asked 420 college students taking online courses about the advantages of learning online (Alexander et al., 2012). 80% mentioned that the most significant advantage of learning online is that it is convenient and flexible. Not thinking about what to wear to class or which transportation to use and being able to enter the class from anywhere makes online learning convenient. Other advantages are that it is easier for students to communicate with their teacher and each other, feel more comfortable asking questions in the lesson, have more time for self-study, have a quiet environment, and can concentrate more easily (Dinh & Nguyen, 2022).

### **1.2.2. Disadvantages of online learning**

Besides the advantages, online learning has many disadvantages. In a study involving 128 students, they were asked about the disadvantages of online learning (Dinh & Nguyen, 2022). About 60% reported that the biggest disadvantage of online learning was problems with internet connection. Students who experienced cut-offs in their internet connection stated that they could not hear what exactly the teacher said, could not see the lecture presentation on the screen, and could not turn on their microphones to speak in the class or ask questions. Another disadvantage is that students interact less with their friends and teachers (Davis et al., 2019). Students who do not spend time at school due to distance education have difficulty making friends and feel less social support. In addition, it is more difficult to reach teachers during extracurricular times. Moreover, another disadvantage of online learning is that sitting in front of a computer for too much time causes health problems (Bhuvanewari et al., 2020). They include problems such as excessive weight gain, anxiety, depression, diabetes risk, heart disease risk, and visual impairment. Apart from these, there is also a disadvantage for teachers. Students do not turn on their cameras and microphones for any reason, such as not wanting to turn on the camera or not looking good (Moise et al., 2021). The fact that the camera is off also causes the teacher to be unable to check whether the student is really in the lesson and, therefore, whether the student is listening to the lesson. As stated in the advantages and disadvantages of online learning, interaction has a significant impact on online learning.

#### **1.2.2.1. The effect of interaction in online learning**

Online learning is a part of distance education. A study has been carried out on the necessary interactions for learning to be effective in distance education and it has been suggested that there are three types of interaction (Moore, 1989). These three interaction types are learner-content, learner-learner, and learner-instructor interaction.

#### **1.2.2.2. Learner-content interaction**

The first of three different types of interaction suggested by Moore (1989) is the learner-content interaction. The learner-content relationship in education is indispensable. The learner-content relationship includes the process by which the learner interacts with the content, and thus the content changes the learner's way of thinking, perspective, or structure. The learner learns this information by talking to himself/herself about the information he/she encounters during the training. Without this relationship, there can be no education and learning.

### **1.2.2.3. Learner-learner interaction**

The second type of interaction is learner-learner interaction. This interaction includes the interaction of students in the classroom environment with each other (Moore & Kearsley, 1996). In line with the taught content, students exchange ideas with each other and share their thoughts, knowledge, and experiences. Thus, the content that is tried to be taught in the classroom environment is reinforced and learned.

### **1.2.2.4. Learner-instructor interaction**

The third and final type of interaction is the learner-instructor interaction (Moore, 1989). This interaction occurs between the person trying to teach the educational content during online education, namely the teacher, and the people trying to learn this content, namely the students. It is one of the most necessary interactions for learning to take place. First, the instructor stimulates the students' minds to teach the necessary content by trying to draw the student's attention to the course material or to keep their attention on the course material. Then through feedback and answering questions, the instructor organizes what students learn and manipulates the information presented by students. In addition, the instructor offers different strategies for students to learn by assessing whether they are making progress. Finally, the instructor provides each learner with as much support and encouragement as he or she needs. The teacher is precious when learning new knowledge. Because students need a teacher to know how to apply the new knowledge they see or whether they have learned correctly.

There are also more recent studies emphasizing the importance of teacher-student interaction, especially in online education (Volery & Lord, 2000). Because some studies in the literature show that in online education, learning is effective when the teacher and the student have meaningful communication and interaction (Kentnor, 2015; Paudel, 2021). It has been observed that when there is no good interaction, and there is a lack of communication, the students have difficulties, such as problems with their homework and exams (Tümen Akyıldız, 2020). On the contrary, if the interaction is good, students' learning needs are more likely to be met, and thus, better learning comes true as desired (Demir Kaymak & Horzum, 2013).

In addition, one of the things that affect the interaction between the student and the instructor during online education is whether the student's camera is turned off or on. As mentioned before, one of the disadvantages of online learning is that students' cameras are turned off (Moise et al., 2021). Because, if the students' cameras are turned off, the teacher

does not have a chance to monitor whether the students are listening to the lesson. According to a study, researchers compared people's vocabulary learning only through photography and audio of the words and with the teacher presenting the same material on video (Martin et al., 2019). It was found that vocabulary learning was better when the teacher taught the words in the video compared to the condition where the human face was not visible.

### **1.2.3. Zoom**

One of the programs used for online education is Zoom. Zoom is a simple video conferencing and messaging tool that can be used on many devices. It has many features that make online education easier. For instance, students and teachers can see each other live in class even if they are in different countries. It provides a synchronized education and offers a real learning and knowledge-sharing environment (Amiti, 2020). It enables students to perceive the learning environment as a natural classroom environment rather than a virtual one. At the same time, it allows students to immediately communicate with their teachers, ask questions, take responses, and discuss topics (Suadi, 2021). Moreover, it has features such as messaging, screen sharing for presentations, dividing participants into conference rooms, and engaging webinars (Zoom Video Communications Inc., 2021).

#### **1.2.3.1. Zoom vs. other video conferencing tools**

When distance education started with the COVID-19 pandemic, more than one tool that could be used in online education was recommended so that education could continue. These apps were Google Meets, Google Classroom, Skype, and Zoom (Ramadani & Xhaferi, 2020). Some of these applications, such as Skype, were familiar before the pandemic. However, Zoom is one of the video conferencing tools for online education that has been used more, especially with the pandemic. Since Skype and Zoom are the more known and preferred tools in online education, studies with different samples from different countries compare these two in the literature (Archibald et al., 2019; Dharma et al., 2017; Nurieva & Garaeva, 2020; Palupi & Raharjo, 2020; Ramadani & Xhaferi, 2020). For instance, in a study conducted with people who want to learn Japanese, the lesson was conducted over Skype and Zoom, allowing the students to compare the two applications used for online education (Dharma et al., 2017). 83.8% of respondents said Zoom has more coherent and distinct audio compared to Skype. They also report that starting a call is much easier, the course material displayed on the screen has a sharper display, a smoother transition when changing the screen, and the connection is much more stable. In fact, all of the participants preferred Zoom instead of Skype in online education.

In another study, nurses working in Australia were asked questions about their perceptions of the Zoom application, and they were also asked to compare Zoom with Skype (Archibald et al., 2019). 69% of the participants evaluated Zoom as more useful than other video conferencing tools. At the same time, the participants reported that it helps to establish a better relationship as it allows them to see non-verbal cues such as facial expressions and body language thanks to the image of the other person on the screen. Moreover, they said that they see Zoom as an easier-to-use, simple application that protects personal information better than Skype.

Another study conducted with teachers reported that Zoom is more suitable for distance education than Skype in terms of video and audio quality, simultaneous screen sharing, active speaker image, private and group chat, "raise hand" button, and breakout rooms (Nurieva & Garaeva, 2020).

Because of all these features, Zoom has helped a lot of people during the pandemic because it is easy to use and free (Bailenson, 2021). It has grown from 10 million participants in December 2019 to 200 million participants in May 2020 (Iqbal, 2022). Thanks to video conferencing tools, schools were able to continue their education remotely. This study was carried out on Zoom, as it has many advantages mentioned above, such as clear sound, widespread use, ease of use, and more robust connection.

### **1.3. Anxiety**

In many studies, it has been reported that with the emergence of the pandemic, there has been an increase in the symptoms of anxiety and depression in people (Dozois, 2021; Lee, 2020; Liu et al., 2020; Santabarbara et al., 2021; Santomauro et al., 2021; Vindegaard & Eriksen Benros, 2020).

In the 5<sup>th</sup> edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), anxiety is defined as the expectation of potential danger (American Psychiatric Association, 2013). Anxiety is a future-oriented emotion that includes unpredictability and uncontrollability against some adverse situations (Barlow, 2002). Tense muscles, alertness for the presence of potential danger, and circumspect or avoidant behavior are all symptoms of anxiety (American Psychiatric Association, 2013). Anxiety itself is a symptom of some mental disorders, just as there are symptoms of anxiety. When anxiety is examined as a symptom, it is seen in many mental diseases that cause psychological and physical effects on individuals (Özakkaş, 2014). Besides, when the symptoms of anxiety are examined,

symptoms such as inability to stop, concentration difficulties, sensitivity to sound, and irritability are also seen. In addition, due to the overactivation of the sympathetic nervous system, mouth dryness, heart palpitations, frequent urination, and sleep difficulties may occur.

Anxiety is also characterized by a rapid shift of focus to the adverse condition or emotional response to it. Fear is an emotion experienced in the face of danger (Bremner, 2004). Contrary to fear, anxiety is the response when there is no real threat in the environment. For example, the expectation that a negative situation will occur creates anxiety, while the presence of a negative situation creates fear (Cannistraro & Rauch, 2003). Common avoidance habits might occasionally help to lessen the intensity of fear or anxiety (American Psychiatric Association, 2013).

Anxious people pay too much attention to danger signals (Bishop, 2007). At the same time, they interpret vague signals from the environment more negatively (Mathews & MacLeod, 1994). This situation brings to mind the negative interpretation of the facial expressions of others and being affected by it when the cameras are on in online education for anxious people. It was found that selective attention toward threat-related stimuli increased in those with anxiety disorders (Mathews & Mackintosh, 1998). In order for a similar situation to be observed in the non-clinical sample, both trait and state anxiety may need to be high (Mogg & Bradley, 1998).

According to Freud's first theory of anxiety, anxiety stems from undischarged libido (Freud, 1962). Later, this idea changed, and he argued that repression causes anxiety (Freud, 1959). Then he defined anxiety as an ego reaction to a possible traumatic situation (Freud, 1959).

From a cognitive perspective, anxiety is defined as the transition to an uncomfortable emotional state by feeling irritating physical symptoms such as heart palpitations, rapid breathing, and dizziness, along with unpleasant feelings such as tension and uneasiness (Eysenck, 1992). This emotional state, anxiety, usually begins with fear when the person perceives an event or situation as threatening. According to the cognitive perspective, each of the body's systems is affected during this fearful emotional phase when anxiety arises (Beck et al, 1985). First, the physiological system with symptoms such as increased heart rate, rapid breathing, sweating, and dizziness, then the cognitive system with unrealistic and dysfunctional thoughts such as "I am probably going to be disgraced," the motivational

system wanting to be away from a catastrophic experience, the emotional system feeling fear and horror, and finally, the behavioral system is affected by behaviors such as fainting or freezing.

As a result of early studies on the neurobiology of anxiety, it was seen that more primitive regions of the brain, such as the limbic system or, in other words, the emotional brain were responsible for anxiety (Steimer, 2002). It was found that the amygdala, which is part of the limbic system, regulates emotions and, therefore, emotional behavior (LaDeux, 1994). As a result of this study, it has been seen that the amygdala is the brain region that primarily evaluates a threatening situation or event by quickly analysing it. In subsequent studies on anxiety, not only the amygdala but also neuroanatomical structures such as locus ceruleus hypothalamus, nucleus ambiguus, and nucleus reticularis, and central noradrenergic and serotonergic systems such as GABA-Benzodiazepine have been found to have a significant role in the emergence of anxiety symptoms (Uzay, 2002). All these brain regions and serotonergic systems come together and cause physical symptoms such as accelerated heartbeat, increased blood pressure, and respiratory rate, thus the person's fight, flight, or freeze response (Steimer, 2002).

According to an evolutionary standpoint, each emotion may be considered a computer program created to do a particular fitness job (Nesse, 1990). In hazardous conditions that endanger reproductive resources, anxiety boosts fitness (Marks & Nesse, 1994). Anxiety encourages people to avoid dangerous areas and ensures survival (Croqs, 2015). In this way, it has the function of ensuring survival.

### **1.3.1. Types of anxiety**

When anxiety is classified according to its persistence, there are two different types of anxiety: State anxiety and trait anxiety (Spielberger, 1972).

#### **1.3.1.1. State anxiety**

State anxiety is the real and temporary anxiety experienced in the face of any threat (Spielberger, 1972). In other words, it is a state of anxiety experienced at the moment (Eysenck, 1992).

#### **1.3.1.2. Trait anxiety**

Trait anxiety is being anxious as a personality trait, and the person acts as if there is a threat at any moment (Spielberger, 1972). Trait anxiety is closely related to personality

(Spielberger, 1983). In other words, it is how intensely a person will be anxious in the face of any situation.

### **1.3.2. Unusual situations and anxiety**

In a study conducted in Belgium, the period when COVID-19 measures were tight was compared with the period when they were less stringent, and places and schools were open in terms of anxiety (Bruggeman et al., 2022). The findings showed that anxiety levels were low during the less stringent period and even similar to the pre-COVID period. Anxiety levels were found to be higher during the period when strict measures such as staying at home were taken. According to a cross-sectional study conducted in Ecuador, social isolation affected people negatively, and during the isolation, anxiety was found to be the most common mental health problem (Mautong et al., 2021). In addition, anxiety was associated with the increase in COVID-19 news during this period (Huckins et al., 2020). A recent review in the literature summarizes the subject as follows; during the COVID-19 pandemic, people are increasingly anxious about their own health, the health of their loved ones, being isolated, loss of social support, job loss, and inability to earn money (Santabarbara et al., 2021). They stated that the prevalence of anxiety disorders is normally 7.3% worldwide. As a result of their meta-analysis, the prevalence of anxiety may increase up to 3 times during the COVID-19 pandemic. According to the World Health Organization (2022), the pandemic led to a 25.6% increase in anxiety disorders in 2020. According to a meta-analysis, anxiety symptoms increased in children and adolescents during the pandemic (Wang et al., 2022). According to another meta-analysis conducted during the COVID-19 era, the prevalence of anxiety symptoms in youth is 20.5% (Racine et al., 2021). Considering that it was 11.6% before the pandemic, it can be said that it has almost doubled (Tiirikainen et al., 2019).

With the increase in anxiety disorders during the COVID-19 period, the transition to online education may have caused students' existing anxieties to be reflected in their education or online education may have caused people to worry even more about the issues they were worried about due to the pandemic (Özdin & Bayrak Özdin, 2020; Yaghi, 2021). For example, some studies show that during online education, students are anxious about being judged by their friends, misunderstanding what they say, disappointing other students, less socializing, less social support, and not being able to establish a good relationship with the teacher (Symeonides & Childs, 2015; Yaghi, 2021).

Another situation that results in the transition to online education and creates anxiety in people is earthquakes. The earthquake causes symptoms of anxiety, post-traumatic stress disorder (PTSD), depression, or general psycho-physical stress in addition to being extremely traumatic (Caia et al., 2010). Following experiencing significant trauma, such as an earthquake, individuals are more likely to experience post-traumatic stress responses, which are linked to feelings of chronic anxiety and depression (Goenjian et al., 2000).

Since Türkiye is on the seismic belt, it is a natural earthquake disaster area (Bilici et al., 2013). Until this time, there have been earthquakes of many magnitudes and disasters in Türkiye (Aker, 2006). For example, in a study conducted after the Erzincan earthquake, one of the major earthquakes in Türkiye, people living in Erzincan and Ankara were compared and the anxiety levels of the participants from Erzincan were found to be higher than the participants from Ankara (Karancı & Rüstemli, 1995). Also, in the measurement taken after 16 months, the anxiety level of these people was again high. In studies conducted in the first two years after the 17 August earthquake, which was the largest earthquake in Türkiye until the last earthquake in Kahramanmaraş, it was reported that the prevalence of PTSD was between 23% and 43% (Başoğlu et al., 2002, 2004).

### **1.3.3. Anxiety and performance**

Besides these, anxiety is necessary for certain circumstances because the level of anxiety a person is experiencing has an impact on her/his performance. According to the Yerkes-Dodson law (Yerkes & Dodson, 1908), low and high levels of anxiety have a negative impact on performance, whereas a normal level of anxiety allows a person to desire, make decisions, produce energy in accordance with those decisions, and increase performance by utilizing that energy. People with high anxiety pay attention to more non-task-related stimuli and encode fewer details than people with low anxiety (Eysenck, 1979). As anxiety increases, distraction increases, and concentration decreases (Eysenck, 1982). Some studies in the literature show that anxiety has a negative impact on people's learning and performance in a testing situation (Hopko et al., 2005; Mandler & Sarason, 1952; Seipp, 1991).

The Processing Efficiency Theory explains the disruptive effect of state anxiety on complex cognitive tasks. High-level state anxiety interferes with effective cognitive processing and performance (Eysenck & Calvo, 1992). Similarly, individuals with high trait anxiety often perform worse than those with low trait anxiety, particularly under stressful

circumstances. It brings to mind that people's anxiety may affect their performance in online learning.

Anxiety affects our lives in many ways. Whether the effect of anxiety on people is positive or negative depends on many factors such as the intensity and duration of the anxiety. Especially when learning is taken into consideration, high anxiety affects learning negatively (Horwitz, 2001).

#### **1.4. Seeing Oneself**

In addition to anxiety, another factor affecting performance is seeing oneself on a screen. A study indicated that people who see themselves on the screen develop a critical self-awareness towards themselves (Murphy, 2020). Similarly, in another study that made people see themselves in the mirror, it was found that when people see themselves, they pay more attention to negative feedback in social interaction (Fenigstein, 1979). With this negative feedback, the self-awareness of the person increases. This causes an increase in anger in angry people, a decrease in the internal motivation of the person, and a decrease in self-esteem (Plant & Ryan, 1985). For all these reasons, communication is badly affected. Moreover, when people see themselves through a mirror, it has been observed that they focus on themselves rather than the outside world (Carver & Scheier, 1978). Thus, there was a decrease in the skilled performance of the people (Baumeister et al., 1990). In addition to these, seeing oneself on the screen is distracting (Miller et al., 2017).

A theory that may explain the behavior of people when they see themselves on the screen could be the test, operate, test, exit (TOTE) model. The model explains behavior regulation via a feedback system (Miller et al., 1960). In the test phase, the current situation and the targeted situation are compared. If there is a difference as a result of the comparison, the existing state is changed (operate). Test and operate phases continue until the goal is achieved. Based on this theory, in online education, if the person's camera is on and s/he can see herself/himself, the person can check whether s/he is in the targeted state and may change the state. This may result in focusing on her/his own image instead of focusing on the lesson, the teacher, or the material.

In the literature, there are different opinions about turning on or off the camera during online learning. There are educators who argue that turning cameras on should not be compulsory for reasons such as anxiety, and inequity of conditions (Castelli & Savary, 2021). However, some educators argue that the effects of turning cameras on, such as

encouraging participation and preventing the instructor from talking to a blank screen, should be taken into consideration when determining camera policies (Schwenck & Pryor, 2021).

## **1.5. Current Thesis**

### **1.5.1. Aim and importance**

There are some studies on attitudes toward online education in the literature. In one study, students' attitudes were examined at the beginning and end of an eight-week course, and it was found that their attitudes were more positive at the end (Knowles & Kerkman, 2007). Unger and Meiran (2020) examined student attitudes toward suddenly switching to online education. In that research, students stated that online education would be different from face-to-face education, and they experienced anxiety. In a qualitative study, students' attitudes toward online education were examined in the first week of compulsory online education (Hussein et al., 2020). Safety, convenience, being effective in terms of time and cost, and increased participation was found to be positive aspects, while technology problems, focusing problems, distraction, heavy workload, and low support from teachers and students were found to be negative aspects. In another study, online and face-to-face education were compared. While one section of the same course was online, the other section was face-to-face, and no significant difference was found between them in terms of participation, grades, and assignments (Neuhauser, 2002). Online education has been researched from different perspectives and continues to be researched (Blayone et al., 2017; Ferri et al., 2020; Fuchs, 2021; Gillett-Swan, 2017; Kanuka et al., 2007; Magunje & Chigona, 2021; Muilenburg & Berge, 2005; Topuz et al., 2022). In a newly published article in the literature, similar variables to the current study were examined. In this study, it was thought that turning on the camera and self-view setting in online education would create appearance anxiety in students and therefore reduce their learning (Tien et al., 2023). However, the researchers did not manipulate the anxiety. It was examined whether cameras and self-view setting were on caused appearance anxiety and whether this anxiety has any mediating role in the performance of the students. Apart from this, within the knowledge of the researcher, no research has been found in the literature that examines the effect of whether the cameras are on or off on memory performance by manipulating anxiety.

This study aims to examine the effect of camera (on or off) and anxiety in online learning on memory performance among university students. Due to COVID-19, online education was started 1.5 years ago (Council of Higher Education, 2020). While university

students were trying to cope with the anxiety caused by COVID-19, they also tried to learn what was taught in online classes. In this research, conditions similar to a classroom environment were created. As in extraordinary situations such as the COVID-19 period, students were made to be anxious, and students' online learning processes were examined. A study related to this will provide valuable contributions to the literature regarding online education. Online education platform designers can use this information. At the same time, students and educators can benefit from the findings.

### **1.5.2. Hypotheses**

Considering the purpose of this study and the literature, hypotheses were developed as follows:

1. Turning cameras on during online learning is expected to affect memory performance negatively.
2. Experimentally manipulated anxiety during online learning is expected to affect memory performance negatively.
3. The highest memory performance among groups is expected when participants cannot see themselves and others (cameras off) and their anxiety is not provoked.

## **2. METHOD**

### **2.1. Participants**

A priori analysis was performed in the G\*Power 3.1 (Faul et al., 2009) to calculate the exact total number of participants. When the effect size is medium ( $d = .25$ ),  $p < .05$ , and the estimation of power is .95; the calculated total participant number is 96. The sample of the current research consists of a total of 145 participants.

All participants were university students reached with the help of lecturers in the Department of Psychology, Molecular Biology and Genetics and Audiology at Başkent University. The participants were over the age of 18. Participants with neurological or psychiatric disorders or high trait anxiety and those taking psychiatric medications were not included in the study. The participants must have attended classes on the online platform beforehand.

### **2.2. Materials**

#### **2.2.1. Informed consent form**

Participants' rights, the purpose of the research, and confidentiality are presented in the informed consent form. At the same time, the informed consent form contains the conditions of the research. In this way, the participants declared that they participated in the research voluntarily by evaluating whether they were suitable for the conditions (see Appendix 1).

#### **2.2.2. Demographic information form**

A demographic information form was presented at the beginning of the study to identify participants according to exclusion and inclusion criteria and to obtain sociodemographic information (e.g., age, diagnosis, medication) about the participants (see Appendix 2).

#### **2.2.3. The State-Trait Anxiety Inventory**

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger et al. (1970) to detect state and trait anxiety symptoms of individuals and to distinguish between these symptoms from depression symptoms. STAI includes two separate scales consisting of 20 items each, with a total of 40 items focusing on worry, tension, apprehension, and nervousness. Half of them constitute The State Anxiety Inventory which consists of statements that describe how a person feels at a particular moment, and it is evaluated with

a 4-point Likert-type scale ranging between never (1) and very much so (4). An example item of the scale is as follows: “I feel currently calm” (see Appendix 3). However, The Trait Anxiety Inventory consists of statements that describe how a person feels generally, and it is evaluated with a 4-point Likert-type scale ranging between almost never (1) and almost always (4). An example item of the scale is as follows: “I am usually happy.” (see Appendix 4). While calculating the total score, items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20 in The State Anxiety Inventory are coded as the reverse. The highest score that can be obtained from the inventory is 80 in total, and the lowest score is 20 in total. As the scores obtained from the scale increase, it shows that the anxiety level of the person is also higher.

The standardization of the scale into Turkish was done by Öner and Le Compte (1985). During the translation into Turkish, only the 3<sup>rd</sup> and 14<sup>th</sup> items in the Trait Anxiety Inventory were changed. Therefore, reverse-coded items in the Turkish version of The Trait Anxiety Inventory are 1, 6, 7, 10, 13, 16, and 19. Except for these items, the rest of the items remained the same, no item was removed from the scale, or a new item was not added to the scale. For this reason, answering the items and scoring the scale is the same as in the original scale. The validity and reliability studies of the scale were also conducted by Öner and Le Compte (1985). The Kuder-Richardson Alpha reliability ranged between .83 and .87. and the test-retest reliability ranged between .71 and .86. It takes about 20 minutes to complete the scale. However, it has been observed that this time can be reduced to 15 minutes for university students.

Necessary permission to use this inventory has been obtained from the Yöret Foundation (see Appendix 5).

#### **2.2.4. Solvable and unsolvable labyrinths**

In this research, solvable and unsolvable labyrinths are used in order to manipulate the state anxiety levels of individuals. While the solvable labyrinth does not cause any anxiety in people, the unsolvable labyrinth causes anxiety in people (Doğutepe Dinçer, 2010). In both labyrinth tasks, the participant is asked to start from the starting arrow and exit from the ending arrow. In the solvable labyrinth task, it is said that the labyrinth was being developed for another research, and the participant was asked to help with the other research. There is no time limit in the solvable labyrinth mission (see Appendix 6). In the unsolvable labyrinth task, it is stated that the labyrinth was used to measure general mental ability and the university students completed this labyrinth in a short time. Participants are told that they have limited time to complete the task. Then the researcher said, “Time is running out,” and

“Hurry up.” In addition, the participants in this task are given feedback on how the labyrinth is very easy, everyone who has participated so far has done it easily, and it is wondered how they will perform in the following tests, regardless of their performance (see Appendix 7).

### **2.2.5. Wechsler Memory Scale – III: Logical Memory-I Subtest**

Wechsler Memory Scale (WMS) is a performance test that is used in order to evaluate memory (Wechsler, 1997). Wechsler Memory Scale-Revised (WMS-R) was obtained by expanding the WMS developed by Wechsler in 1945 (Wechsler, 1987). WMS-III was created by improving the original WMS and the WMS-R (Wechsler, 1997). It was developed to provide a detailed assessment of learning and memory in people aged 16-89.

The test is applied individually and provides measurements on the main topics of verbal memory, visual memory, and attention. It consists of 11 subtests which are information and orientation, logical memory, faces, verbal paired associates, family pictures, word lists, visual reproduction, letter-number sequencing, spatial span, mental control, and digit span. Eight indexes are calculated as a result of the test. These are the auditory immediate index, visual immediate index, immediate memory index, auditory delayed index, visual delayed index, auditory recognition delayed index, general memory index, and working memory index. Logical memory I and verbal paired associates I are the most reliable subtests of the test (Iverson, 2001). Low scores in logical memory I and II indicate that there may be a loss in learning and recalling audibly presented material.

Özdemir (2005) conducted the Turkish reliability and validity preliminary study of the logical memory subtest. One of the two stories in this subtest, story A, is the same as story A in WMS-R, which Türkiye standardization was made by Karakaş et al. (2013). The Spearman-Brown reliability coefficient for the logical memory I test is .87, and the internal consistency coefficient is .91 (Özdemir, 2005).

In this study, only the logical memory I subtest of WMS-III is used. In the logical memory I test, two different stories are read to the participants, and they are asked to repeat the story as much as they can remember immediately after listening to this story (see Appendices 8 and 9). While story B was read twice in the Logical Memory-I subtest, each story was read once in this study, and the participants were expected to report what they remembered right after. There are 25 scored elements for both stories and 1 point is given to the participant for each correct answer. The scores obtained from the stories are added together to form the total score of the logical memory test. In order to avoid researcher bias,

two separate evaluators made scoring. At the same time, throughout this evaluation process, the evaluators were not aware of the participants' groups.

### **2.2.6. Manipulation check questions**

In order to keep the research conditions constant, questions were asked about whether they participated in the research via computer and whether they turned on their camera. Questions about whether the participant complied with the research instructions were also added to this form (see Appendix 10).

## **2.3. Procedure**

### **2.3.1. Pilot study**

Ethical approval was obtained from Başkent University Ethics Committee. After the approval, this study was preregistered for Open Science Framework (<https://osf.io/m8tsg>). Then, a pilot study was conducted.

In a previous study, unsolvable labyrinths (Doğutepe Dinçer, 2010) were used to manipulate people's anxiety. One of the conditions of the current research was to manipulate people's anxiety on an online platform. A pilot study was conducted to test the manipulation method in an online environment. Conditions were kept similar to the main study. First, a Qualtrics link including informed consent, demographic information form, the Trait Anxiety Inventory, and possible research days and hours was sent to the participants. University students aged between 18-22 were reached via social media. Participants were not diagnosed with neurological or psychiatric disorders and had previously used an online meeting program. When trait anxiety scores were examined, it was observed that there were no outliers. For this reason, all participants were accepted into the study because of the trait anxiety score.

Participants attended the Zoom meeting at the time they chose. It was said that the aim of the study was to collect information about the general mental functions of university students. First, the state anxiety of the participants was measured. Then the unsolvable labyrinth was introduced as very easy. It has been stated that this labyrinth task is indicative of general mental ability. It was stated that university students could easily get out of the labyrinth in an average of 1 minute, and the participants were told that they would have 2 minutes to get out of the labyrinth. Participants tried to get out of the labyrinth by following the roads with their fingers or eyes. Meanwhile, the researcher told them to be fast, their time was getting shorter, and they had to hurry. After 1 minute was up, the labyrinth screen

automatically switched to the next screen, so the participants were given 1 minute instead of 2 minutes. Then the participants filled in the State Anxiety Inventory again. Afterward, the manipulation and the purpose of the research were explained to the participants, and the pilot study was terminated. Findings can be found in the results section.

### **2.3.2. Main study**

In the main study, data were collected in the fall semester of the 2022-2023 academic year. The participants were accessed via lecturers in the Department of Psychology, Molecular Biology and Genetics and Audiology at Başkent University. Participants who completed the research earned points for their class. A Qualtrics link containing informed consent, a demographic information form, The Trait Anxiety Scale, and possible research dates is shared with the participants (see Appendix 11). Participants ranked eight possible sessions according to their convenience. The experimental conditions in the sessions were determined in advance. When choosing sessions, participants did not know the experimental conditions of the sessions. Participants assigned themselves to the groups according to the session day and time they chose. Participants with high trait anxiety were not included in the study. An e-mail was sent to the participants with the date and time of their appointment (see Appendix 12). Participants were asked to inform in advance if they were unable to attend. Research sessions were at 19:00 and 20:00 on weekdays to keep the conditions similar. A reminder e-mail was sent to them the day before the experiment (see Appendix 13) and 1 hour before the experiment started to remind them of the experiment (see Appendix 14). The total number of participants on the screen was kept in the range of 6-7, 10-11, or 24-27 people, including 2 researchers.

When the research started, the researcher waited 5 minutes for the participants to enter the Zoom meeting. Then the instruction was given to the participants according to their group. In the first experimental group, participants turned on their cameras, and anxiety manipulation was done (see Appendix 15). An unsolvable labyrinth was used to manipulate their anxiety. Participants were told that this labyrinth is very easy and shows mental ability. In the second experimental group, the participants did not turn on their cameras. Only the instructor's camera was on, and participants' anxiety was heightened by the labyrinth manipulation (see Appendix 16). In the third experimental group, the participants' cameras were on, but anxiety manipulation did not occur (see Appendix 17). Participants found the way out of a labyrinth, which is solvable and easy. In the control group, the cameras were turned off, and anxiety manipulation was not performed (see Appendix 18).

After that, the logical memory-I subtest of the WMS-III was performed. All four groups were instructed to listen to the story and to keep it in mind. After reading story A, the researcher told the participants to enter the link sent from the chat. Participants reported the story as they remembered on Qualtrics. It was checked through Qualtrics whether all participants had completed their answers. When all participants finished answering, story B was read. The same instruction was given. Participants kept in mind and reported the story as they remembered on another Qualtrics link. Next, participants answered some questions to check if there were any problems meeting the research requirements. Finally, the debrief form was presented to the participants (see Appendix 19). The summary is presented below in Figure 4.

#### **2.4. Statistical Analyses**

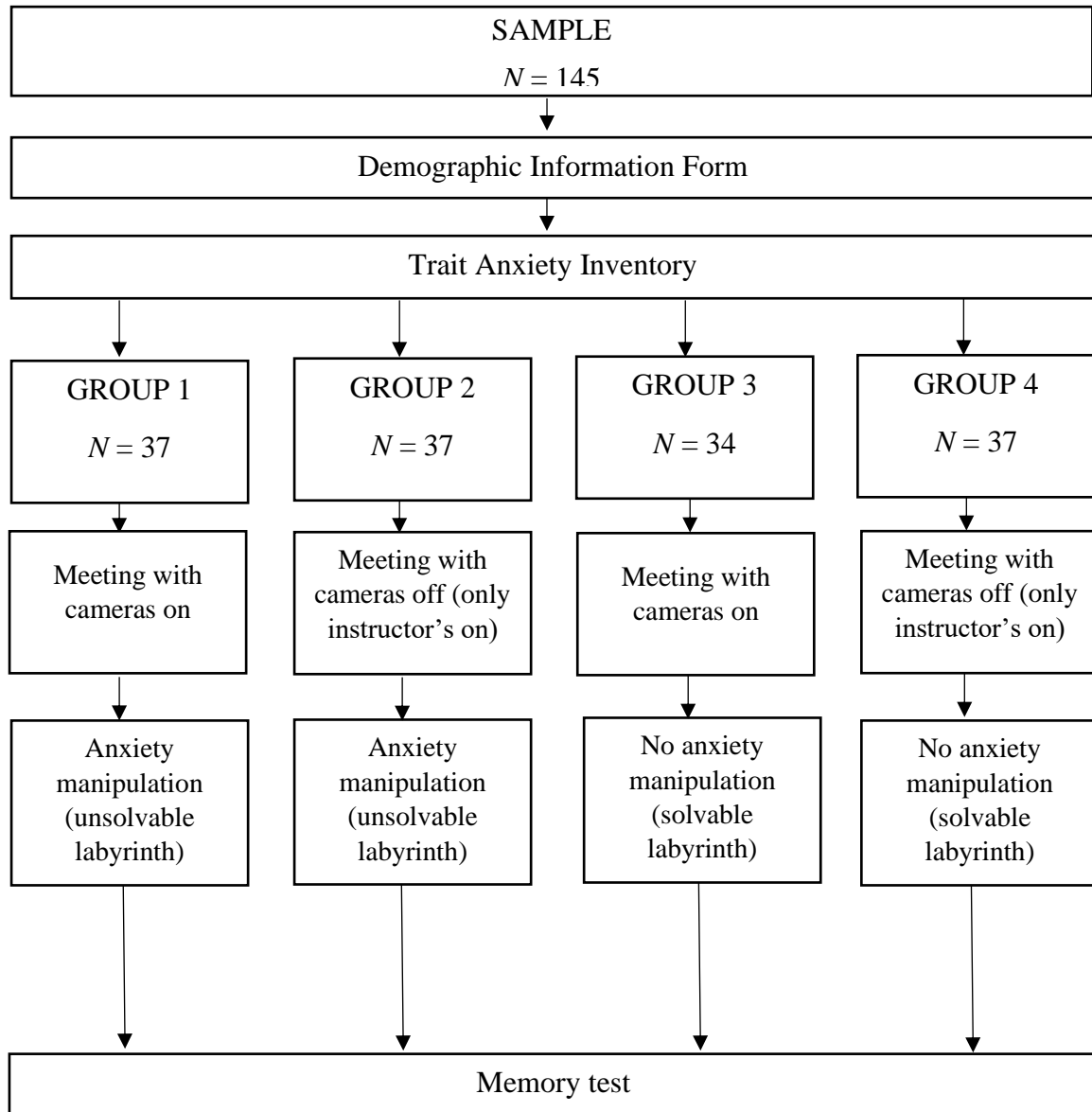
All analyses were conducted with IBM SPSS Statistics 24.0. Wilcoxon Signed Ranks Test was conducted to test whether the manipulation technique is valid in the online environment.

The normality of the data was evaluated with skewness and kurtosis values. Whether there were univariate outliers in continuous variables was determined by the standardized values, and whether there were multivariate outliers was checked with Mahalanobis distance.

The effect of camera (on or off) on memory performance was examined with the Multivariate Analysis of Variance (MANOVA). The same test was also conducted to examine the effect of anxiety, and the interaction effect of camera and anxiety on memory performance. In addition, the MANOVA was conducted to analyse the effect of the number of people on the screen and the frequency of using the online platform on memory performance.

**Figure 4**

*Overview of Study Design*



### 3. RESULTS

In this study, it is primarily aimed to examine the effect of camera (on or off) and anxiety in online learning on memory performance among university students.

#### 3.1. Pilot study

To test anxiety manipulation in online conditions, the state anxiety scores of the participants before the manipulation were compared with their scores after the manipulation in the pilot study. The pilot study was conducted with 16 participants. Because the population is not normally distributed, A Wilcoxon Signed Ranks Test was conducted to see if there was a difference between the pre-test and post-test. Anxiety after manipulation (Mdn = 2.25) was significantly higher than before manipulation (Mdn =1.98),  $z = -2.45$ ,  $p < .05$ , with a large effect size,  $r = .61$ .

#### 3.2. Main study

In total, 317 participants completed the first survey. However, 49 of these participants were not invited to the second stage because 22 participants were diagnosed with a neurological or psychiatric disease, 8 participants were using neurological or psychiatric medications, and 19 participants were diagnosed with a neurological or psychiatric disease and using neurological or psychiatric medications. Although 268 participants were invited to the second stage, 123 of them did not participate and 146 of them participated in the second stage. The data of one participant was deleted because the participant did not complete the labyrinth stage applied for anxiety manipulation. Since participants who did not meet the inclusion criteria in the first stage of the study were not invited to the second stage, no participant was excluded from the data according to the inclusion or exclusion criteria. There were no missing data among those who completed the survey, as all questions must be answered in order to progress through the surveys.

Other than that, none of the participants were removed from the data because no univariate or multivariate outlier was detected. Thus, the analyses were performed on 145 participants with a mean age of 21. When the normality of the data was evaluated with skewness and kurtosis values, it was observed that the values were within the acceptable range (Tabachnick & Fidell, 2013). Accordingly, the data fulfills the assumption of normal distribution. However, the variances are not homogeneously distributed.

### 3.2.1. Descriptive statistics

The research was conducted with 129 female and 16 male participants. The ages of the participants ranged from 18 to 41. The average age of the participants was 21.30 ( $SD = 2.41$ ). There were 37 participants in three groups, which were camera on-anxiety, camera off-anxiety, and camera off-no anxiety, and 34 participants in the camera on-no anxiety group. The average trait anxiety scores of the groups are as follows; camera on - no anxiety ( $M = 47.44$ ,  $SD = 9.66$ ), camera on - anxiety ( $M = 46.97$ ,  $SD = 10.43$ ), camera off - no anxiety ( $M = 45.76$ ,  $SD = 8.39$ ), camera off - anxiety ( $M = 49.03$ ,  $SD = 8.54$ ). The groups were not significantly different in terms of distribution of gender,  $\chi^2(3, N = 145) = .642, p > .05$ , handedness,  $\chi^2(3, N = 145) = .664, p > .05$ , and trait anxiety,  $\chi^2(3, N = 145) = 1.905, p > .05$ . However, the groups were significantly different in terms of the frequency of online platform usage,  $\chi^2(9, N = 145) = 18.617, p < .05$ . The demographic characteristics of participants are demonstrated in Table 1 below.

**Table 1**

#### *Demographic Characteristics of Participants*

Demographic characteristics	On-anxiety		Off-anxiety		On-no anxiety		Off-no anxiety		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender										
Female	32	86.5	35	94.6	30	88.2	32	86.5	129	89.0
Male	5	13.5	2	5.4	4	11.8	5	13.5	16	11.0
Handedness										
Right-handed	34	91.9	32	86.5	31	91.2	31	83.8	128	88.3
Left-handed	3	8.1	5	13.5	3	8.8	6	16.2	17	11.7
Frequency of online platform usage										
Every six months	18	48.6	9	24.3	10	29.4	11	29.7	48	33.1
Once a month	10	27.0	6	16.2	11	32.4	15	40.5	42	29.0
Once a week	8	21.6	22	59.5	13	38.2	11	29.7	54	37.2
Once a day	1	2.7							1	.7
Mean age	21.38		20.92		21.41		21.51		21.30	

The mean and standard deviation values of the scores taken from the Logical Memory I subtest of the Wechsler Memory Scale-III (story A, story B and calculated total score from both stories) among the groups can be found in Table 2.

**Table 2***Means and Standard Deviations of the Scores from Logical Memory I*

Measurement	On-anxiety		Off-anxiety		On-no anxiety		Off-no anxiety	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Story A	9.51	3.97	9.78	3.54	8.56	5.96	10.95	4.34
Story B	9.81	3.03	10.22	2.98	10.44	3.43	11.84	3.35
Total score (A+B)	19.32	4.88	20.76	4.70	18.38	7.94	22.78	6.48

**3.2.2. Inferential statistics**

The effects of camera (on or off) and anxiety on memory performance in online learning were examined with MANOVA. Memory performance was evaluated with the score from story A, the score from story B, and the score generated by the sum of stories A and B. Since there was no homogeneity between the variances, the Pillai's Trace value was reported. The test revealed that the main effect of camera (on or off) had a significant effect on memory performance, *Pillai's Trace* = .08,  $F(3, 139) = 3.77$ ,  $p < .05$ ,  $\eta_p^2 = .08$ . When the effect of the camera on the scores obtained from the stories used for evaluating memory performance was examined, no statistically significant difference was found for story A ( $p > .05$ ) and story B ( $p > .05$ ). However, there was a statistically significant effect on the total score ( $p < .05$ ). The average total memory score of those in the camera on condition was lower ( $M = 18.87$ ,  $SD = 6.50$ ) than the average memory score of the camera off condition ( $M = 21.77$ ,  $SD = 5.71$ ).

Similarly, MANOVA was conducted to examine the main effect of anxiety on memory performance. According to this test using anxiety manipulation on participants did not have a statistically significant effect on memory performance, *Pillai's Trace* = .05,  $F(3, 139) = 2.41$ ,  $p > .05$ ,  $\eta_p^2 = .05$ . When the effect of the anxiety on the scores obtained from the stories used for evaluating memory performance was examined, no statistically significant difference was found for story A ( $p > .05$ ) and the total score ( $p > .05$ ). However, there was a statistically significant effect on the story B ( $p < .05$ ). The average total memory score of those in the anxiety condition was lower ( $M = 10.01$ ,  $SD = 2.99$ ) than the average memory score of the camera off condition ( $M = 11.17$ ,  $SD = 3.44$ ).

The interaction effect of camera and anxiety on the memory performance was examined with MANOVA. There was no significant camera and anxiety effect on memory performance, *Pillai's Trace* = .02,  $F(3, 139) = .74$ ,  $p > .05$ ,  $\eta_p^2 = .02$ . The results were shown in Table 3. When the interaction effect of camera and anxiety on the scores obtained from the stories used for evaluating memory performance was examined, there was no statistically significant effect on either story A, story B, or the total score ( $p > .05$ ).

**Table 3**

*MANOVA Results to Examine Camera, Anxiety and Interaction of Camera and Anxiety*

	<i>Pillai</i>	<i>F</i>	<i>Hypothesis df</i>	<i>Error df</i>	<i>p</i>
Camera	.08	3.77	3	139	.01
Anxiety	.05	2.41	3	139	.07
Camera and Anxiety	.02	.74	3	139	.53

The results of two-way MANOVA for the main effect of the camera, the main effect of anxiety, and the interaction effect of the camera and anxiety on the scores obtained from each story and the total score used for evaluating memory performance were given in Table 4.

**Table 4***Two-Way MANOVA for Memory Scores*

Source	Memory Scores	<i>df</i>	<i>F</i>	<i>p</i>	$\eta_p^2$	Power
Camera	Story A	1	3.11	.08	.02	.42
	Story B	1	2.88	.09	.02	.39
	Total Score (A+B)	1	8.28	.01	.06	.82
Anxiety	Story A	1	.02	.89	.00	.05
	Story B	1	4.49	.04	.03	.56
	Total Score (A+B)	1	.29	.59	.00	.08
Camera and Anxiety	Story A	1	1.97	.16	.01	.29
	Story B	1	.87	.35	.01	.15
	Total Score (A+B)	1	2.15	.15	.02	.31

*Note.*  $\eta_p^2$  = partial eta squared; Power = observed power computed using  $\alpha = .05$ .

All pairwise comparisons of the camera and anxiety conditions can be seen in Table 5 and Table 6 respectively.

**Table 5***Pairwise Comparisons of Camera Conditions*

Memory Performance	Mean Difference (camera off-camera on)	Std. Error	<i>p</i>
Story A	1.33	.75	.08
Story B	.90	.53	.09
Story Total (A+B)	2.92*	1.01	.01

\* $p < .05$ .

**Table 6**

*Pairwise Comparisons of Anxiety Conditions*

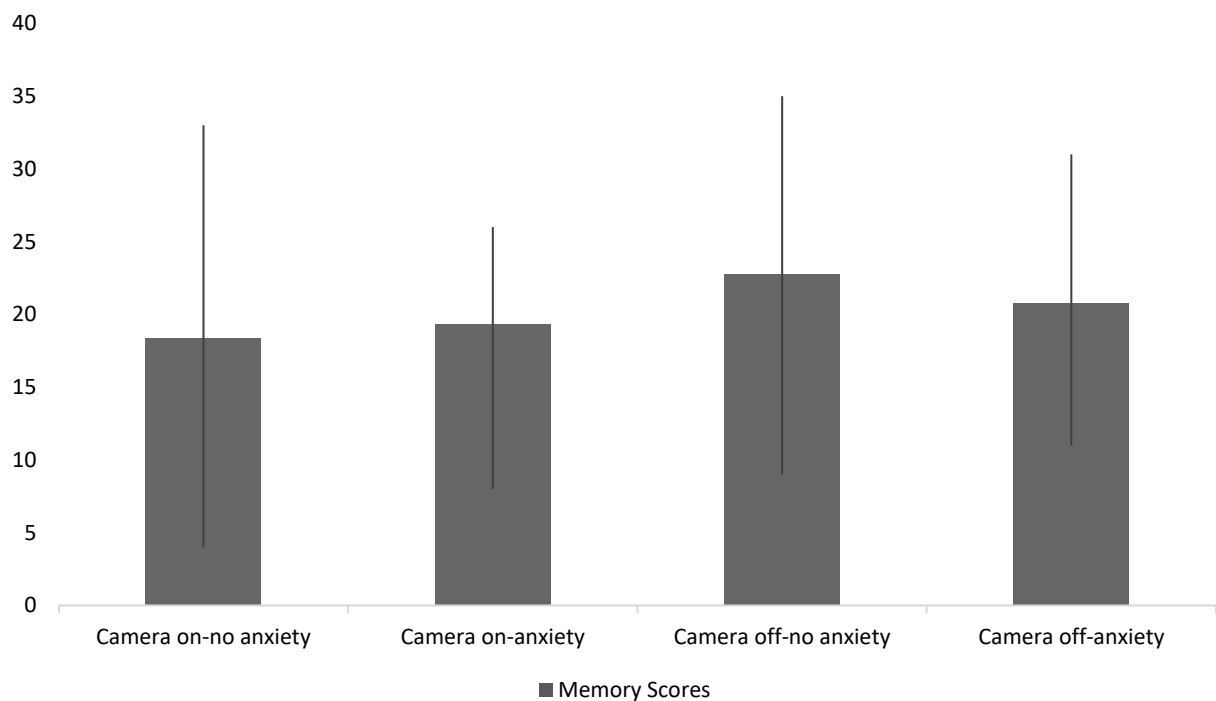
Memory Performance	Mean Difference (no anxiety-anxiety)	Std. Error	<i>p</i>
Story A	.10	.75	.89
Story B	1.13*	.53	.04
Story Total (A+B)	.54	1.01	.59

\* $p < .05$

The bar graph of the mean memory scores of the groups is demonstrated in Figure 5.

**Figure 5**

*Mean Memory Scores of the Groups*



\* $p < .05$

Since the groups differed in terms of the frequency of using the online platform, one-way MANOVA was conducted to examine the effect of this variable on memory

performance. According to the results of the analysis, the frequency of using the online platform (never, about once every six months, about once a month, about once a week, about once a day, multiple times a day) does not have a significant effect on memory performance, *Pillai's Trace* = .03,  $F(9, 423) = .48$ ,  $p > .05$ ,  $\eta_p^2 = .01$ . In addition, whether the number of people on the screen (6-7, 10-11, or 24-27) has an effect on memory performance was examined with the one-way MANOVA and no significant effect was found, *Pillai's Trace* = .01,  $F(6, 282) = .25$ ,  $p > .05$ ,  $\eta_p^2 = .01$ .

## 4. DISCUSSION

In this study, the effects of camera (on or off) and anxiety on memory performance in the online learning environment were examined. In this section, the main effect of camera, the main effect of anxiety, and the interaction effect of camera and anxiety on memory performance were interpreted, respectively.

### 4.1. The Main Effect of Camera on Memory Performance

The effect of camera (on or off) on memory performance in an online learning environment was examined with MANOVA. According to the results of this analysis, whether cameras were on or off, in other words seeing themselves and others on the screen, had a significant effect on memory performance in the online environment. The average memory score acquired by the camera-on group was lower than the camera-off group. Thus, the first hypothesis of the research has been confirmed that turning cameras on negatively affect memory performance.

This result can be associated with various reasons. If the online education environment is adapted to the face-to-face classroom environment, it would be like having a big mirror behind the teacher and the students seeing the whole class and themselves through that mirror while listening to the teacher (Tien et al., 2023). When students turn on their cameras, they see themselves and others on the screen by default settings. Seeing others means seeing those who see them. It can be disturbing to be constantly watched by others or to think that they might be watched. According to Innes & Young (1975), the possibility of being evaluated by other people in an environment negatively affects performance by increasing self-awareness. People may feel that they are being judged by others for their appearance, facial expressions, tones of voice, gestures, and body language. Being constantly watched by someone when the cameras are on can be quite annoying. Therefore, students or even teachers may find it difficult to concentrate on the course material. Because of this reason, students' learning and memory performances may decrease. Apart from all these, making it mandatory to turn on cameras may have caused pressure on participants in camera on groups. Thus, they may have underperformed under pressure.

The negative effect of turning on cameras on memory performance may be related to the direction of people's perceptions towards themselves and others, thus distracting them from the presented material. The TOTE model (Miller et al., 1960) and objective self-awareness theory (Duvall & Wicklund, 1972) provide similar explanations for this situation.

People compare their current situation with the targeted situation and make behavioral adjustments until the target state is reached. In other words, their attention is on themselves rather than on the material presented, and they constantly check themselves to see if they are in the conditions they want. This may result in a decrease in their performance.

When students see themselves, they may control their appearance and behavior. When the reasons for students to keep their cameras turned off in online education were investigated, the highest reported reason was their concerns about their appearance (Castelli & Sarvary, 2021). Especially during the university years, which can still be considered as adolescence, the importance of physical attractiveness and looking good are crucial for students. Because feeling attractive is associated with high self-esteem, being skilled in social interaction, and being successful (Crocker et al., 2003; Langlois et al., 2000). In addition, being physically unattractive is also associated with being rejected by others (Park, 2007). For this reason, students may intensely worry about their appearance as they see themselves and others when the cameras are on. Students constantly checking themselves to see if they look good, checking their body language or facial expressions, and whether their hair is good can make it difficult for them to focus on the lesson and cause them to be distracted.

In addition, people do not speak in front of the mirror in daily life, except for actors or people whose profession is to speak in front of people and who practice in front of mirrors. Naturally, people are not accustomed to the image of themselves in the mirror talking or listening to someone. With COVID-19, people who have never observed themselves in the mirror for a long time have suddenly fallen into such a situation. Therefore, it may be normal for people to find their images on the screen interesting and be interested in themselves for a long time.

Although online education is lifesaving for education, a concept called Zoom fatigue has emerged due to the fatigue it creates (Bailenson, 2021). It has been argued that Zoom fatigue results from the limitation of physical activity, too much close-eye gazing, increased self-evaluation when looking at oneself, and cognitive load. In the Zoom environment, people are communicating with each other from a close distance and uninterruptedly unlike face-to-face communication. As mentioned before, seeing yourself all the time is also an unusual situation. People can criticize themselves and get stressed. Staying at the same point during the Zoom meeting also negatively affects cognitive performance. Moreover, more effort is needed to receive and send non-verbal cues on Zoom. Sending extra cues can form

part of the cognitive load. An example of this would be nodding exaggeratedly for a long time or making eye contact while looking at the camera (Bailenson, 2021). All of these can cause Zoom fatigue and therefore may decrease performance.

Of course, turning cameras on or off is not only about seeing themselves and others but also about seeing the environment they are in. The conditions of every student are not the same, and some students reported that showing this from the camera can be a concern for those who are especially in worse conditions (Castelli & Sarvary, 2021; Reich et al., 2020). One reason students don't want to turn on their cameras in online education is the appearance of other people in the background (Castelli & Sarvary, 2021). Not everyone lives alone. Students living with their families or someone else may not want someone to be seen behind them. In addition, they may worry about someone suddenly entering the place where they attended the meeting. In fact, this may cause distraction, and perhaps they start to focus entirely on that person instead of the lesson being taught.

In addition, it was examined whether the number of people on the screen (6-7, 10-11, or 24-27) had an effect on memory performance, and no significant results were found. This is in line with the findings of Tien et al. (2023) that large and small groups do not differ in terms of anxiety and performance in online settings.

#### **4.2. The Main Effect of Anxiety on Memory Performance**

The effect of manipulated anxiety on memory performance in the context of online education was examined using MANOVA. When the effect of the anxiety on the scores obtained from the stories used for evaluating memory performance was examined, no statistically significant difference was found for story A and the total score. However, there was a statistically significant effect on the story B. As a result of the analysis, no significant difference was found for the main effect of anxiety on memory performance. Therefore, the hypothesis that experimentally manipulated anxiety would negatively affect memory performance was not confirmed. However, the group with increased anxiety had a lower mean memory score than the other group.

There may be several reasons why the second hypothesis was not confirmed. Anxiety manipulation may not have caused enough anxiety to affect the memory performance of the individuals. According to Yerkes-Dodson law (Yerkes & Dodson, 1908), performance is better when there is an optimal level of anxiety. The manipulation used in this study may not have been effective enough to affect memory performance. Therefore, the anxiety group may

have exhibited the same cognitive performance as the no anxiety group with the positive effect of manipulated anxiety. Although the groups did not differ statistically in terms of trait anxiety, the trait anxiety mean scores of the groups were examined. When the camera on groups were compared with each other, the average trait anxiety score of the camera on - no anxiety group was slightly higher than the camera on - anxiety group. When the camera off groups were compared with each other, the average trait anxiety score of the camera off - anxiety group was higher than the camera off - no anxiety group. The fact that the trait anxiety of the camera on - no anxiety group was higher than that of the camera on - anxiety group may have neutralized the effect of anxiety manipulation and caused the groups to not differentiate. Although there was no significant effect of anxiety manipulation on memory performance in camera off groups, the reason why the camera off - no anxiety group outperformed the camera off - anxiety group may be related to the fact that they already had lower trait anxiety scores.

The environment in which people participated in the research may have affected memory performance negatively. Of course, each participant participated in the research from different environments, but during the research, different environments of the participants were observed in camera on conditions. For example, some students participated in the research in a library canteen, while others participated in the research in front of their friends. These environments may have caused people to be distracted and not be able to do the assigned task with due care.

Considering the effect of anxiety on the memory scores obtained from story A, story B and the sum of these scores, the fact that it was effective only on story B may be due to the ordering effect. Before starting, neither the anxiety group nor the no anxiety group was familiar with the task, even though instructions were given on what to do. Both groups may have tried to get used to the task in story A task. So, everyone may have been focused on learning the task in story A. Thus, there may not have been a difference between the anxiety group and the no anxiety group for story A. Since the task was learned in story A, the effect of anxiety may have emerged in story B. Thus, the no anxiety group performed better in story B, and the anxiety group might have performed worse because they were more anxious. Also, in the content of story B, there is an event that may happen to everyone and may cause anxiety. For this reason, people may have been worried during memory measurement by identifying with the character of story B.

Since the frequency of using the online meeting platform between groups was different, the effect of this frequency on memory performance was examined. However, the frequency of people using the online meeting platform did not have an effect on memory performance. There was no one among the participants to use the online meeting platform for the first time, as this was one of the inclusion criteria. For this reason, they knew how to use the online meeting platform. Therefore, the time spent by the participants with these platforms may not have any effect on the research results.

#### **4.3. The Interaction Effect of Camera and Anxiety on Memory Performance**

The interaction effect of camera and anxiety on the memory performance was examined with MANOVA. As a result of the analysis, no statistically significant difference in memory performance was found. Statistically, the significant effect of the camera only on the total memory score and the anxiety only on the B story may not be sufficient enough for the interaction effect of the camera and anxiety to be effective on memory performance.

Turning on the camera in online education may have already caused anxiety. Just like trying to create anxiety with the labyrinth task, turning on the camera may have manipulated the anxiety. So, the labyrinth might not only have manipulated anxiety with the labyrinth task but also anxiety might have been manipulated by the camera. The effect of camera and anxiety manipulation on memory performance may not have been distinctive. Thus, anxiety may have been manipulated by the camera being turned on, even in groups where anxiety is not wanted to be manipulated. Apart from that, the camera may also have had a distracting effect. The distracting effect of turning on the camera may even have influenced the anxiety manipulation. In other words, people may not have paid attention to the instructions given for manipulation after turning their cameras on.

The groups in the research were formed according to the conditions of anxiety manipulation and camera (on or off), and they were as follows: camera on-no anxiety, camera on-anxiety, camera off-no anxiety, and camera off-anxiety group. The group with the highest mean memory score was the camera off-no anxiety manipulation group. The camera off-anxiety manipulation group followed the first group and then, followed by the camera on-anxiety manipulation group. The group with the lowest score was the camera on-no anxiety manipulation group. In summary, the group that showed the best memory performance was the camera off-no anxiety group, as expected. Therefore, the third hypothesis was supported.

There may be several reasons why the camera off-no anxiety group performed best in the memory performance test. It was found in the current research that turning cameras on (seeing oneself and others) in online education had a negative effect on memory performance. It was thought that seeing oneself on the screen could increase students' self-awareness, create a desire to control their own physical appearance, create Zoom fatigue and all of these could be distracting. Studies on this subject in the literature have also made similar comments. In fact, Baumeister (1984) stated that as people's self-awareness increases, they put pressure on themselves for better performance, and the pressure will adversely affect performance. In addition, this pressure may cause people to develop anxiety about whether they will perform better. Also, anxiety has a negative effect on performance. In fact, as the level of anxiety increases, the probability of paying attention to non-task-related stimuli increases (Eysenck, 1979). The non-task-related stimulus for the online learning environment may be one's own physical image or the pressure on performance. Therefore, when the cameras are on, people's physical appearance, and focusing on their own performance may create anxiety for them. Also, an increase in anxiety may cause people to pay attention to non-task-related stimuli such as physical appearance and consequently decrease performance. The theory of objective self-awareness provides information that can be paralleled with this finding. According to this theory, when people focus on themselves, they automatically compare themselves with the traits, behaviors, or attitudes that they think are right and objective self-awareness is formed (Duvall & Wicklund, 1972). If there is a difference between what is believed to be right and one's own self, the person finds herself/himself in a conflict and people can always find something about themselves they want to change. To terminate this conflict, they either try to get closer to their standards or stop comparing themselves with these standards. These require a non-task-related effort, so performance may be adversely affected.

When cameras are off, people may be more likely to pay attention to the course material or what the instructor is saying because there is no distracting element, such as the physical image of themselves or their friends on the screen. People do not worry about the appearance of their environment because they and their surroundings are not visible. On the other hand, naturally, there are other factors that can cause anxiety during online education. However, when cameras are off, at least one element of anxiety may be eliminated. In the group with the best memory performance, no anxiety manipulation was performed. In short, the negativities caused by keeping the cameras on and anxiety were not present in this group.

Therefore, it was thought that the camera off-no anxiety group would show the best memory performance, and the result was found in this direction.

#### **4.4. Strengths, Limitations, and Further Suggestions**

In the literature, there are studies generally examining the attitudes of students or teachers about online education (Hussein et al., 2020; Knowles & Kerkman, 2007; Unger & Meiran, 2020) or comparing online education and face-to-face education (Ananga & Biney, 2017; Brown & Park, 2016; Neuhauser, 2002; Soffer & Nachmias, 2018; Yen et al., 2018) or advantages (Alexander et al., 2012; Dinh & Nguyen, 2022; Yuhanna et al., 2020) and disadvantages of online education (Bhuvaneswari et al., 2020; Davis et al., 2019; Dinh & Nguyen, 2022). Other studies examined the reasons why people don't want to turn their cameras on or off in online education (Castelli & Sarvary, 2021; Moise et al., 2021; Reich et al., 2020). In more recent research, it was examined whether cameras and self-view were on caused appearance anxiety and whether this anxiety has any mediating role in the performance of the students (Tien et al., 2023). To the knowledge of the researcher, there is no experimental study that examines the effects of turning cameras on/off and manipulated anxiety on memory performance in online education settings. For this reason, the current research is a first in terms of examining the effects of manipulated anxiety and camera conditions together on online learning. Especially in Türkiye, there are few studies on the subject of online education. These studies, like other studies in the literature, examined the opinions about online education (Tekedere et al., 2022; Telli & Altun, 2021), the motivation of students in online education (Bayindir, 2021) or attitudes about whether cameras should be on or off during online education. (Akdemir & Arda, 2022). Online courses have become very common at all levels of education and will continue to become widespread with the advantages they provide. For this reason, it is very important to research it in different samples, in different contexts, with different variables. Therefore, this study is important as it is the first study to empirically examine the effects of camera conditions and anxiety on memory performance in online education in Türkiye.

The findings of this study can provide information to teachers, students, and school administrators about turning on the camera. Students, especially those with distraction problems, may turn off their cameras when they have trouble concentrating in online learning environments. Teachers can inform their students about the possible benefits of turning on the camera, as well as informing them that they can turn it off when they have difficulty

concentrating. Administrators, on the other hand, can consider the findings of this study when determining camera usage requirements.

Although this study was conducted in conditions suitable for the nature of online education, there is little control over confounding variables. Participants were told with an informed consent form that they had to participate in the research on a computer with a camera. In addition, at the end of the research, they were asked whether they followed this instruction. However, especially in the camera-off groups, whether they participated on a computer was checked only with participants' statements. If there were people among the participants who did not follow the instructions and did not participate in the research on a computer, this may have caused the labyrinth used to manipulate anxiety not to be seen clearly. Thus, maybe their anxiety could not be manipulated at the desired level. For this reason, although this research is suitable for the natural conditions of online learning and education, in the future, other more controlled experimental studies can be conducted in the laboratories.

In this study, memory was measured through the learning of a text in a short time. However, in real educational settings, exams usually take place after a few weeks of lectures. Future research may test learning with a several weeks long course, in order to bring it closer to the context of education. It is an important finding that turning cameras on negatively affects learning, and it needs to be studied again in different samples in a multifaceted way. If similar results are found again in various studies, we will increase our findings in order to understand the people especially those who have problems with online education.

One of the limitations of this study is that the state anxiety measurement was not taken in the main study. It was thought that while the participants were answering the state anxiety inventory, a certain amount of time would pass, and the effect of manipulation would decrease. In addition, it was thought that having the participants solve the same inventory of 20 questions with an interval of approximately one minute would not yield healthy results. Future research can control the effect of anxiety manipulation with analysis by measuring state anxiety with very few questions, even maybe with one question.

The stories used in this study were taken from the Logical Memory I subtest of WMS-III. In the original measurement, story A is presented first, followed by story B. For this reason, the stories were used in this order in this study, but the fact that the stories were always presented in the same order may have caused the ordering effect. This may also have

had an effect on the results. For this reason, counterbalancing can be used in future research. Apart from the ordering effect, it was thought that in the current study, besides the labyrinth, the camera might also have caused anxiety. For this reason, while anxiety is manipulated in future studies, other variables that may cause anxiety may also be considered.

Also, the test used to evaluate memory was a test that could be affected by the researcher's assessment. Although memory scores were evaluated by two different evaluators without knowing the groups in order to avoid researcher bias, a complete objective evaluation could not be made due to the nature of the test. For this reason, in future studies using the same test, it would not be correct to compare the memory scores of individuals with those in the current study, since the same evaluators will not evaluate the participants. Accordingly, future studies may use more objective tests consisting of questions such as multiple-choice questions when evaluating.

The fact that social interaction was not taken into consideration is one of the limitations of the study. Switching to online education may increase social isolation in students, and at the same time, the transition to online education may already be at a time when isolation increases. Although it was found that turning on the cameras and seeing oneself and others negatively affect memory in the online setting, there are also positive aspects of turning cameras on. For example, having the cameras on may enable students to continue their social interactions. Turning on the camera may be protective against the negative effects of social isolation on cognitive performance, and executive functioning (Cacioppo & Hawkey, 2009), and other health outcomes (Aleman & Sommer, 2020). In other words, turning off the cameras may indirectly affect learning, memory, and education. For this reason, future research that will contribute to online education should also consider the effect of social isolation. In this regard, among the future research variables, there may be additional variables related to social isolation such as perceived loneliness, pet ownership, psychotherapy, and leisure activities. Also, increased social isolation is associated with mental disorders such as depression (Teo, 2013). For this reason, future research can examine the symptoms of depression, and even general symptom control can be done. In addition, the effect of turning cameras on can be examined on both memory performance and social isolation at the same time in the future. Therefore, when using online platforms in education, both the findings of the current research (memory performance decreased when cameras are on) and its positive effect on social isolation should be considered. Moreover, the effect of the presence of others on performance is a topic that needs to be studied in the

online environment as well. For example, if the evaluation was made verbally so that others could hear responses, how would the camera being on or off affect the performance? What if the other people in the online meeting were also evaluators? Without comprehensive research on this subject, it would not be correct to say cameras should be on or off in online education.

Social interaction is also important for teachers. In this study, learning and memory were investigated, but turning on the cameras and seeing each other may also affect teaching and, thus, affect learning and memory. Teachers can recognize their students' dissatisfaction, satisfaction, or confusion from their body language and facial expressions, and reorganize their teaching with the cues they receive to improve students' learning (Mottet & Richmond, 2002). When the cameras are off, teachers may feel like they are talking to themselves (Castelli & Sarvary, 2021). Therefore, seeing themselves and others in online education can be explored from the instructor's perspective in the future.

Context is an important factor to consider when researching online education and learning. For instance, emergency remote teaching and online learning are not the same (Fuchs, 2022). There are many conditions under which online learning takes place. During the COVID-19 pandemic, there were times when there was a full lockdown, and nearly no one could go out. Therefore, people have compulsorily experienced online learning mostly from their homes. Meanwhile, they were responding to their losses and worrying about the pandemic. When an earthquake occurred, online learning took place in a completely different context with the loss of loved ones, homes, and cities, and the trauma caused by these. There is also non-compulsory online learning. For example, while online education is compulsory in some cases, education can also be hybrid, and people may choose to participate in online education. The context of all this is different from each other, and learning needs to be examined considering all circumstances. Additionally, it is different conditions that everyone to have their cameras on and some of them on and others off. Having one's own camera on while some people's cameras are off may create some skeptical thoughts. For example, they may not be sure whether others are recording them or others are listening to them. They may feel like they are missing something because some cameras are off. For this reason, future studies may examine the conditions for everyone to turn on their cameras, some to turn on and everyone to be closed, with various variables.

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## APPENDICES

### APPENDIX 1: INFORMED CONSENT FORM

Başkent Üniversitesi Klinik Psikoloji Yüksek Lisans öğrencisi Zeynep İkra Aldemir tarafından Doç. Dr. Elvin Doğutepe danışmanlığında yürütülen bir çalışmaya katılmaya davetlisiniz. Çalışmaya katılmak için ana dilinizin Türkçe olması, 18 yaşın üzerinde olmanız, psikiyatrik ya da nörolojik bir tanıya sahip olmamanız ve bir çevrim içi görüşme programını (örn. Zoom) daha önce kullanmış olmanız gerekmektedir. Aynı zamanda araştırmaya kamerası olan bir bilgisayar ile katılım sağlanması gerekmektedir.

- Çalışmanın amacı çevrim içi yapılan toplantılarda bellek performansını araştırmaktır.
- Araştırma kapsamında katılımcılara, araştırmacı tarafından bir hikaye okunacaktır. Katılımcılardan bu hikayeyi akıllarında tutmaları ve daha sonra hatırladıkları kısmını bildirmeleri beklenmektedir. Çalışma kişilere rahatsızlık verecek herhangi bir soru içermemektedir. Çalışmanın süresi yaklaşık 25 dakikadır.
- Bu çalışmaya katılmak herhangi tehlikeli bir durum oluşturmamaktadır.
- Günümüzde artık çoğu toplantılar, dersler çevrim içi yürütülüyor. Bu araştırmanın bulguları dahilinde çevrim içi eğitimden daha yüksek verim almak için yapılabileceklere yönelik literatüre anlamlı katkılar sağlamak beklenmektedir.
- Bu çalışmaya katılmak için herhangi bir ödeme yapılmayacak veya katılma bedeli ödenmeyecektir.
- Katılımcılar ile ilgili tüm bilgiler gizli tutulacaktır. Katılımcıların isimleri sayılarla kodlanacaktır. Kişiyeye ait bilgiler verilerden ayrı tutulacak ve gizli kalacaktır. Araştırma sonuçları hazır olduğunda, katılımcılara ait bilgiler açıklanmayacaktır. Katılımcılardan kameralarını açmaları istenebilir ama isteyen kişiler takma isimle araştırmaya katılabilirler. Görseliniz kesinlikle kullanılmayacaktır ve kayıt alınmayacaktır.
- Çalışmaya katılmak isteğe bağlıdır. Katılımcılar çalışmaya katılma veya reddetme hakkına aynı zamanda herhangi bir sebeple, herhangi bir noktada çalışmadan çekilme hakkına da sahiptirler. Bu çalışmadan çekilme durumunda herhangi bir yaptırım olmayacaktır.
- Araştırma ile ilgili bir sorunuz veya endişeleriniz varsa, katılımcıların hakları veya başka bir konuda araştırmacı ile iletişime geçebilirsiniz.

Bu formu onaylayarak yukarıdaki bilgileri okuduğunuzu ve bu çalışmaya tamamen gönüllülük esasıyla katıldığınızı kabul etmiş olacaksınız.

## APPENDIX 2: DEMOGRAPHIC INFORMATION FORM

1- Cinsiyetiniz: .....

2- Yaşınız: .....

3- Üniversite öğrencisi misiniz? Evet /Hayır

4- Hangi seviyede öğrencisiniz?

Lisans / Yüksek Lisans / Doktora

5- Size uygun olanı seçin: Sağlak / Solak

6- Nörolojik ya da psikiyatrik bir tanı aldınız mı?

Aldıysanız belirtiniz:.....

7- Kullanmakta olduğunuz bir ilaç var mı? Evet/ Hayır

Varsa ilacı belirtiniz:.....

8- Daha önce çevrim içi görüşme programı (örn. Zoom) kullandınız mı? Evet / Hayır

9- Çevrim içi (online) derslere/konferanslara ne sıklıkla katılıyorsunuz? Asla / Yaklaşık  
ayda bir / Yaklaşık haftada bir / Yaklaşık günde bir / Günde birden çok kez

### APPENDIX 3: STATE ANXIETY INVENTORY

Aşağıda kişilerin kendilerine ait duygularını anlatmada kullandıkları bir takım ifadeler verilmiştir. Her ifadeyi okuyun, sonra da o anda nasıl hissettiğinizi ifadelerin sağ tarafındaki parantezlerden uygun olanını işaretlemek suretiyle belirtin. Doğru ya da yanlış cevap yoktur. Herhangi bir ifadenin üzerinde fazla zaman sarf etmeksizin **anında** nasıl hissettiğinizi gösteren cevabı işaretleyin.

		HİÇ	BİRAZ	ÇOK	TAMAMIYLA
1.	Şu anda sakinim	(1)	(2)	(3)	(4)
2.	Kendimi emniyette hissediyorum	(1)	(2)	(3)	(4)
3.	Su anda sinirlerim gergin	(1)	(2)	(3)	(4)
4.	Pişmanlık duygusu içindeyim	(1)	(2)	(3)	(4)
5.	Şu anda huzur içindeyim	(1)	(2)	(3)	(4)
6.	Şu anda hiç keyfim yok	(1)	(2)	(3)	(4)
7.	Başıma geleceklerden endişe ediyorum	(1)	(2)	(3)	(4)
8.	Kendimi dinlenmiş hissediyorum	(1)	(2)	(3)	(4)
9.	Şu anda kaygılıyım	(1)	(2)	(3)	(4)
10.	Kendimi rahat hissediyorum	(1)	(2)	(3)	(4)
11.	Kendime güvenim var	(1)	(2)	(3)	(4)
12.	Şu anda asabım bozuk	(1)	(2)	(3)	(4)
13.	Çok sinirliyim	(1)	(2)	(3)	(4)
14.	Sinirlerimin çok gergin olduğunu hissediyorum	(1)	(2)	(3)	(4)
15.	Kendimi rahatlamış hissediyorum	(1)	(2)	(3)	(4)
16.	Şu anda halimden memnunum	(1)	(2)	(3)	(4)
17.	Şu anda endişeliyim	(1)	(2)	(3)	(4)
18.	Heyecandan kendimi şaşkına dönmüş hissediyorum	(1)	(2)	(3)	(4)
19.	Şu anda sevinçliyim	(1)	(2)	(3)	(4)
20.	Şu anda keyfim yerinde	(1)	(2)	(3)	(4)

#### APPENDIX 4: TRAIT ANXIETY INVENTORY

Aşağıda kişilerin kendilerine ait duygularını anlatmada kullandıkları bir takım ifadeler verilmiştir. Her ifadeyi okuyun, sonra da **genel olarak** nasıl hissettiğinizi ifadelerden uygun olanını işaretlemek suretiyle belirtin. **Doğru ya da yanlış cevap yoktur. Herhangi bir ifadenin üzerinde fazla zaman sarf etmeksizin genel olarak nasıl hissettiğinizi gösteren cevabı işaretleyin.**

		Hemen hemen hiçbir zaman	Bazen	Çok zaman	Hemen her zaman
1.	Genellikle keyfim yerindedir	(1)	(2)	(3)	(4)
2.	Genellikle çabuk yorulurum	(1)	(2)	(3)	(4)
3.	Genellikle kolay ağlarım	(1)	(2)	(3)	(4)
4.	Başkaları kadar mutlu olmak isterim	(1)	(2)	(3)	(4)
5.	Çabuk karar veremediğim için fırsatları kaçıırım	(1)	(2)	(3)	(4)
6.	Kendimi dinlenmiş hissediyorum	(1)	(2)	(3)	(4)
7.	Genellikle sakin, kendine hakim ve soğukkanlıyım	(1)	(2)	(3)	(4)
8.	Güçlüklerin yenemeyeceğim kadar biriktiğini hissederim	(1)	(2)	(3)	(4)
9.	Önemsiz şeyler hakkında endişelenirim	(1)	(2)	(3)	(4)
10.	Genellikle mutluyum	(1)	(2)	(3)	(4)
11.	Her şeyi ciddiye alır ve endişelenirim	(1)	(2)	(3)	(4)
12.	Genellikle kendime güvenim yoktur	(1)	(2)	(3)	(4)
13.	Genellikle kendimi emniyette hissederim	(1)	(2)	(3)	(4)
14.	Sıkıntılı ve güç durumlarla karşılaşmaktan kaçınırım	(1)	(2)	(3)	(4)
15.	Genellikle kendimi hüzünlü hissederim	(1)	(2)	(3)	(4)
16.	Genellikle hayatımdan memnunum	(1)	(2)	(3)	(4)
17.	Olur olmaz düşünceler beni rahatsız eder	(1)	(2)	(3)	(4)
18.	Hayal kırıklıklarımı öylesine ciddiye alırım ki hiç unutamam	(1)	(2)	(3)	(4)
19.	Aklı başında ve kararlı bir insanım	(1)	(2)	(3)	(4)
20.	Son zamanlarda kafama takılan konular beni tedirgin ediyor	(1)	(2)	(3)	(4)

## APPENDIX 5: PERMISSION TO USE INVENTORY

03.11.2022

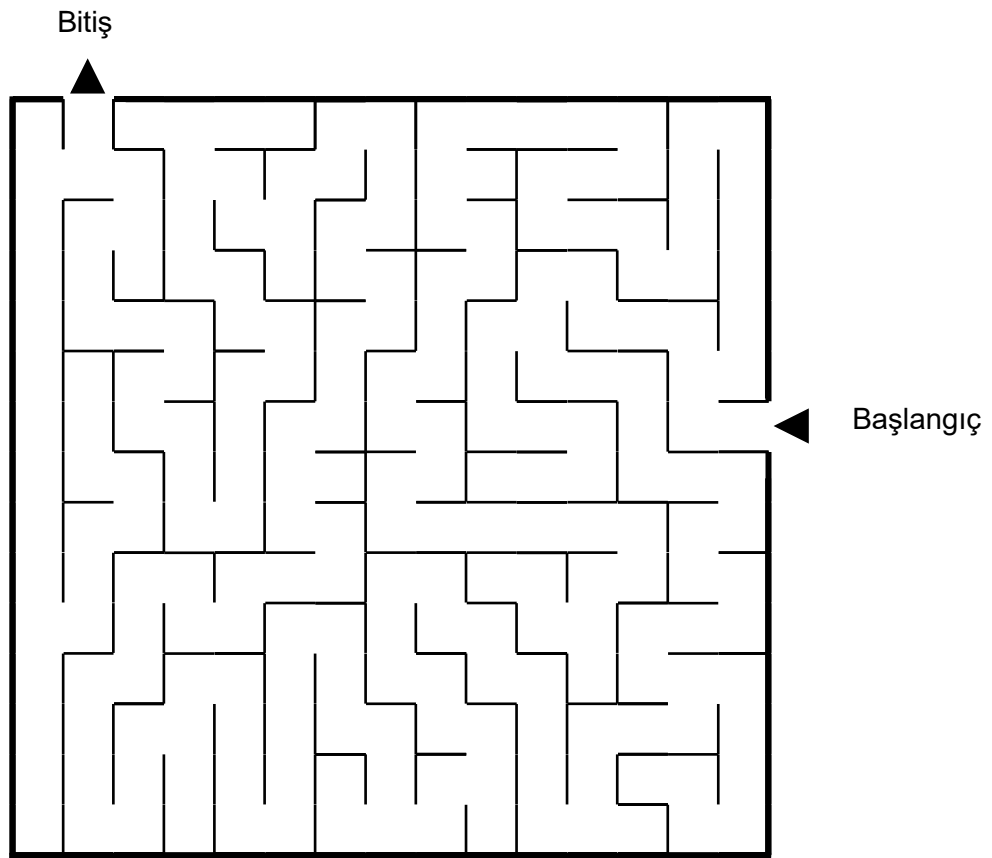
### **İlgili Kuruma,**

Prof Dr. Necla Öner, "Sürekli Durumluk / Sürekli Kaygı Envanteri" ile ilgili tüm haklarını YÖRET Vakfına devretmiştir. Ölçek kullanımı için izin yazıları Prof. Dr. Necla Öner adına YÖRET Vakfı Başkanı Sibel Erenel imzası ile vakıf tarafından göndermektedir.

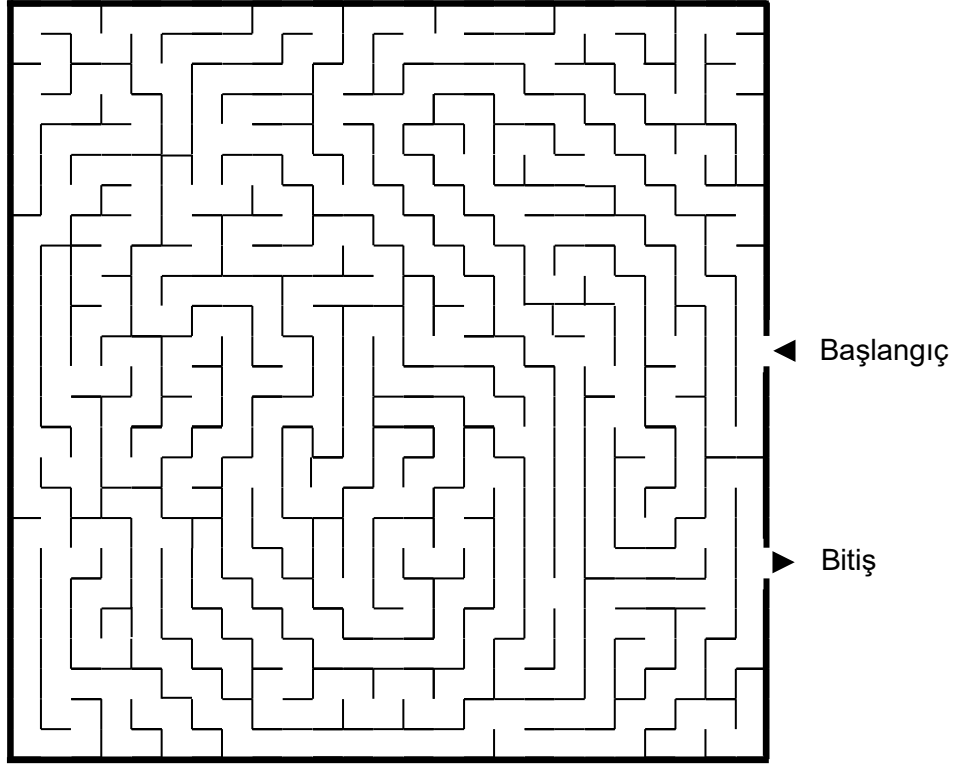
Başkent Üniversitesi'nde tez çalışması yapan Zeynep İkra Aldemir'in, "*The Effects of Online Learning and Anxiety on Memory Performance*" konulu yüksek lisans tezinde "Sürekli Durumluk / Sürekli Kaygı Envanteri" ni kullanmasına izin veriyorum.

Prof. Dr. Necla Öner

## APPENDIX 6: SOLVABLE LABYRINTH



## APPENDIX 7: UNSOLVABLE LABYRINTH



## APPENDIX 8: LOGICAL MEMORY SUB-TEST STORY A

Bir okul yemekhanesinde aşçı olarak çalışan Doğu Karadenizli Ayşe Öztürk önceki gece Hükümet Caddesinde önünün kesildiğini ve 560 milyonunun çalındığını Merkez Karakoluna bildirdi. Kadının dört küçük çocuğu vardı, kiranın ödenmesi gerekiyordu ve iki gündür hiçbir şey yememişlerdi. Kadının haline acıyan polisler onun için aralarında para topladılar.

Question: Dinlediğiniz hikaye ile ilgili hatırladıklarınızı aşağıya yazınız.

.....

	0 veya 1 puan	
A hikayesi	Hikaye Bölümü	Puanlama Kriteri
Bir okul		Okulu söylemesi
yemekhanesinde		Yemekhaneyi söylemesi
aşçı olarak		Ahçı veya bu kelimenin değişik formlarını söylemesi
Çalışan		Kadının çalıştığını söylemesi
Doğu		Doğuyu söylemesi (herhangi bir bağlamda)
Karadenizli		Karadeniz (herhangi bir bağlamda) söylemesi
Ayşe		Ayşe ismini söylemesi
Öztürk		Öztürk'ü söylemesi
önceki gece		Önünün kesilmesinden önceki gece olduğunu söylemesi
Hükümet Caddesinde		Hükümet caddesini söylemesi (herhangi bir bağlamda)
önünün kesildiğini		Önünün kesildiğini söylemesi (bıçak ya da silahla)
ve 560 milyonunun		Kadından 490 dan çok 600 den az bir miktarın alındığını belirtilmesi
çalındığını		Hırsızlığın söylenmesi
Merkez		Merkezi söylemesi
Karakoluna		Karakol veya ona benzer bir kelimeyi söylemesi
bildirdi.		Yetkili kişiye ifade verdiğini söylemesi (herhangi bir bağlamda)
kadının dört		Dördün söylenmesi
küçük çocuğu vardı,		Çocuk ya da benzer bir kelimenin söylenmesi
kiranın ödenmesi gerekiyordu		Kiranın ödenmesi gerektiğini söylemesi
ve iki gündür		İki günün söylenmesi
hiçbir şey yememişlerdi		Çocuklarının veya ailesini aç olduğunu söylemesi
kadının haline acıyan		Kadının hikayesinden etkilenildiğini söylemesi
polisler		Polis veya polisleri söylemesi
onun için		Kadın veya çocukları için para topladığının söylenmesi
aralarında para topladılar.		Para toplandığının söylenmesi

## APPENDIX 9: LOGICAL MEMORY SUB-TEST STORY B

Zonguldaklı Ahmet Demir Pazartesi akşamı saat 06.00' da evden çıkmak için giyinirken televizyon seyrediyordu. Aniden hava durumu haberiyle izlediği filme ara verildi. Kar fırtınasının bulunduğu bölgeye doğru iki ya da üç saat içinde ulaşacağını ve fırtınanın sabaha kadar devam edeceğini spiker bildirdi. Yoğun tipiyle gelen kar yağışının 60 cm. ye ulaşacağını ve 15 dereceye kadar sıcaklığın düşeceğini söyledi. Ahmet evde kalmaya karar verdi. Paltosunu çıkardı. Koltuğuna oturdu ve seyrettiği filmi izlemeye devam etti.

Question: Dinlediğiniz hikaye ile ilgili hatırladıklarınızı aşağıya yazınız.

.....

	0 Veya 1 puan	
B hikayesi	Hikaye Bölümü	Puanlama Kriteri
Zonguldaklı		Zonguldak'ı söylemesi
Ahmet		Ahmet ismini söylemesi
Demir		Demir'i söylemesi
Pazartesi		Pazartesiyi söylemesi
akşamı		Akşamı söylemesi (herhangi bir bağlamda)
Saat 06:00'da		06:00' yı söylemesi
evden çıkmak için		Evden çıkmayı söylemesi
giyinirken		Giyinmeyi söylemesi
televizyon seyrediyordu.		Televizyon seyrettiğini söylemesi
Aniden hava durumu haberiyle		Hava durumu hakkında bir haber olduğunu söylemesi
izlediği filme ara verildi.		Normal program akışına ara verildiğinin söylemesi
Kar fırtınasının		Kar fırtınası uyarısının olduğunu söylemesi
bulunduğu bölgeye doğru		Kar fırtınasının geldiğini söylemesi
iki ya da üç saat içinde ulaşacağını		Yaklaşık 2 ya da 3 saatlik bir zamanı söylemesi
ve fırtınanın sabaha kadar devam		Fırtınanın sabaha kadar devam edeceğini söylemesi
edeceğini		
spiker bildirdi.		Fırtına haberinin biri tarafından bildirildiğini söylemesi
Yoğun tipiyle gelen		Yoğun tipinin geleceğini söylemesi
kar yağışının		Kar yağışını söylemesi
60 cm. ye ulaşacağını ve		60 cm 'i söylemesi
15 derece kadar		15 derece kadar azalacağını söylemesi
sıcaklığın düşeceğini söyledi.		Sıcaklığın azalacağını söylemesi
Ahmet evde kalmaya karar verdi.		Adamın evde kalmaya karar verdiğini söylemesi
Paltosunu çıkardı.		Adamın paltosunu ( vb.) çıkarttığını söylemesi
Koltuğuna oturdu		Adamın oturduğunu söylemesi
ve seyrettiği filmi izlemeye devam		Film izlendiğini söylemesi
etti.		

## APPENDIX 10: MANIPULATION CHECK QUESTIONS

- 1- Arařtırmaya bilgisayar üzerinden mi katıldınız? Evet / Hayır
- 2- Arařtırma sırasında kameranızı açtınız mı? Evet / Hayır
- 3- Arařtırmacı tarafından verilen yönergelere uyamamanızı sađlayan bir durum oldu mu?
- 4- Yönergeye uyamamanızı sađlayan durumu belirtiniz.....
- 5- Arařtırma esnasında bulunduđunuz ortamda dikkat dađıtıcı bir durum oldu mu?
- 6- Dikkat dađıtıcı durumu belirtiniz.....
- 7- Bugün ierisinde sizi normalden fazla kaygılandıran bir durum oldu mu? Evet / Hayır
- 8- Bugün sizi normalden fazla kaygılandıran durumu belirtiniz.....
- 7- Yakın zamanda bir kayıp yařadınız mı? Evet / Hayır

## **APPENDIX 11: POSSIBLE RESEARCH DATES**

Araştırmanın bir sonraki aşaması Zoom toplantısı üzerinden olacaktır. Bir sonraki sayfada seçeceğiniz gün ve saate göre e-mail adresinize Zoom linki gönderilecektir. Toplantı linkinin gönderilmesini istediğiniz mail adresinizi yazınız.

Zoom toplantısı yaklaşık 15 dakika sürecektir. Aşağıda toplantı gün ve saatleri verilmiştir. Lütfen size en uygun olan seçenektan en az uygun olan seçeneğe doğru sıralama yapın. Size en uygun olan seçeneği 1. sıraya sürüklemeniz gerekmektedir. Sıralamanız göz önünde bulundurularak uygun olan toplantı saatine yerleştirileceksiniz.

24 Ekim Pazartesi Saat 19:00

24 Ekim Pazartesi Saat 20:00

25 Ekim Salı Saat 19:00

25 Ekim Salı Saat 20:00

## APPENDIX 12: E-MAIL

Merhaba! Ben Bařkent Üniversitesi klinik psikoloji yüksek lisans programından Zeynep İkra Aldemir. Arařtırmaya katılmayı kabul ettiđiniz için teřekkür ederim. **25 Ekim Salı günü saat 19:00**'da ařađıda bulunan linkten Zoom toplantısına girmeniz beklenmektedir. Arařtırma günü size tekrar hatırlatıcı bir e-posta gönderilecektir. Fakat e-postalar gereksiz (spam) kutunuza düşebilir. Lütfen spam kutunuzu kontrol etmeyi unutmayın.

Toplantıya katılırken adınızı yazmanız gerekmektedir. Dilerseniz soyadınızı yazmayabilirsiniz. Arařtırmaya çalışır kameralı bir bilgisayar üzerinden girmeniz gerekmektedir. Mikrofonunuzu açmanız gerekmeyecektir.

Eđer gelememe durumunuz olursa arařtırmanın sağlıklı yürütülebilmesi için lütfen önceden bildirin.

İyi günler.

(link)

### **APPENDIX 13: REMINDER E-MAIL**

Tekrar merhaba! Ben Bařkent Üniversitesi klinik psikoloji yüksek lisans programından Zeynep İkra Aldemir. Arařtırmaya katılmayı kabul ettiđiniz için teřekkür ederim. **Bugün saat 20:00’de** ařađıda bulunan linkten Zoom toplantısına girmeniz beklenmektedir. Toplantıya katılırken adınızı yazmanız gerekmektedir. Dilerseniz soyadınızı yazmayabilirsiniz. Arařtırmaya alıřır kameralı bir bilgisayar üzerinden girmeniz gerekmektedir.

Eđer atandıđınız toplantı gün ve saatinde deđişiklik yapmanız gerekiyorsa benimle iletişime geçebilirsiniz. Katılımınız çok kıymetli.

İyi günler.

(link)

#### **APPENDIX 14: REMINDER E-MAIL (AN HOUR BEFORE)**

Tekrar merhaba! Ben Bařkent Üniversitesi klinik psikoloji yüksek lisans programından Zeynep İkra Aldemir. Arařtırmaya katılmayı kabul ettiđiniz için teřekkür ederim. **Bugün saat 20:00’de** ařađıda bulunan linkten Zoom toplantısına girmeniz beklenmektedir. Toplantıya katılırken adınızı yazmanız gerekmektedir. Dilerseniz soyadınızı yazmayabilirsiniz. Arařtırmaya alıřır kameralı bir bilgisayar üzerinden girmeniz gerekmektedir.

İyi günler.

(link)

## APPENDIX 15: INSTRUCTIONS FOR CAMERA ON-ANXIETY GROUP

Merhaba öncelikle arařtırmaya katıldığınız için herkese teřekkürler. Ben İkra. Aramızda ... var. Bugün linkleri yollamakta bana yardımcı olacak. řimdi herkesin kameralarını açmasını istiyorum. Teřekkürler. Arařtırma boyunca kameranız açık, mikrofonunuz kapalı kalacak. Ekranınızda kendiniz, ben ve diđer katılımcıların görüntüsü olmalı. Sağ üstte görüntüleden galeri görünümünü seçmelisiniz. Lütfen bu ayarı uygulama boyunca deđiřtirmeyin. Arařtırma boyunca sohbet kısmından linkler yollanacak. Her yollanan linkte öğrenci numaranızı girmeniz için bir soru olacak. Lütfen her ankette öğrenci numaranızı girin ve yanıtlarınız kaydedildi yazısını görene kadar devam edin. Arařtırma boyunca bir soru ya da sorun için lütfen mikrofonunuzu açık konuşmayın. Soru ya da sorunları daha sonra bana iletebilirsiniz. Sizlerin dikkatinin dađılmaması için kimsenin oturumu bölmemesini rica ediyorum.

Katıldığınız bu arařtırmanın amacı üniversite öğrencilerinin genel zihinsel (biliřsel) işlevleri hakkında bilgi toplamaktır. Bu amaca uygun olarak size deđiřik zihinsel (biliřsel) işlevleri deđerlendiren bir dizi görev uygulanacaktır. Bu görevlerden ilki genel zihinsel beceriniz hakkında bilgi verecek olan kısa ve kolay bir labirent görevidir.

Bu labirent görevi, psikoloji literatüründe genel zihinsel yeteneđin göstergesi olarak sıklıkla kullanılan bir ölçümdür. Labirent görevinin kısa sürede tamamlanması, yani labirentten kısa sürede çıkmak genel zihinsel yeteneđinizin bir göstergesi olacaktır. Yapılan arařtırmalar, üniversite öğrencilerinin ortalama 1 dakikada labirentten kolayca çıkabildiklerini göstermektedir.

Bu labirentten çıkmak için 2 dakika süreniz olacak. Geçtiğiniz yolları gözünüzle ya da parmađınızla takip edebilirsiniz. Labirente başlangıç okundan başlayıp bitiş okundan çıkmalısınız. Lütfen çıkış okundan başlamayın. Bu görev sizin için oldukça kolay olacaktır, ancak yine de olabildiđince hızlı olmaya çalışın. Hazırsanız chat kısmından link atılıyor. Unutmayın kısıtlı süreniz olacak. Tıklayabilirsiniz. Başlayın. Süreniz azaldı. Acele edin.

Muhtemelen süreniz bitmiştir. Çok kolay bir labirent görevi idi. řu ana kadar katılan herkes kolaylıkla yaptı. Bakalım bundan sonraki testlerde nasıl bir performans göstereceksiniz.

Şimdi size bir hikaye okuyacağım. Siz dikkatle dinleyeceksiniz. Bittikten sonra chat kısmından gelen linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı ilgili kısma yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldığı.

After reading is over: Şimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

After writing is over: Yanıtlarınız kaydedildi yazısını gördükten sonra şimdi tekrar Zoom ekranını açmanızı istiyorum. Ekranınızda kendiniz, ben ve diğer katılımcılar olacak. Şimdi bir başka hikayeyi okuyacağım. Yine dikkatle dinleyin. Bittikten sonra yollanacak olan linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldığı.

After reading is over: Şimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

## **APPENDIX 16: INSTRUCTIONS FOR CAMERA OFF-ANXIETY GROUP**

Merhaba öncelikle arařtırmaya katıldığınız için herkese teřekkürler. Ben İkra. Aramızda ... var. Bugün linkleri yollamakta bana yardımcı olacak. řimdi herkesin kameralarını kapatmasını istiyorum. Teřekkürler. Arařtırma boyunca kameranız ve mikrofonunuz kapalı kalacak. Ekranınızda yalnızca ben olacađım. Lütfen bu ayarı uygulama boyunca deđiřtirmeyin. Arařtırma boyunca sohbet kısmından linkler yollanacak. Her yollanan linkte öğrenci numaranızı girmeniz için bir soru olacak. Lütfen her ankette öğrenci numaranızı girin ve yanıtlarınız kaydedildi yazısını görene kadar devam edin. Arařtırma boyunca bir soru ya da sorun için lütfen mikrofonunuzu açıp konuşmayın. Soru ya da sorunları daha sonra bana iletebilirsiniz. Sizlerin dikkatinin dađılmaması için kimsenin oturumu bölmemesini rica ediyorum.

Katıldığınız bu arařtırmanın amacı üniversite öğrencilerinin genel zihinsel (biliřsel) işlevleri hakkında bilgi toplamaktır. Bu amaca uygun olarak size deđiřik zihinsel (biliřsel) işlevleri deđerlendiren bir dizi görev uygulanacaktır. Bu görevlerden ilki genel zihinsel beceriniz hakkında bilgi verecek olan kısa ve kolay bir labirent görevidir.

Bu labirent görevi, psikoloji literatüründe genel zihinsel yeteneđin göstergesi olarak sıklıkla kullanılan bir ölçümdür. Labirent görevinin kısa sürede tamamlanması, yani labirentten kısa sürede çıkmak genel zihinsel yeteneđinizin bir göstergesi olacaktır. Yapılan arařtırmalar, üniversite öğrencilerinin ortalama 1 dakikada labirentten kolayca çıkabildiklerini göstermektedir.

Bu labirentten çıkmak için 2 dakika süreniz olacak. Geçtiđiniz yolları gözünüzle ya da parmađınızla takip edebilirsiniz. Labirente başlangıç okundan başlayıp bitiş okundan çıkmalısınız. Lütfen çıkış okundan başlamayın. Bu görev sizin için oldukça kolay olacaktır, ancak yine de olabildiđince hızlı olmaya çalışın. Hazırsanız chat kısmından link atılıyor. Unutmayın kısıtlı süreniz olacak. Tıklayabilirsiniz. Başlayın. Süreniz azaldı. Acele edin.

Muhtemelen süreniz bitmiştir. Çok kolay bir labirent görevi idi. řu ana kadar katılan herkes kolaylıkla yaptı. Bakalım bundan sonraki testlerde nasıl bir performans göstereceksiniz.

Şimdi size bir hikaye okuyacağım. Siz dikkatle dinleyeceksiniz. Bittikten sonra yollayacağım linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı ilgili kısma yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldığı.

After reading is over: Şimdi sohbet kısmından yolladığım linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

After writing is over: Yanıtlarınız kaydedildi yazısını gördükten sonra şimdi tekrar Zoom ekranını açmanızı istiyorum. Ekranınızda ben olacağım. Şimdi bir başka hikayeyi okuyacağım. Yine dikkatle dinleyin. Bittikten sonra yollanacak olan linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldığı.

After reading is over: Şimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

## APPENDIX 17: INSTRUCTIONS FOR CAMERA ON-NO ANXIETY GROUP

Merhaba öncelikle arařtırmaya katıldığınız için herkese teřekkürler. Ben İkra. Aramızda ... var. Bugün linkleri yollamakta bana yardımcı olacak. řimdi herkesin kameralarını açmasını istiyorum. Teřekkürler. Arařtırma boyunca kameranız açık, mikrofonunuz kapalı kalacak. Ekranınızda kendiniz, ben ve diđer katılımcıların görüntüsü olmalı. Sağ üstte görüntüleden galeri görünümünü seçmelisiniz. Lütfen bu ayarı uygulama boyunca deđiřtirmeyin. Arařtırma boyunca sohbet kısmından linkler yollanacak. Her yollanan linkte öğrenci numaranızı girmeniz için bir soru olacak. Lütfen her ankette öğrenci numaranızı girin ve yanıtlarınız kaydedildi yazısını görene kadar devam edin. Arařtırma boyunca bir soru ya da sorun için lütfen mikrofonunuzu açık konuşmayın. Soru ya da sorunları daha sonra bana iletebilirsiniz. Sizlerin dikkatinin dađılmaması için kimsenin oturumu bölmemesini rica ediyorum.

Katıldığınız bu arařtırmanın amacı üniversite öğrencilerinin genel zihinsel (biliřsel) işlevleri hakkında bilgi toplamaktır. Bu amaca uygun olarak size deđiřik zihinsel (biliřsel) işlevleri deđerlendiren bir dizi görev uygulanacaktır.

Bu görevlere geçmeden önce, başka bir arařtırmada kullanmak üzere geliřtirdiđimiz bir labirent görevine son halini vermemiz için bize yardımcı olmanızı istiyorum.

Bu labirentten çıkmak için süre sınırlamanız yok. Chat kısmından labirentin linki atılıyor. Ben “Bařlayın” dediđimde bařlayın. Lütfen geçtiđiniz yolları gözünüzle ya da parmađınızla takip edin. Labirente bařlangıç okundan bařlayıp bitiş okundan çıkmalısınız. Lütfen çıkış okundan bařlamayın. Bittikten sonra ekranda ilerleyip öğrenci numaranızı gireceksiniz. Yanıtlarınız kaydedildi yazısını görene kadar devam edin. Hazırsanız bařlayın (in a calm voice).

Yardımlarınız için teřekkür ederiz. Artık asıl çalışmamız için uygulanması gereken testlere geçebiliriz.

řimdi size bir hikaye okuyacađım. Siz dikkatle dinleyeceksiniz. Bittikten sonra yollayacađım linke gireceksiniz ve hikaye ile ilgili hatırladıđlarınızı ilgili kısma yazacaksınız.

After reading is over: řimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıđlarınızı ilgili kısma yazın.

After writing is over: Yanıtlarınız kaydedildi yazısını gördükten sonra řimdi tekrar Zoom

ekranını açmanızı istiyorum. Ekranınızda kendiniz, ben ve diđer katılımcılar olacak. Őimdi bir başka hikayeyi okuyacađım. Yine dikkatle dinleyin. Bittikten sonra yollanacak olan linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldıđı.

After reading is over: Őimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

## APPENDIX 18: INSTRUCTIONS FOR CAMERA OFF-NO ANXIETY GROUP

Merhaba öncelikle arařtırmaya katıldığınız için herkese teřekkürler. Ben İkra. Aramızda ... var. Bugün linkleri yollamakta bana yardımcı olacak. řimdi herkesin kameralarını kapatmasını istiyorum. Teřekkürler. Arařtırma boyunca kameranız ve mikrofonunuz kapalı kalacak. Ekranınızda yalnızca ben olacađım. Lütfen bu ayarı uygulama boyunca deđiřtirmeyin. Arařtırma boyunca sohbet kısmından linkler yollanacak. Her yollanan linkte öğrenci numaranızı girmeniz için bir soru olacak. Lütfen her ankette öğrenci numaranızı girin ve yanıtlarınız kaydedildi yazısını görene kadar devam edin. Arařtırma boyunca bir soru ya da sorun için lütfen mikrofonunuzu açıp konuşmayın. Soru ya da sorunları daha sonra bana iletebilirsiniz. Sizlerin dikkatinin dađılmaması için kimsenin oturumu bölmemesini rica ediyorum.

Katıldığınız bu arařtırmanın amacı üniversite öğrencilerinin genel zihinsel (biliřsel) işlevleri hakkında bilgi toplamaktır. Bu amaca uygun olarak size deđiřik zihinsel (biliřsel) işlevleri deđerlendiren bir dizi görev uygulanacaktır.

Bu görevlere geçmeden önce, başka bir arařtırmada kullanmak üzere geliřtirdiđimiz bir labirent görevine son halini vermemiz için bize yardımcı olmanızı istiyorum.

Bu labirentten çıkmak için süre sınırlamanız yok. Chat kısmından labirentin linki atılıyor. Ben “Bařlayın” dediđimde bařlayın. Lütfen geçtiđiniz yolları gözünüzle ya da parmađınızla takip edin. Labirente bařlangıç okundan bařlayıp bitiř okundan çıkmalısınız. Lütfen çıkıř okundan bařlamayın. Bittikten sonra ekranda ilerleyip öğrenci numaranızı gireceksiniz. Yanıtlarınız kaydedildi yazısını görene kadar devam edin. Hazırsanız bařlayın (in a calm voice).

Yardımlarınız için teřekkür ederiz. Artık asıl çalışmamız için uygulanması gereken testlere geçebiliriz.

řimdi size bir hikaye okuyacađım. Siz dikkatle dinleyeceksiniz. Bittikten sonra chat kısmından gelen linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı ilgili kısma yazacaksınız.

After reading is over: řimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

After writing is over: Yanıtlarınız kaydedildi yazısını gördükten sonra řimdi tekrar Zoom ekranını açmanızı istiyorum. Ekranınızda ben olacađım. řimdi bir başka hikayeyi

okuyacađım. Yine dikkatle dinleyin. Bittikten sonra yollanacak olan linke gireceksiniz ve hikaye ile ilgili hatırladıklarınızı yazacaksınız. Lütfen not almayın. Önemli olan aklınızda ne kadar kaldığı.

After reading is over: Şimdi sohbet kısmından yollanan linke tıklayın ve hikayeye ilgili hatırladıklarınızı ilgili kısma yazın.

## **APPENDIX 19: DEBRIEF FORM**

Araştırmaya katıldığınız için teşekkür ederim! Bu çalışmadan keyif aldığınızı umuyorum. Bu form, bu araştırmanın neden yapıldığıyla ilgili ayrıntılı bilgi vermek amacıyla sunulmaktadır. Lütfen bu araştırmayla ilgili her türlü soru ve yorumlarınızı bizimle paylaşmaktan çekinmeyin.

Katıldığınız bu araştırma Başkent Üniversitesi Klinik Psikoloji Bölümü öğrencisi Zeynep İkra Aldemir tarafından yapılmıştır.

Çalışmanın amacı Zoom toplantılarında kameraların açık veya kapalı olmasının ve kaygının; öğrenme üzerindeki etkisini incelemektir. Araştırma dört grup ile yürütülmüştür. Bir grupta katılımcıların kameraları açıktır ve kaygı yaratılmıştır. İkinci grupta katılımcıların kameraları açıktır fakat kaygı yaratılmamıştır. Üçüncü grupta aktif konuşmacı hariç, katılımcıların kameraları kapalıdır ve kaygı yaratılmıştır. Dördüncü grupta ise aktif konuşmacı hariç, katılımcıların kameraları kapalıdır ve kaygı yaratılmamıştır.

Kaygı yaratılmak istenen gruplarda çözümü olmayan bir labirent verilip, bu labirentin çok kolay olduğu söylenmiştir. Bu labirentin aslında çözümü yoktur. Zihinsel becerilerinizin bir göstergesi değildir.

**Lütfen bu araştırmanın içeriği, amacı ya da koşullarıyla ilgili hiçbir bilgiyi kimseyle paylaşmayın. Araştırmaya katılanların bilgi sahibi olmadan katılması gerekmektedir.**

Önceden de belirtildiği gibi, bu araştırmaya katılımınız tamamen gönüllülük esasına dayanmaktadır. Bu formu okuduktan sonra araştırmadan çekilmek istediğiniz takdirde araştırma sonucu elde edilen tüm bilgileriniz imha edilecektir. Araştırmadan çekilmeniz dolayısıyla size bir yaptırım uygulanmayacaktır.

Aşağıda verilen e-mail adresinden bize ulaşarak bu araştırmayla ilgili tüm sorularınızı yöneltebilirsiniz.