FACTORS AFFECTING COURSE ATTENDANCE IN DISTANCE EDUCATION

UZAKTAN EĞİTİMDE DERSE DEVAMI ETKİLEYEN FAKTÖRLER*

Ufuk GÜVEN
Düzce Üniversitesi
Temel Eğitim Bölümü
ufukguven@duzce.edu.tr
ORCID: 0000-0003-1977-6426

Sedat KARAÇAM
Düzce Üniversitesi
Matematik ve Fen Bilimleri Eğitimi Bölüm
sedatkaracam@duzce.edu.tr
ORCID: 0000-0001-7610-3848

Behlül Bilal SEZER
Düzce Üniversitesi
Temel Eğitim Bölümü
behlulbilalsezer@duzce.edu.tr
ORCID: 0000-0003-4287-7460

ÖZ

Okul öncesinden üniversiteye kadar öğrencilerin öğrenme ve akademik başarısını etkileyen en önemli faktörlerden bir tanesi derse katılımdır. Derse katılım COVID-19 pandemisi nedeniyle karşılaştığımız acil uzaktan öğretim koşullarında daha da önemlidir. Teknolojinin gelişmesiyle birlikte uzaktan eğitime geçiş başlamış ve bu sistemin kendine has özellikleri öğrenci katılımını da etkilemektedir. Bu çalışmanın amacı uzaktan eğitimde öğrenci katılımını etkileyen faktörleri belirlemektir. Nitel araştırma yöntemlerinden biri olan keşfedici durum çalışması deseninin kullanıldığı bu çalışmada yarı yapılandırılmış görüşme tekniği kullanılmıştır. Bu araştırmanın çalışma grubunu farklı üniversitelerden on beş fen bilgisi öğretmen adayı oluşturmuştur. İçerik analizi yöntemi ile incelenen öğrenci görüşme formları, katılımı etkileyen faktörlerin iç ve dış faktörler olarak kategorize edildiğini ortaya koymuştur. İç faktörler; inançlar, ilgi/merak, kaygı, kişisel kazanç gibi bilişsel ve fiziksel etmenler olarak bulunurken, dış faktörler ise eğitmenler, ders programları, ev ortamları, akran ilişkileri ve eğitim teknolojilerinin özellikleri olarak bulunmuştur.

ABSTRACT

From pre-school to university, one of the most important factors affecting students' learning and academic success is attendance. It is even more important in emergency distance teaching conditions that we are facing due to COVİD-19 pandemics. With the development of technology, the transition to distance education has started, and the unique features of this system also affect student attendance. This study aims to find the factors affecting student attendance in distance education. The study utilized exploratory case study design, on of the qualitative research methods. Semi-structured interview form was used as a data collection tool. Fifteen prospective science teachers from different universities participated this study. The student interview forms, which were examined with the content analysis method, revealed that the factors that affect attendance are categorized as internal and external factors. While internal factors are affective factors such as beliefs, interest/curiosity, and anxiety, cognitive factors such as personal gains, and physical factors such as personal health problems; external factors are instructors, course program, home environment, peer relations, and educational technology.

Introduction

Technology arises from the needs of human beings; this technology is affected by the culture of human beings as well as affecting them in all aspects and form the basis to create new technology. This dynamic interaction between technology and society guarantees technological progress because technologies are the products of human imagination and creativity. Technology has changed and will continue changing customs of centuries. One of the changing customs is in the education system. Until 20 years ago, there was no need to name the current education system. However, educators have started to define the previously used education system as traditional learning or face-to-face learning with the online education system introduced by the technology. Although the history of online education is not very new, it is a method that is not used very often, especially in Turkey. At very few universities, some courses were offered to students in the online model. However, with the COVID-19 pandemic, online education, also called emergency remote teaching (Hodges, et al., 2020), has started to be widely used all over the world and in Turkey to offer both theoretical and practical courses. When the first decision on online education was made, all stakeholders of education process had many concerns since that was a big shift in education. This concern was about whether the online system would replace face-to-face learning and whether the technical infrastructure would be sufficient. Especially the teachers' and parents' concerns about whether the online system would replace face-to-face learning were not unwarranted because, in the online system, the student cannot make eye contact with his/her friends or teacher and cannot communicate without words. This problem was similar for the teacher. Teachers could "dance" effectively with their students in face-to-face learning, but in online education, teachers were asked to "dance" with three people (teachers, students, and IT technologies). The three-person dance was unfamiliar to teachers, and they had to use both arms more actively than before. Under these concerns, online education began synchronously in Turkey, and new problems arose in this new form of education, which teachers, academics, students, and parents are not accustomed to.

Connection problems, motivating students to learn, and ensuring that students attend classes are just a few of these problems. Educators stated that students do not attend classes regularly, especially after the online education has begun (Goldstein, Popescu & Hannah-Jones, 2020). In April 2020, when the pandemic started and online education began, more than half of the students in the United States did not continue online education regularly. This number was even higher in low socioeconomic environments (Goldstein, Popescu & Hannah-Jones, 2020). That led education managers to seek a solution to this problem. Attendance can be defined as effective student participation in the learning process (Christenson, Reschly & Wylie, 2012). Various studies have been carried out to ensure that students attend online courses regularly. Some of these studies have revealed that students living in rural areas with low socioeconomic levels are unable to attend classes due to technical reasons such as lack of devices or lack of internet connection, and these problems have been tried to be solved. However, even if one of the most crucial factors affecting attendance is technical deficiencies, focusing on this point alone is not enough to plan the future of online education. Technical deficiencies are just the tip of the iceberg. In addition to technical infrastructure, teachers, students, parents, and education managers are the factors in the online education process. In this regard, positive and negative factors affecting the attendance of undergraduate fourth-grade prospective science teachers who attended all courses in an online activity that lasted for five days were examined.

Theoretical Framework

From preschool to senior year of university, the most important factor affecting students' learning and academic success is attendance. In this respect, many studies have been carried out on student attendance. As a result of these studies, it has been revealed that student attendance is related to many variables (Sever, Ulubey, Toraman & Türe; 2014). In a study conducted by Unal (1981), it was stated that students attend the course if the instructors choose the appropriate methods. In other studies, it was found that learning environments and student characteristics besides instructors were effective in student attendance (Adıyaman, 2008; Agile, 2008; Sarıtepeci, 2012). These studies are generally aimed at student attendance in face-to-face learning. On the other hand, a student's desire to attend online courses is related to how satisfied they are with the process. When various studies aimed at determining student satisfaction are examined, it was seen that they are usually used to measure the elements that students are satisfied with (Baikal et al., 2002; Tütüncü & Ipekgil Dogan, 2003) or

determine the differences in student satisfaction in different education systems (Ev, 2005; Ayhan & Tunacan, 2006). It is also discussed that the use of online communication tools in both traditional and online learning environments can positively affect attendance (Harasim, 1989; Leidner & Jarvenpaa, 1995). Besides, when student attendance in online courses increases, their satisfaction increases (Alavi & Dufner, 2005) and attendance rates change positively (Rovai, 2002). As a result of these studies, it is seen that students are very motivated to learn when they attend online courses (Hrastinki, 2008). Also, it is known that the level of interaction between students and education is quite high in the online education process. According to the results of the study conducted by Bilgiç, Dogan, and Seferoglu (2011), it was determined that the three crucial factors affecting student success in online education programs were pedagogical and technical competencies of instructors and advances in online media technologies, respectively. Therefore, to establish a more effective online education system, instructors must be equipped with sufficient pedagogical and technical knowledge (Kim & Bonk, 2006). In the study of Volery and Lord (2000), they argued that distance education has become an even more active process by going beyond traditional learning through the digital technologies used in online education. In this study, which is mentioned that the internet is one of the most powerful tools that can be used in education, it is seen that with some technological developments in education; it becomes crucial for instructors to improve their technology use skills. Efficient and correct use of technology by teachers is as important as the creation of technology infrastructure. According to the results of Ertürk's (2008) study, the reasons for the lack of effective use of technology in the teaching process are attributed to the lack of technological infrastructure in educational institutions and the inability of teachers to use the technology at the desired level. According to the research results, enabling prospective teachers to take a more positive attitude towards technology and engage in activities that will improve their ability to use technology for educational purposes will also increase the quality of education.

The Study

Previous studies have shown that studies have been carried out on students' attendance and participation in face-to-face learning (Kaplan, 2009; Saritepeci & Yildiz, 2014; Eroglu & Kalayci, 2020). Although the factors affecting attendance in face-to-face learning give the outlines of attendance in online education, it cannot be expected to give all the factors that affect attendance in online education, which is very different from face-to-face learning. In face-to-face learning, the individual is physically in the classroom; it is known by his/her family that s/he goes to school at a certain time, and an environment is created in which the individual spends time with his/her friends at the school. However, in online education, there is none of these. In other words, we cannot expect the internal and external factors affecting attendance in online education to be the same. In contrast, it is noted that there are few studies aimed at identifying factors affecting student attendance in online education, whose nature is quite different from face-to-face learning. For this reason, it is aimed to eliminate this gap in the literature by trying to determine the factors affecting the attendance of the prospective teachers who attend the online activity, which includes ten lessons per day for five days, with no absenteeism.

As a result of this study, positive examples and factors that triggered the continuation of these positive examples were shown as the prospective teachers who participated in the study continued to attend the courses. In this respect, the reasons for students who do not attend classes are not the focus of this study. Therefore, the situation discussed in this study should be considered as a positive example. Within the findings obtained from this positive example, suggestions were made for the online pre-course, course, and post-course positions of the teachers at the end of the study. Parents and education managers are offered suggestions for preparing and maintaining the online course programs. The following question is the research question of this study: What are the factors that affect prospective science teachers' regular attendance online classes? The goal of this study is to determine the factors affecting prospective science teachers' attendance in online classes. Besides, it aims to determine the problems that prospective teachers encounter in online classes.

Method

The case study method, one of the qualitative research methods, was used in this study in which the factors affecting the attendance of the prospective science teachers in online courses were determined. The case study

is a qualitative research approach in which the researcher conducts an in-depth examination of the specific dimensions of one or more clearly defined situations (events/facts) using various data collection tools, and creates the themes related to the cause of the situation (Creswell, 2007). Yin (2004) examines the case study in three classes as exploratory, descriptive, and explanatory case study. According to Yin (2004), the exploratory case study looks for answers to the question of "what?" regarding the specified dimension of any situation. In this study, in which the exploratory case study was adopted, the factors affecting the regular student attention in the activities in a project supported by TUBITAK, which lasted for five days and 10 hours a day, were examined.

Study Group

According to Neuman (2014), the maximum variation sampling method allows identifying a wide range of themes related to the situation or phenomenon being studied. In this context, the activity was shared on social media, especially on the project webpage, through the written press in June. Applications were submitted via Google forms until August, and 195 prospective science teachers studying at various universities applied to the project. Among the applicants, 40 prospective science teachers were chosen. To ensure maximum variation, the candidates are first grouped according to their university and ranked according to their academic achievements. In the selection, first the top-scoring students at all universities, then the second top scoring ones were chosen, and a group of 40 participants was formed. As a result, 40 prospective science teachers from 17 different universities participated in the event. However, 5 participants could not continue the activities for various reasons. 20 of the remaining 35 students did not give feedback to the structured interview form sent to determine the factors affecting their attendance in activities. As a result, 15 prospective science teachers, who are fourth-grade students of the science teaching department with academic averages higher than 2.5, participated in the study. Despite the decision to switch to distance education at universities in the spring semester of the 2019-2020 academic year due to the pandemic, most of the courses were conducted asynchronous (assigning homework). In this respect, the prospective teachers who participated in the research attended all the courses online within a program for the first time. Since the activities are conducted as two sessions, before the practice of the activities, the group of forty people was randomly divided into two groups, with twenty people in each group.

Practice

Since the activity addressed in the study was organized online, and materials were required for practice-based activities for teaching astronomy, two communication groups were formed through a communication program for participants and educators before the practice. In these groups, the content of the activity, the practice procedure, and the materials were shared, and questions were answered. Besides, some simple materials (shoebox, scissors, etc.) required for the activities were provided by the participants, and materials that were difficult to obtain such as lenses for virtual glasses were shipped to the participants by the coordinator. Similarly, the communication groups' questions were answered. Also, since the activities were conducted in two groups, two virtual classrooms have been established. Before the activities, participants were made to enter the system at different times in their virtual classroom to get to know the online system in which the activities were conducted. In this orientation session, it was checked whether all participants' cameras and microphones work properly, and the important features of the online education system were explained. Attendance for the orientation session was voluntary.

Twenty-three activities (see Appendix 1) aimed at teaching methods and materials for astronomy education were completed online in five days. The instructors that had tasks in the project work in different universities in Turkey and all of them have a PhD degree in the subject they taught. In practice, ten lessons were held per day, each for 45 minutes, and the activities started at 8:00 a.m. and ended at 6:45 p.m. every day. It was conducted in two groups, with twenty teacher candidates in each group. There was a fifteen-minute break between lessons and a lunch break was given for one hour at 13:00. At the end of each day, an evaluation of the day was held with the participants, and the next day's activities and necessary materials were specified. The evaluation of the day was done separately in both groups, and motivating expressions were used for the participants. A moderator has been assigned to the virtual classrooms to assist the instructors and to follow the process. These moderators opened virtual classes 15 minutes before the event time, guided the educators about the system, and monitored

the participants. During the practice, only two participants experienced power cuts, but the participants attended the lessons on their mobile phones and did not fall behind. After the completion of the activities, the structured interview form prepared to determine the factors affecting the attendance of the participants was sent from the group created in the communication program and they were asked to answer the questions and return them within two days.

Data Collection Tools

A semi-structured interview form consisting of open-ended questions was developed by the researchers to determine the factors affecting the participants' attendance in an online project. After the form was prepared, two experts were consulted about the questions. One language expert was consulted about the language and the other expert was consulted for comprehension. The question form did not include any demographic information as they were known through the TUBITAK project application form. The final form consists of three questions about attending online courses (see Appendix 2). The major reason for using the semi-structured interviews in the study was the lack of time and the lack of face-to-face interviews since the participants were in different cities. An alternative online interview was considered, but that was not preferred because the online system does not allow audio and video recordings to be transferred to different media. The semi-structured interview form was created for these reasons and it was shared with the participants through an online education platform, and they were given enough time to answer the questions. Participants sent back the forms via e-mail or message.

Data Analysis

The data obtained from the structured interview form was analyzed by content analysis. The purpose of content analysis is to reveal the concepts hidden in the meanings in the data and the relationships between these concepts. According to Yıldırım and Şimşek (2006), in content analysis, researchers group the data within the common concepts or themes and reflect the patterns between these groups in a way that the reader can understand. In this context, code and conceptual categories related to the factors affecting the attendance of prospective science teachers in online classes with content analysis were presented in this study.

In the analysis process of the data, data were first read once. This has increased the coders' knowledge of data. In this process, the coders have noted the remarkable codes. They also gave nicknames to each participant. These nicknames were used while writing the article. In the second stage, the actual coding was started. During this coding, both coders used different colored pens and underlined the statements related to the code, and noted important citations. They also saved the code in the code list when they encountered different codes. The coders reviewed the data from the beginning, returning to the first data every five people. It ensured the consistency of the codes given in this process. The coding process was done by two coders. 83 codes were given by coders and 7 codes were found to be different from them. When the consistency of the codes given by the coders (Miles & Huberman, 1994) was examined, it was seen that there was 91.6% consistency between the codes. Since this level is higher than the 90% level specified by Miles and Huberman (1994), it can be considered that the results are reliable.

Findings

In this study, it was aimed to determine the factors affecting student attendance to online theoretical and applied courses by 14 different instructors to 40 students from 17 different universities within an online project. The findings of the interviews that were qualitatively analyzed in-depth as a result of the research are explained in this section. As a result of the analysis, it was determined that the factors affecting the attendance of prospective teachers to online classes are grouped under two themes. These themes have been defined as internal and external factors. These definitions are considered by Ertmer (1999) as primary (external factors) and secondary (internal factors).

Theme 1. Internal Factors

It was determined that prospective teachers, who emphasized the theme of internal factors, emphasized some cognitive, physical, and affective factors related to their attendance in online education. These factors are defined as internal factors as they are related to and originate from the individual. These factors are affective factors

such as beliefs, interest/curiosity, and anxiety; cognitive factors such as gains, and physical factors such as personal health problems. These factors are discussed below.

Belief Factor: As seen in the statements of prospective teachers, an important factor affecting the prospective teachers' attendance to online classes is their belief that the courses they will attend will contribute to their lives and professions. One participant stated her opinion (F.7, Female): "I believe that this project will provide me individual and professional development, so it was the biggest factor that kept me going in this process". Another participant (F.5, Female) stated her belief by saying that "First, I believe that taking part in such a TUBITAK project has improved me in many ways and this makes me very happy." As a result of the study conducted by Duman and Ulubey (2008), it revealed a positive relationship between the educational beliefs and technology uses of prospective teachers. It can be said that prospective teachers have a positive belief in the courses, which positively affects their participation in the courses.

Interest/Curiosity Factor: Almost all the prospective teachers stated they were interested and curious about the course they will attend. More than half of the participants stated they wanted to continue their online courses because they were interested in the subject. The students expressed their interest and curiosity towards the courses: (F.1, Female) "The most important factor that allows me to actively participate in the project and to sit at the computer for 11 hours is my interest and curiosity in the subject". Another participant stated that (F.2, Female) "First of all, I have to state that I attend this activity both to contribute to my professional life and to make myself competent for my students, and to find answers to my questions by communicating with people who are competent in Astronomy, which is my curiosity. I am very glad to have participated." At the same time, students will be more motivated towards the course in a distance education environment where students are interested. It is estimated that student attendance may increase when they are motivated by online lessons.

Personal Gains Factor: Another factor affecting the regular attendance of the students to the lessons offered by the distance education method is the personal gains they get at the end of the lessons. The students stated that they attended the classes because they thought that they would obtain useful tools and information that they could use when they became teachers. One participant (F.9, Female) said: "I always wanted to participate in the activities, to improve myself and to feel more instructive and experienced in science education" and mentioned the personal gains that she aimed to get at the end of the project. At the same time, most of the prospective teachers who participated in the study claimed that they continued the courses because they believed that they would make significant personal gains in life or profession as a factor affecting their attendance at the online activity. One of these prospective teachers (F.3, Female) said: "I can say that I have been enlightened about many issues related to my profession. They guided us by telling us about their experiences in terms of profession and gave us ideas." In this way, when the prospective teachers think that they will make significant personal gains for their professional lives, it is seen that they want to continue the courses. In many studies, it was found that the attendance rates of students in this training increased when the training was closely related to learning outcomes (Fayyoumi, 2009; Lee, 2005; Girginer & Ozkul, 2004).

Anxiety Factor: Internal factors that negatively affect attendance have also emerged in distance education. These were identified as anxiety and personal health problems. Students state that they have various concerns about online education. One of the prospective teachers (F.2, Female) who participated in the study expressed this concern: "The first day I learned that this project would be online, I had concerns. After all, it wouldn't be easy for me to be on the computer for hours and spend a long time." Another participant (F.11, Female) expressed her anxiety throughout the online courses: "Conducting this project through distance education affected me negatively. There was important information that I missed due to internet connection problems. Besides, since there is no classroom environment in our house, I had a hard time following classes and focusing because of the noise my little brother made." It can be said that feeling anxious during the distance education process is due to their unfamiliarity with educational technologies that they have not used before. These educational activities were conducted online for the first time caused students to panic. While information technologies continue to replace traditional methods used in education, they emphasized that one of the

challenges to using computers is anxiety, so technical training should be given to teachers to prevent this anxiety (Agaoglu et al., 2008).

Personal Health Problems Factor: Another negative factor that students experienced in online education was health problems. A participant (F.2, Female) stated: "I sometimes had difficulty because I had an eye laser surgery approximately 2 months ago, and most of the time I had to listen to the lessons with sunglasses, but that wasn't a big obstacle." Another participant (F.1, Female) said: "I can't describe how I was physically and mentally exhausted at the end of the day. Sitting at the computer for hours reduced my interest in classes on some days because I started to feel pains in my eyes and back. I had to go to the hospital because of these pains". Many students stated that they experienced physical problems such as headaches and eye pains due to long-term screen use. Salturk and Güngör (2020) evaluated distance education through the students' perception, and it is seen that it causes health problems in 25% of students due to long-term screen use.

Theme 2. External Factors

While the prospective teachers participated in distance education courses, they continued online courses under the influence of some factors. In this section, the factors that affect students externally when attending online courses are explained.

Instructor Factor: Most of the prospective teachers stated that one of the external factors positively affecting them is the instructor. The more the instructor knows his/her field, the more the students' interest increases. As an indicator of this situation, one of the students (F.8, Female) stated: "The rapid interventions of our coordinator teacher in this project enabled our other teachers to transfer information more efficiently". Another participant (F.13, Female) said that "What made me most happy about the project was that our teachers were as enthusiastic and excited as we were. Maybe I recovered thanks to the positive energy I got from them when the process was getting worse. Seeing these significant efforts made me feel valuable." Those instructors assisted prospective teachers during online education ensured them to take a positive attitude towards the course. Prospective teachers who had a positive attitude towards the course attended the online classes regularly. In the same way, Özer (2011) stated that the instructors' behaviors in the distance education process affected the students.

Peer Relationship Factor: Almost half of the participants stated their peer relationships, another positive external factor, as follows: (F.4, Female) "I noticed that all the prospective teachers and the project coordinator participating in this program are helpful. If there was something someone did not know, someone else would help them." The other participant (F.11, Female) said: "At first I didn't know the people. But then the sincerity of my teachers and friends changed this situation." It is seen that the rate of prospective teachers' attendance is quite high when they have positive relationships with their peers throughout online courses. In the study conducted by Güvey Aktay and Gültekin (2015), it is stated that peer collaboration enables students to interact with their peers while gaining learning experiences, and the social relationships they establish with their peers increase the quality of education in the classroom and provide an effective education process.

Course Program Factor: The factor that affects prospective teachers both positively and negatively is the course program. Regarding the course program, one participant (F.10, Female) said: "The fact that the course process was based on practice rather than theory was effective in spending a lot of time on the computer. Since we are in the pandemic period and we have been away from schools for a long time, doing something in terms of education is among the most effective reasons I stay at the computer for 11 hours". Also, nearly half of the prospective teachers expressed their thoughts about the crash program. One of them (F.14, Female) stated that "Even while having breakfast, I attended online classes from 3 different devices (computer, personal phone and friend's phone) because of the fear that electricity will go out and the computer will break down." Almost all the participants stated that the online training for 11 hours a day was quite intense. As a result of the intensive course program, they stated that they had various health problems such as headaches and eye pain. One participant (F.3, Female) said: "Being at the computer for 11 hours was good at first, but towards the end, there was a headache, a desire not to listen and fall asleep. No matter how much I want, after a while, I couldn't focus
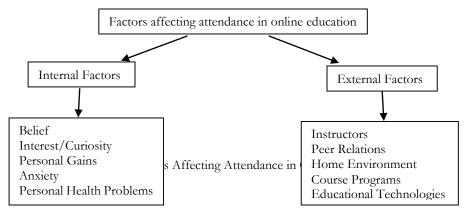
on anything." Prospective teachers mentioned that they had various problems due to the intensive course program and were negatively affected by the course program. Besides, Al and Orçun Mardan (2004) mentioned in their study that special course programs should be applied to the student in distance education and that more flexible course programs can be created in this way. The course loads of the students should also be determined and the daily course hours should be adjusted accordingly.

Home Environment Factor: Many prospective teachers who participated in the study stated that their home environment negatively affected their online course attendance. One student (F.7, Female) stated: "I had problems with the internet at some hours because there are other students trying to attend online classes other than me in the home". Another participant (F.12, Female) stated: "Although being at home seems positive for most people, it has led to many negative situations for me because I have 2 younger siblings". She also mentioned that she had difficulties in the home environment due to family members. Many prospective teachers who participated in the study stated that their conditions at home were not suitable for distance education and they did not get the desired efficiency from distance education courses. As a result, some students had problems with attendance due to home conditions. During the distance education process, students had to study at home because all the places (libraries) where students could study were closed. In the study conducted by Sarı (2020), it is not possible to determine whether students' home environments are suitable for studying. Therefore, it is necessary to consider all hard conditions at home (number of younger siblings, responsibilities in the house, etc.), especially when evaluating students.

Educational Technologies Factor: Another factor that negatively affects almost all the participants is related to educational technologies. They stated that their home internet is insufficient, and they frequently had connection problems. One participant (F.5, Female) stated that "The day I had a power cut, my phone was also out of charge. I could not attend the lesson for a few hours. I am very sorry for the information I missed during this time ". Another participant (F.14, Female) said: "We have only one device to use in distance education, but sometimes my brother (primary school student) needs to use it for his courses. In this case, I cannot attend to my courses". Since these problems are thought to negatively affect the confidence and desire of prospective teachers in the teaching process, it can be said that prospective teachers' attitudes towards online courses are also negatively affected. According to the study of Papuşcuoglu (2021) which examines the effects of distance education on social inequalities, one of the biggest problems in distance education is the lack of access to online courses due to not having the internet connection or a capable device. He mentions that these deficiencies prevent students to participate in distance education courses.

Conclusion and Discussion

With the Covid-19 pandemic, new problems arose with the sudden change from face-to-face education to online education. One of these problems is ensuring regular student attendance. This study was conducted to reveal the factors affecting student attendance. As a result of this study, in which the interview technique is used from qualitative research methods, it can be said that the factors affecting attendance are collected in the major topics of internal and external factors as seen in Figure 1. Among the internal factors, beliefs, interest and curiosity, and personal gains were found to positively affect attendance, while anxiety and health problems emerged as factors that were negatively affected. External factors affecting student attendance are instructors, course programs, home environment, peer relations, and educational technologies used in courses.

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Educational technologies are the basic components of distance education. To increase the effectiveness of the courses, the effective use of these technologies in the courses is crucial. In his study, Ertmer (1999) grouped these barriers as primary factors and secondary factors while stating the barriers to the effective use of technologies in lessons. One of the primary factors is beliefs. He stated that to use technology effectively, teachers must first have a positive belief. In this study, beliefs were found to be a factor affecting attendance. Students' interest and curiosity in the course, as well as the gains they will make at the end of the course, affect attendance. According to Pluck and Johnson's (2011) study, students' interest and curiosity in the course is an important factor that drives them to search for information and learning activities. Both the competence of the instructors who gave the course and their attitudes towards the students positively affected attendance. In their study, Weil, Rosen and Wugalter (1990) mention that the successful integration of technology into education is only possible with educators, administrators, and teachers who develop a positive attitude towards technology and have mild anxiety. The students who participated in the study emphasized that their course program also affects effective participation in the courses. Besides, the concerns and health problems that students may experience during the course, especially the possibility of contracting Covid-19, affect attendance. In the study conducted by Sarı (2020), it is mentioned that it is very important to keep students' anxiety levels at a low level in distance education.

External factors, which are among the findings of the study, affect attendance positively and negatively. Students with low SES have problems attending distance education because they either do not have the internet connection or devices to log into distance education platforms. The situation gets worse if low SES students have school-aged siblings because that have shared the only device. Having too many class hours in one day or starting too early or finishing late both prevent effective participation in lessons and reduce student productivity. For this reason, studies are suggesting that distance education lessons' beginning and ending times and durations should be reorganized (Yildirim, 2020). The students who participated in the study emphasized that their course program also affects effective participation in the courses. Too many courses or courses that start too early negatively effect student attendance in distance education. Moreover, health problems and concerns that students may experience during the course, especially the possibility of contracting Covid-19, affect attendance. In the study conducted by Sarı (2020), it is mentioned that it is very important to keep students' anxiety levels at a low level in distance education.

Because of COVID-19, the long duration of distance education and attending lessons from home changed the perspective of individuals about the students and resulted in students being asked to take responsibility at home. That can affect student attendance negatively. Although the intensive course program affected student attendance negatively, the relationships of the students with each other were found to be a positive factor affecting attendance. When students motivate each other to attend the lessons, it prevents absenteeism. Therefore, peer relationships are crucial in face-to-face learning as well as in distance education. Peer relationships are also crucial in distance education for students to feel like they belong to a learning community (Chetwynd, Gardner & Jefferis, 2013). It is stated by many researchers that technology should be used in education to provide qualified education (Strycker, 2020; Turvey & Pachler, 2020). It is seen that the attendance of students who see technology as an advantage in the education process and do not have problems in their use has also increased.

Suggestions

It is possible to sort the suggestions that can be given at the end of the study as follows. First, students' belief in the distance education system should be strengthened. There is a lot of work in this regard, especially for educators. It should be explained to students that the online education system can be a useful education format, and it should be demonstrated practically. By explaining the advantages of distance education, students' beliefs in this education format should be strengthened. Another important suggestion may be for teachers and instructors. Instructors should attract students' interest and curiosity with the lesson contents and their teaching methods. Students with high levels of interest and curiosity are more motivated to both learn and continue the course. Another suggestion that can be given to the instructors is to clearly explain the personal gains they will get at the end of the online education. If students are given information about where and how to use these gains, students can attend the lessons regularly. In cases which thousands of students who suddenly switched

to the distance education system during the COVID-19 pandemic experience anxiety during the adaptation to the system, instructors should give orientation to the students about how to use the system and applications. In this way, the concerns of the students about the system can be prevented. Another factor that increases students' anxiety levels may be personal illnesses or COVID-19. If the student and his/her family have the COVID-19 virus, students should be supported and assisted with homework and exams. At the same time, students should be allowed to express their situation by providing them with different communication channels. Regarding the distance education course program, the courses should not begin early in the morning (8 a.m.), the total daily course hours should be limited (never exceeding 10 lesson hours), there should be sufficient breaks between the different courses, and the lessons should not be held in blocks and the course hours should not be extended. To increase the efficiency of distance education in a home environment, families should be informed, and sufficient time and the opportunity should be provided for the students' lessons and assignments. Considering that peer relationships are crucial at every stage of education, peers should be encouraged to communicate with each other. In educational technologies, students should be given hands-on demonstrations on how to connect to the system in the first place, and detailed orientations should be organized before the courses start. In this way, the student should know how to deliver the assignment and learn to communicate with the instructor. Another suggestion may be about devices for attending online classes. Students should connect to lessons from technological devices (tablets, computers, etc.) whose screen size is larger than the phone. As they constantly read, watch, and examine the contents displayed on the screens, students get tired quickly.

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Appendix 1.
Activity Schedule

Gün	Etkinlikler	Gün	Etkinlikler
1. Gün	Astronomideki kavram Yanılgılarının Sunumu (3 Saat) Benim Dünyam, Güneşim ve Ayım! drama etkinliği (3 Saat) Teleskopları ve Teleskop Kurmayı Öğreniyorum (2 Saat) İnsanlık için Büyük Adım isimli argümantasyon etkinliği (2 Saat)	2. Gün	Uzaydaki Çöplerimiz isimli QR kod etkinliği (2 Saat) Güneş Saati Nedir? isimli güneş saati yapım etkinliği (1 Saat) Usturlap (Astrolabe) Nedir? isimli usturlap yapım etkinliği (1 Saat) Takım Yıldızları ve Yıldız Saati Nedir? isimli takım yıldızı dürbünü yapım etkinliği (1 Saat) Kavramsal Değişim Metin Hazırlıyorum isimli kavramsal değişim metni etkinliği (3Saat)
3. Gün	Sanal Gerçeklik isimli basit malzemelerle sanal gerçeklik gözlüğü yapım etkinliği (2 Saat) Evrenden Sınıfa: 3D Hologram isimli astronomi konularında hologram kullanımı etkinliği (2 Saat) Kişiye Özel Planetaryum- Güneş Sistemini Tanıma isimli sanal gerçeklik uygulamaları etkinliği (1 Saat) Kişiye Özel Planetaryum- Güneş Sistemini Tanıma isimli sanal gerçeklik uygulamaları etkinliği (1 Saat) Kişiye Özel Planetaryum ile Uzayı Tanıma isimli sanal gerçeklik uygulamaları etkinliği (2 Saat) Hedef Ay! İsimli STEM temelli astronomi öğretimi etkinliği (3 Saat)	4. Gün	Özel Gereksinimli Öğrencilere Astronomi Öğretimi isimli özel gereksinimli öğrencilere astronomi öğretiminin nasıl yapılacağına yönelik etkinlik (2 Saat) Biçimlendirici Değerlendirmeye Dayalı Temel Astronomi Olgularının Öğretimi isimli astronomi öğretiminde biçimlendirici değerlendirmenin kullanımına yönelik etkinlik (2 Saat) Mevsimlerin Neden Oluştuğunu Öğrenelim, Öğretim isimli istasyon tekniği temelli etkinlik (3 saat) Webquest Destekli Astronomi Eğitimi isimli webquest uygulamalarının astronomi öğretiminde kullanımına yönelik etkinlik (3 Saat)

5. Gün	Astronomide Artırılmış Gerçeklik Uygulamaları isimli astronomi konularında artırılmış gerçeklik uygulamalarının kullanımına yönelik etkinlik (4 Saat)
	Eğitsel Oyunlar isimli astronomi öğretiminde kullanılabilecek eğitsel oyunların tasarlandığı etkinlik (2 Saat)
	Kavram Karikatürlerine Yönelik Uygulamalar isimli kavram karikatürlerinin entegre edilebilecek yöntemler ve önemli hususların sunulduğu etkinlik (1 Saat)
	Kavram Karikatürü Hazırlıyorum isimli astronomi kavramlarına yönelik kavram karikatürü hazırlama etkinliği (1 Saat)
	Yapılandırılmış Görüşme Formunun katılımcılara gönderilmesi

Appendix 2.
Semi-Structured Question Form

Uzaktan Eğitimde Öğrenci Devamını Etkileyen Faktörler

Bu çalışmada sizlerin uzaktan eğitim ortamlarında derslere devam etmenizi etkileyen faktörleri belirlemek istiyoruz. Aşağıdaki sorulara Gök Kubbeye Yolculuk projesi kapsamında aldığınız derslerdeki durumları dikkate alarak cevaplamanızı bekliyoruz. Katılımınız için şimdiden teşekkür ederiz.

1. Gök Kubbeye Yolculuk Projesinde günde 11 saat derse bir fiil katıldınız. Bu süreçte beş gün tam 11 saat bilgisayar başında kalmanızı sağlayan ne veya neler idi? Ders öncesi, ders süreci, içsel veya dışsal faktörler olabilir. Yazınız.

2. Gök Kubbeye Yolculuk projesinde derslere aktif olarak katılmanızı olumsuz etkileyen etkenler nelerdir? Ders öncesi, ders süreci, içsel veya dışsal faktörler olabilir. Yazınız.

3. Bunların dışında belirtmek istediğiniz olumlu ya da olumsuz etkenleri yazınız.

GENİŞLETİLMİŞ ÖZET

Geleneksel ya da online eğitimde öğrencilerin akademik başarısını etkileyen en önemli faktörlerden bir tanesi de öğrencilerin derslere devamını ve aktif katılımlarını sağlamaktır. Yüz yıllardır kullanılan geleneksel eğitim yönteminde eğitmenler geçmişten getirdikleri tecrübeleri de kullanarak öğrencilerin derslere devamını sağlamak adına birçok strateji ve yöntem geliştirmişlerdir. Ancak, teknolojik gelişmelerle birlikte yüzyıllardır süregelen alışkanlıklar bir bir değişmeye başlamıştır. Teknolojik gelişmelerin yanında Covid-19 pandemisinin de ortaya çıkmasıyla geçmişten beri süregelen yüz yüze eğitimle birlikte online eğitimde yoğun olarak kullanılmaya, özellikle de üniversitelerde başlanmıştır. Online eğitim sisteminin özellikle de Türkiye de çok uzun bir geçmişi olmamasından dolayı öğrencilerin derslere devamı sürekli ve verimli olamamaktadır. Online eğitime çoğunlukla asenkron bir anlayışla başlandı ve öğretmenlerin, akademisyenlerin, öğrencilerin ve velilerin çokta alışık olmadıkları bu yeni eğitim formatında gün geçtikçe yeni sorunlar ortaya çıkmaya başladı. Bağlantı problemleri, öğrencileri derse dahil etme, öğrenmeye motive etme ve öğrencilerin derslere devam etmelerini sağlama gibi sorunlar bu sorunlardan sadece bir kaçını oluşturmaktadır. Eğitimciler özellikle online eğitime geçildikten sonra öğrencilerin derslere düzenli olarak devam etmediklerini belirtmeye başladılar. Nisan 2020 tarihinde yani pandeminin henüz başlayıp online eğitime daha yeni geçildiğinde Amerika Birleşik Devletleri'nde öğrencilerin yarısından fazlasının online eğitime düzenli olarak devam etmedikleri ve bu sayının düşük sosyo ekonomik düzeye sahip çevrelerde daha da yüksek olduğu haberi yayınlandı (Goldstein, Popescu ve Hannah-Jones, 2020). Öğrencilerin online derslere düzenli olarak devam etmelerini sağlamak amacıyla çeşitli çalışmalar yapılmıştır. Bu çalışmalardan bazıları özellikle düşük sosyo ekonomik düzeye sahip kırsal kesimlerde yaşayan öğrencilerin cihaz eksikliği ya da internet bağlantısı yoksunluğu gibi teknik sebeplerden dolayı derslere devam edemediklerini tespit ederek bu sorunlar çözülmeye çalışılmıştır. Fakat derse devamı etkileyen en önemli faktörlerden biri teknik yetersizlikler olsa dahi, derse devamı teknik yetersizlikler zemininde bırakmak online eğitimin geleceğini planlamak açısından yeterli değildir. Çünkü teknik yetersizlikler buzdağının sadece görünen yüzüdür. Teknik alt yapının yanında öğretmen, öğrenci, veli, eğitim yöneticileri online eğitim sürecinin yürütülmesinde birer faktördür ve bu bakımdan online eğitim sürecinde öğrenci devamını etkileyen faktörlere yönelik buzdağının altı keşfedilmelidir. Bu araştırmanın amacı fen bilimleri öğretmen adaylarının online derslere devam etmelerini etkileyen faktörleri belirlemektir. Ayrıca, öğretmen adaylarının online derslerde karşılaştıkları sorunları tespit etmek de bu çalışmanın amaçlarındandır.

Fen bilimleri öğretmen adaylarının çevrimiçi yürütülen derslere devamını etkileyen faktörlerin tespit edildiği bu çalışmada nitel araştırma yöntemlerinden durum çalışması yöntemi kullanılmıştır. Keşfedici durum çalışmasının benimsendiği bu çalışmada da beş gün süren ve günde 10 saat dersin işlendiği TUBİTAK tarafından desteklenen bir projedeki etkinliklere hiç aksatmadan devam eden öğrencilerin derse devamlarını etkileyen faktörler incelenmiştir. Araştırmada nitel araştırmaya özgü örnekleme yöntemlerinden maksimum çeşitlilik örnekleme yöntemi kullanılmıştır. Bu kapsamda etkinliğin duyurusu haziran ayında proje sayfası başta olmak üzere sosyal medya, yazılı basın üzerinden paylaşılmıştır. Başvurular Ağustos ayına kadar Googleforms üzerinden hazırlanmış, form aracılığıyla alınmış ve projeye çeşitli üniversitelerde öğrenim gören 195 fen bilimleri öğretmeni başvurmuştur. Başvuru yapan adaylar arasından 40 fen bilimleri öğretmen adayı seçilmiştir. Bu seçimde maksimum çeşitliliği sağlamak için ilk olarak adaylar öğrenim gördükleri üniversiteye göre gruplandırılmış ve akademik başarılarına göre kendi içinde sıralandırılmışlardır. Seçimde ilk olarak her üniversitenin birincileri, tüm üniversitelerden birinciler alındıktan sonra ikincileri alınarak 40 kişilik katılımcı grubu oluşturulmuştur. Sonuç olarak etkinliğe 17 farklı üniversitede öğrenim gören 40 fen bilimleri öğretmen adayı katılmıştır. Fakat 5 katılımcı çeşitli nedenlerle etkinliklere devam edememiştir. Geriye kalan 35 öğrenciden ise 20'si etkinliklere devam etmelerini etkileyen faktörleri belirlemek için gönderilen yapılandırılmış görüşme formuna dönüt vermemiştir. Sonuç olarak araştırmaya akademik ortalamaları 2.5'den yüksek olan fen bilgisi öğretmenliği ana bilim dalı dördüncü sınıf öğrencisi 15 fen bilimleri öğretmen adayı katılmıştır. Katılımcıların çevrimiçi düzenlenen bir projedeki etkinliklere devamını etkileyen faktörleri belirlemek için araştırmacılar tarafından geliştirilmiş ve açık uçlu sorulardan oluşan yapılandırılmış görüşme formu kullanılmıştır. Yapılandırılmış görüşme formundan elde edilen veriler içerik analizi ile analiz edilmiştir. Bu çalışmada içerik analizi ile fen bilimleri öğretmen adaylarının çevrimiçi derslere devamlarını etkileyen faktörlere yönelik kod ve kavramsal kategoriler sergilenmiştir.

Bu çalışmada, online olarak yürütülen bir proje kapsamında 17 farklı üniversiteden 40 öğrenciye 14 farklı öğretim üyesi tarafından online eğitimler verilerek, öğrencilerin online ortamlarda verilen teorik ve uygulamalı derslere

olan devamlılıklarını etkileyen faktörlerin belirlenmesi amaçlanmıştır. Bu çalışma da öğrencilerin derse devamını etkileyen faktörleri ortaya çıkarmak için yapılmıştır. Nitel araştırma yöntemlerinden görüşme tekniğinin işe koşulduğu bu çalışmanın sonucunda öğrencilerin online derslere katılmalarını etkileyen faktörler içsel ve dışsal faktörler olarak tanımlanmıştır. İçsel faktörler temasına vurgu yapan öğretmen adayları online eğitimde derslere devamlılığa yönelik kendilerine ilişkin bazı bilişsel, fiziksel ve duyuşsal faktörlere vurgu yaptıkları tespit edilmiştir. Bu faktörler bireyin kendine ilişkin ve kendinden kaynaklanmasından dolayı içsel faktörler olarak tanımlanmıştır. İçsel faktörler *inançlar, ilgi ve merak ve kazanımlar* derse devamı olumlu yönde etkileyen faktörler olarak bulunurken *kaygı ve sağlık sorunları* ise olumsuz yönde etkileyen faktörler olarak ortaya çıkmıştır. Öğretmen adayları uzaktan eğitim derslerine katılım sağlarken aynı zamanda kendilerinin dışında faktörlerin etkisinde kalarak online derslere devam sağlamışlardır. Öğrenci devamını etkileyen dışsal faktörler ise *öğretim üyeleri, ders programları, ev ortamı, akran ilişkileri ve derslerde kullanılan öğretim teknolojileri* başlıkları ön plana çıkmıştır.

Öğrencilerin online derslere katılımlarını arttırmak için öncelikle, öğrencilerin uzaktan eğitim sistemine olan inançları güçlendirilmelidir. Bu konuda özellikle eğitimcilere çok fazla iş düşmektedir. Online eğitim sisteminin faydalı bir eğitim formatı olabileceği öğrencilere anlatılmalı ve uygulamalı bir şekilde gösterilmelidir. Yine uzaktan eğitim yönteminin avantajları da anlatılarak öğrencilerin bu eğitim formatına olan inançları güçlendirilmelidir. Diğer bir önemli tavsiye ise öğretmen ve öğretim üyeleri için olabilir. Öğretim elemanları derslerde anlattıkları konu içerikleriyle ve kullandıkları anlatım metodlarıyla öğrencilerin ilgi ve meraklarını çekebilmeyi başarmaları gerekir. İlgi ve merak düzeyi yüksek olan öğrenciler hem öğrenmeye hem de derse devam etme konusunda daha motive olmaktadırlar. Öğretim üyelerine verilebilecek diğer bir öneri ise, öğrencilere aldıkları online eğitimler sonunda elde edecekleri kazanımlar açık bir şekilde anlatılmalı ve derslerde edinecekleri bu kazanımları nerede ve nasıl kullanacakları ile ilgili bilgiler verilerek öğrencilerin derse devamı sağlanabilir.