

Determining the Optimal Duration of a Single Lecture in Distance Education Using Facial Analysis of Instructors

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ABSTRACT

The Covid-19 Pandemic, which has affected the entire world profoundly, has given rise to changes in many areas. The change in the education system appears as a compulsory transition to distance education, which raises the question as to how long the lectures in distance education should last. This study examined the emotional changes of the instructors who teach in the distance education environment by analyzing their faces with the Facial Action Coding System (FACS). Through the software developed by the researchers, the emotions of the instructors were evaluated in terms of feelings of disgust, sadness, happiness, fear, contempt, anger, and surprise. For evaluation, 53,923 photographs were obtained from 149.8 hours of videos recorded in 288 sessions of 29 different courses provided by 9 instructors and 47,883 of them were analyzed. Based on the changes in emotions, the optimum lecture time in the distance education environment was examined. In addition, the study determined the effects of instructors, courses, programs, weeks of the course, students' attendance, lecture type, session information on emotional changes. The study revealed that instructors' negative emotions generally increased between the 11th and 20th minutes, whereas the negative emotions of the instructors who preferred to have a longer session decreased after the 25th and 35th minutes. The study revealed that all of the emotions mentioned varied according to instructors, courses and programs that some emotions differed significantly according to students' attendance and lecture type, and that week of the course and session information did not cause any emotional changes.

Keyword: Optimum lecture time, distance education, Facial Action Coding System (FACS), teacher's emotional change, facial emotion recognition

INTRODUCTION

Several extraordinary events in the world has caused serious changes in education systems. According to UNESCO (2020), more than 1.2 billion children in 186 countries across the world have been affected by the school closures during the current pandemic, and this has increased both the number of distance education users and its significance. It has been observed that distance education, which provides opportunities for individuals who are unable or unwilling to attend lectures in a face-to-face environment, is applied in various ways. While distance education is perceived as textual data by some students, for others, it means regular communication with students and instructors as well as specially-prepared study materials (Holmberg, 2005). Holmberg (2005) stated that some universities offer their students the opportunity to watch only recorded lectures during distance education, while there are other examples in which universities allow their students to communicate with instructors and other individuals via writing or on the phone. Even though distance education practices vary, lecture time in distance education environment is considered to be an important component of the education process. This period should be taken into account as regards both the student and the instructor. Although there is no analysis based on data in the literature as to how long online courses should last, many people with experience in this field suggest that a lecture should be no longer than 20 minutes (Hersh et al., 2001). In the study conducted by Hersh et al. (2001), virtually all of the participants found it appropriate to divide a lecture into 20-minute segments, while some students found this duration long, suggesting that a lecture should not be more than 15 minutes.

It is known that the attention of individuals decreases as time progresses in lectures in distance education environment. While it has not been possible to find any studies on instructor's attention span in the literature, studies on student's attention span are abundant. These studies determined similar attention spans close to each other. McKeachie (1986) argued that student's attention lasts 10 minutes, while Davis (1993) and Wankat (2002) suggested that it lasts 10-15 minutes. According to the study by Stuart & Rutherford (1978), it was determined that students' attention increased rapidly during the first 10-20 minutes of the lecture and then declined gradually. Johnstone and Percival (1976), on the other hand, argued that attention decreased in the first 5 minutes and that it continued for 10-18 minutes. In universities, lectures generally last nearly 50 minutes, but there are many authors who maintained that student's attention span is 10-15 minutes, and asserted that the lecture time should be limited to this duration (Bradbury, 2016). Since the attention span of the students is limited (Simon, 1957; Simon, 1971), it can be argued that keeping the duration of a session short will increase the attendance in online lessons.

There are also studies on lecture duration in formal education. Some of these studies deal with the determination of teachers' opinions. Caycı (2018) examined teachers' opinions as to whether a 40-minute lecture duration is appropriate in formal education. As a result of the research, while 45% of the participants find this duration appropriate, 15% think that the lecture duration should be reduced because of the fact that students' attention lasts 10-15 minutes. Gökçe (2012) assessed teachers' opinions on the adequacy of the current lecture length. While 61% of the teachers participating in the study found the lecture duration sufficient, 20% found it too long. On the other hand, some studies were conducted through student analyses. As a result of the studies conducted by Author (2017) with the analysis of students' facial expressions, it was concluded that students' attention to the lecture decreased between the 7th and 17th minutes, but this could be changed via the instructor's intervention, and also that it had no effect after the 25th minute and students' attention declined completely. Author (2020) found as a result of the facial analysis of the students that the feeling of contempt, which was thought to be related to the concentration level, decreased rapidly in the first 15 minutes of the lecture, whereas the feelings of happiness and surprise increased.

In a limited number of studies on the distance education environment, it was examined how long students were engaged in the lecture. Regarding the attention span of the MOOC (Massive Open Online Course) participants, Guo et al., (2014) determined that the engagement time is at most six minutes, regardless of the length of the video lesson, according to the six minutes' engagement time; and thus they recommended keeping the videos short. Lectures cannot be kept so short, sometimes because of the complex content of the subject and sometimes because of the fact that excessive workload to which preparing short video lectures will lead may not be preferred by the instructor (Geri et al., 2017). According to the study by Geri et al. (2017), students' attention span is longer than six minutes. Some studies on MOOCs found that the number of participants dropped significantly a few minutes after the video started, and emphasized the importance of keeping the lecture videos short. Guo et al., (2014) argued that attention is lost after 6 minutes unless any stimulus is used. However, attention span of the participants can change according to the reasons for their enrolling in the course, and attention can be maintained even in 50-minute lectures (Lagerstrom et al., 2015). Lagerstrom et al. (2015) examined the duration of watching the recorded videos by undergraduate and graduate students in two separate computer science courses. The study revealed that the students watched a video for an average of 17-20 minutes in a single watching session.

During the literature search, no study was found about the attention time, optimal lecture duration and the effect of other lecture components in distance education regarding the instructor. In distance education, the instructor who will attract the attention of the student to the lecture through his/her communication skills has many substantial roles. Among these roles are being aware of students' autonomy, giving importance to their opinions, and taking individual differences into account (Isman & Dabaj, 2004). Anderson and Dron (2011) evaluated the roles of instructors in distance education in different pedagogical generations, and defined them as Content creator, sage on the stage (Cognitive - Behaviorist model), Discussion leader, guide on the side (Constructivist model), Critical friend, co-traveler (Connectivist model). Although having undertaken various roles in different pedagogical generations in distance education, the instructor is among the most important components in distance education environment. This study performed facial analysis of instructors, who have a considerable role in distance education, and examined their emotional changes. The emotions experienced by individuals are reflected in their facial expressions (Keltner & Ekman, 2000). Some expressions of the emotions felt by teachers can be observed by students and these observations may cause students to behave differently. Many studies revealed that teachers' emotions affect students (Sutton & Wheatley, 2003). Mayer et al. (2000) argued that emotions are among the fundamentals of mental functions. This suggests that being aware of teachers' emotions is essential to understand teachers and teaching process (Sutton & Wheatley, 2003). The aim of this study was to determine the optimal lecture duration by examining the emotions of the instructors. This examination was conducted through facial expression recognition. Facial expression recognition is known to be widely applicable to various research areas, such as mental illness diagnosis and social / physiological interaction detection (Samadiani et al., 2019). Detection of the face in the photograph, determination of components such as eyes, eyebrows, mouth, and nose on the face, and interpretation of their characteristics such as position and size are conducted with algorithms based on obtaining the emotional states as an output.



Figure 1. Framework for automated facial landmark detection and active patch extraction (Happy & Routray, 2014).

In such algorithms, the principles of the Facial Action Coding System (FACS) developed by Ekman and Friesen (1976) are generally used. With a few exceptions, it is known that all people have the same facial muscles (Schmidt & Cohn, 2001) and that different people's facial expressions express the same emotion. Feelings of contempt, fear, joy, surprise, sadness, and anger have been universally defined (Rolls et al., 1992). For this reason, universal emotions were recognized by analyzing the facial expressions of the instructors.

Considering the point that distance education has reached today, determining the optimal lecture duration based on the data will help to eliminate a deficiency in the literature. It can be argued that emotional changes of the instructor, who is one of the fundamental elements of distance education, is reflected in the students. Thus, it is essential for the sake of a healthier educational process that the instructor give a break or end the lecture without waiting for negative emotions to develop. The study conducted to achieve these purposes examined universal facial expressions of the instructor teaching in a distance education environment and sought the answers of the following questions:

1. How do the emotions of the instructor change during a lecture?
2. Do the emotions of the instructor differ significantly during a lecture according to the
 - a. instructors,
 - b. programs,
 - c. courses,
 - d. weeks of the course,
 - e. students' attendance,
 - f. lecture type, and
 - g. session information?

METHOD

In this study, facial expressions of distance education instructors were analyzed using the Facial Action Coding System (FACS). Instructors' emotions were evaluated in terms of feelings of disgust, sadness, happiness, fear, contempt, anger, and surprise, via a software developed by the researchers using the C # programming language and the Microsoft Face Recognition API in the Visual Studio software development environment. In order to determine the facial expressions, a photograph of an instructor was taken from the recorded course videos every 10 seconds and analyzed with the abovementioned special software. Since totally visible faces of the instructors was a prerequisite for the analysis, each photo was examined and the analysis started only after excluding the photographs that were not suitable for the examination out of the 53,923 pieces of data. Except some pictures that the program could not analyze, a total of 47,883 pieces of data were included in the study.

WORKING GROUP

The study was conducted using 149.8 hours of videos recorded in 288 sessions of 29 different courses with 9 instructors teaching at distance education Vocational School in the spring semester of 2019-2020 at a state university in the Mediterranean Region. The instructors teach in six different programs, namely Computer Programming (CPR), Medical Documentation and Secretariat (MDS), Office Management and Executive Assistant (OMA), the Joint Program (JP), which includes all of these programs in the Vocational School, the Faculty Joint Program (FJP) for the common courses selected in different programs of different faculties and Vocational School Joint Program (VSJP) for the common courses selected in different programs of different Vocational Schools. 4 of the instructors are male and 5 are female. Two instructors have been teaching for 10-12

years, two of them for 5-7 years, five of them for 2-4 years in distance education environment. The age range varies between 30 and 40.

DATA ANALYSIS

In order to determine the changes in instructors' emotions according to different variables, firstly, the normal distribution of the data was examined. The suitability of the data for normal distribution is analyzed by several different statistical methods (Kim, 2013). These include kurtosis and skewness values (Tabachnick & Fidell, 2007). While some studies stated that kurtosis and skewness values should be in a certain range (George & Malley, 2003), some others evaluated the value formed by dividing kurtosis and skewness values by their standard deviations (Kim, 2013). In the study, it was determined that these values were not in appropriate ranges, that is, they did not provide a normal distribution; therefore, transformations were applied to the data set. However, in the analysis of the second sub-problem, since the data were not normalized as a result of the data transformations, the Mann Whitney-U test was used to analyze whether the median of two unrelated samples differ significantly; the "Kruskal Wallis H-Test for Independent Samples" was used for more than two samples and the Mann Whitney-U test was used to determine the reason for differentiations.

FINDINGS

Figure 2 shows median emotion changes based on duration and 47,883 photographs related to the question "How do the feelings of the instructor change during a lecture?", which is the first sub-problem of the study.

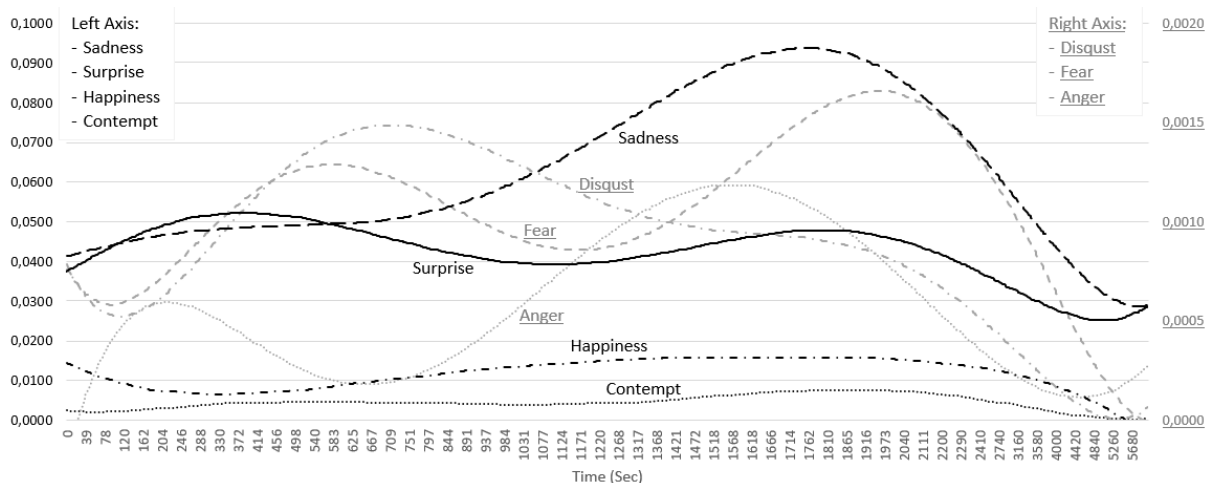


Figure 2. The medians of the instructors' emotional changes during the lecture according to time

Figure 2 shows the changes in the emotions of the instructors over time. The sum of all the feelings of sadness, surprise, happiness, contempt, disgust, fear, anger and neutral in the data produced as a result of the analysis conducted by the software used in the study equals to 1.0. The value of the feeling of neutral, which constituted the highest value in every photograph, was not used in the study because it was not considered to be related to the purpose of the study. The graph in Figure 2 was created with the median values of the same type data corresponding to the same second in the data set of other feelings. In the figure, the feelings of sadness, surprise, happiness and contempt are on the left axis, while disgust, fear and anger are on the right axis. The study revealed that the feeling of sadness gradually increased from the beginning of the lesson while increasing rapidly from about the 12th minute (751th sec) to the 30th minute (1810th sec). However, this feeling subsided rapidly after the 30th minute. The feeling of surprise increased in the first 5 minutes (288 secs) of the lecture, reaching the highest level between approximately the 6th and 7th minutes (330th-420th secs.) and then decreased until approximately the 20th minute (1220th sec.). With a following increase, it started to decline sharply from the 32nd minute (1916th sec.). The feeling of fear started to decrease at the beginning of the lecture, and from about the 2nd minute (120th sec.), it saw a sudden rise until about the 8th minute (498th sec.), then fell again until the 20th minute (1220th sec.) Afterwards, it rose significantly until approximately the 34th minute (2040th sec.) and then started to decrease again. The feeling of disgust fell down until the 2nd minute (120th sec.) in a similar way to the feeling of fear, and then rose until the 10th minute (583th sec.), following which it continued to drop constantly. The feeling of anger increased in approximately the first 4 minutes (246 secs) of the lecture, and then decreased until approximately the 11th minute (667th sec.). Afterwards, it rose until approximately the 25th minute (1518th sec.) and then saw a rapid decrease again. It started to increase after about the 80th minute (4840th sec.) again. The feelings of happiness and contempt did not see any sharp fluctuations. Happiness dropped at the beginning of the lesson until

about the 5th minute (330th sec.), after which it increased steadily until the 52nd minute (3160th sec). After the 64th minute, it saw a fall. The feeling of contempt saw minor fluctuations at the beginning of the lesson, with a slight decrease in the first seconds, and then increased from approximately the 21st minute (1268th sec.) to the 35th minute (2111th sec.), after which it declined.

The study examined the effect of different factors on the change of emotions which constitutes the second sub problem. First of all, Kruskal Wallis H-Test was used to determine whether the emotions of the nine instructors who participated in the study changed according to individuals. Mann Whitney U-test was used to find whom the difference resulted from. As a result of the analyses, the study revealed that, **regarding instructors**, there were significant differences in the feelings of anger (X^2 (sd = 8, n = 290) = 156.889, $p < .05$), contempt (X^2 (sd = 8, n = 290) = 188.175, $p < .05$), disgust (X^2 (sd = 8, n = 290) = 211.046, $p < .05$), fear (X^2 (sd = 8, n = 290) = 188.947, $p < .05$), happiness (X^2 (sd = 8, n = 290) = 161.129, $p < .05$), sadness (X^2 (sd = 8, n = 290) = 191.024, $p < .05$) surprise (X^2 (sd = 8, n = 290) = 213.430, $p < .05$). The source of the difference in the feeling of anger was examined and it was found that each of the instructors with the codes of BS, OD, AO, and SD differed significantly from the instructors with the codes of OP, MA, BO and KA; the difference in the feeling of contempt was between MA and BO, KA, OD, IG, BS, as well as AO, and also between OP and KA, OD, IG, BS, aside from AO. When each emotion was examined in terms of instructors, it was determined that the source of the differentiation was different and there was no regularity in this differentiation.

The same analyses were used for the change in the emotions of the instructors according to the six different programs. As a result of the Kruskal Wallis H-Test, it was determined that, **regarding programs**, there was a significant difference in the feelings of anger (X^2 (sd = 5, n = 290) = 95.812, $p < .05$), contempt (X^2 (sd = 5, n = 290) = 105.776, $p < .05$), disgust (X^2 (sd = 5, n = 290) = 101.884, $p < .05$), fear (X^2 (sd = 5, n = 290) = 38.306, $p < .05$), happiness (X^2 (sd = 5, n = 290) = 77.531, $p < .05$), sadness (X^2 (sd = 5, n = 290) = 70.531, $p < .05$) surprise (X^2 (sd = 5, n = 290) = 20.155, $p < .05$). Via the Mann Whitney U-test, it was determined that the difference was between the programs of CPR and MDS, OMA, JP. In the lectures in CPR, it was observed that the values of anger, contempt, disgust, fear, sadness, surprise were lower than in the other three programs, while the value of happiness was higher. It was determined that the values of contempt, disgust and happiness were lower in OMA than in FJP and JP.

According to the analysis in 29 courses, it was determined that there was a significant difference in the emotions of the instructors. As a result of the Kruskal Wallis H-Test, it was determined that, **regarding courses**, there was a significant difference in the feelings of anger (X^2 (sd = 28, n = 290) = 165.664, $p < .05$), contempt (X^2 (sd = 28, n = 290) = 205.553, $p < .05$), disgust (X^2 (sd = 28, n = 290) = 219.539, $p < .05$), fear (X^2 (sd = 28, n = 290) = 199.103, $p < .05$), happiness (X^2 (sd = 28, n = 290) = 173.906, $p < .05$), sadness (X^2 (sd = 28, n = 290) = 199.006, $p < .05$) surprise (X^2 (sd = 28, n = 290) = 218.015, $p < .05$). It was determined that these differences resulted from seven courses, Mobile Programming, Computer Package Programs, Object-Oriented Programming, New Technologies in Health, Open Source Operating System and Network Basic, all of which are taught in CPR. Significant differences were identified between these courses and the other courses in the program based on verbal knowledge. It was determined that the value of anger was higher in Mobile Programming (MP) and Object Oriented Programming (OOP) when compared to many other courses, while this value was lower in Computer Software Packages (CSP) than in four other courses. The value of contempt was determined to be higher in New Technologies and Mobility in Health (NTMH) than in 8 other courses, higher in MP than in 6 other courses, lower in Open Source Operating System (OSOS) than in other 10 courses, and lower in Network Basics (NB) than in 2 other courses. The value of disgust was found to be higher in OOP than 6 other courses, higher in NTMH than in 10 other courses, higher in MP than in 3 other courses, and lower in OSOS than in 12 other courses. The value of happiness is lower in NTMH than in 6 other courses, higher in NB than in 9 other courses and higher in OSOS than in 9 other courses. The value of sadness is higher in NTMH than in 7 other courses and lower in OSOS than in 9 other courses. The value of surprise is higher in NTMH than in 5 other courses and lower in NB than in 9 other courses.

Whether the instructors' emotions changed in the courses that lasted for six weeks according to weeks was examined with the Kruskal Wallis H-Test and it was determined that, **as regards weeks**, there was no significant difference in the feelings of anger (X^2 (sd = 5, n = 290) = 2.693 $p > .05$), contempt (X^2 (sd = 5, n = 290) = 1.783, $p > .05$), disgust (X^2 (sd = 5, n = 290) = 1.550, $p > .05$), fear (X^2 (sd = 5, n = 290) = 3.007, $p > .05$), happiness (X^2 (sd = 5, n = 290) = 5.204, $p > .05$), sadness (X^2 (sd = 5, n = 290) = 3.039, $p > .05$) surprise (X^2 (sd = 5, n = 290) = 5.477, $p > .05$).

In distance education, it is known that while students sometimes attend lectures synchronously, they sometimes do not. Whether the **attendance of students** in the lecture affects the emotions of the instructor was examined

with the Mann-Whitney U-test; it was determined that the feelings of anger ($U = 16,091$, $p < .05$), contempt ($U = 16.437$, $p < .05$), disgust ($U = 16.348$, $p < .05$) and sadness ($U = 17.445$, $p < .05$) changed significantly, and the values of these feelings were higher in the absence of students. There was no significant difference in the feelings of fear ($U = 20.010$, $p > .05$), happiness ($U = 18.647$, $p > .05$) and surprise ($U = 22.689$, $p > .05$) as regards students' attendance.

Depending on whether the lectures are theoretical or with practical application, the change in emotions was examined with the Mann-Whitney U-test; it was determined that the feelings of anger ($U = 5.052$, $p < .05$), contempt ($U = 8.283$, $p < .05$), disgust ($U = 6.282$, $p < .05$) and sadness ($U = 8.020$, $p < .05$) changed significantly and the values of these feelings were higher in theoretical lectures. There was no significant difference in the feelings of fear ($U = 11.003$, $p > .05$), happiness ($U = 12.106$, $p > .05$) and surprise ($U = 12.442$, $p > .05$) **as regards lecture types**.

Instructors completed some lectures in one session, and some in two sessions by having a break. The change in emotions as regards session information was examined with the Mann-Whitney U-test; it was determined that there was no significant difference in the feelings of anger ($U = 19.123$, $p > .05$), contempt ($U = 19.369$, $p > .05$), disgust ($U = 19.909$, $p > .05$) fear ($U = 19.511$, $p > .05$), happiness ($U = 19.654$, $p > .05$), sadness ($U = 20.545$, $p > .05$) and surprise ($U = 19.091$, $p > .05$) **regarding session information**.

RESULT AND DISCUSSION

In this study, the facial expressions and movements of the nine instructors in 149.8 hours of videos recorded in 288 sessions of 29 different courses that continued for six weeks in the distance education environment were analyzed with Facial Action Coding System (FACS) and evaluated via a software developed by the researchers using the C # programming language and Microsoft Face Recognition API. For this purpose, 53,923 photographs were obtained by taking photographs of the instructors from the offline video records of the lectures every 10 seconds. Since some of these photographs could not be analyzed, the analysis of the universally accepted feelings of disgust, sadness, happiness, fear, contempt, anger, and surprise (Ekman & Friesen, 1976) were conducted with a total of 47,883 photographs.

Via face analysis, the study determined the change as regards duration in the emotions of the instructors who taught in the distance education environment. It was observed that, although they varied for different periods, the feelings of sadness, surprise and anger increased at the beginning, while the feelings of fear, disgust, happiness and contempt decreased. It can be concluded that the instructors might have had a serious attitude at the beginning of the lecture in front of the screen, and this assumption is supported by the fact that, especially in the first minutes, happiness decreased, while sadness and anger increased. The fact that the feelings of fear and disgust decreased until about the 2nd minute and then increased until approximately 8th-10th minutes suggests that after the greeting/introduction phase of the lecture, negative emotions occurred in the instructors while introducing the subject, and that they recovered after they dominated the lecture. It was observed that the feeling of fear generally increased during transitions. The study revealed that negative feelings, though not at the same durations, increased rapidly with significant changes between the 11th-19th minutes. The feeling of sadness rose significantly after the 12th minute, anger after the 11th minute, and fear after the 20th minute. The feeling of sadness subsided after the 30th minute, surprise after the 32nd minute, fear after the 34th minute, anger after the 25th minute, and contempt after the 35th minute. That is to say, sadness, surprise, fear, anger, contempt declined after about the 25th-35th minutes. In the study carried out in 29 courses, it was determined that the instructors completed lectures in sessions that usually lasted 25-40 minutes, and that some lectures lasted longer, as shown in Figure 2. The analyses conducted were evaluated on the basis of medians. In the 25-40 minute lectures, negative emotions went up between the 11th and 20th minutes, whereas they mitigated in the extra time of the lectures. It can be argued that there was a fall in negative emotions after the 25th-35th minutes in lectures which lasted longer due to the preference of the instructor. The finding that the emotions changed significantly according to the instructors also supports this assumption. Considering the average values of all lectures, it was observed that the instructors' negative emotions increased between the 11th and 20th minutes, and that they rose even more between the 25th and 35th minutes. Similarly, the study by Author (2017) also determined that students' engagement time in the lecture declined between the 7th and 17th minutes due to the elevated negative emotions. Similar studies on student engagement time also indicated the 10-20 minute interval (Bradbury, 2016; Davis 1993; Johnstone & Percival, 1978; McEachie, 1986; Wankat, 2002). The study by Lagerstrom et al., (2015), which revealed that the students watched lecture videos for 17-20 minutes, also supports our findings. The data in the study regarding emotional changes are consistent with those in other studies. For instance, in the study by Author (2020), in which the changes on students' faces during the lecture were examined, the changes in students' emotions are quite similar. It can be maintained that the feelings of anger and happiness show almost the same change, including their durations, and that their change patterns are very close to each other even though the initial changes in the feelings of contempt

and sadness are different. This indicates that people who learn or teach in different teaching environments experience similar feelings.

As a result of the analysis, it was determined that the feelings of anger, contempt, disgust, fear, happiness, sadness and surprise differ according to the instructors. When the reason for this differentiation is examined, it was determined that each emotion changed in a different way in different individuals and this change did not occur in a certain pattern. This suggests that emotional changes depend on the reflection of the personal characteristics of individuals. The emotional responses of individuals in different situations vary from individual to individual (Duyan et al., 2011). Tamir et al. (2007) argued that the way individuals regulate their emotions varies. Similarly, Nilsen (2016) suggested that human emotions can differ according to individuals.

This study determined that the emotions of the instructors examined during the courses taught in six different programs varied according to the programs. In CPR, based on numerical knowledge, the values of all emotions except happiness were lower than in MDS, OMA and JP, based on verbal knowledge. Considering that emotions such as anger, contempt, disgust, fear, and sadness are negative feelings, it can be argued that instructors experience positive feelings more intensely in the programs based on numerical knowledge.

As a result of the analysis carried out in twenty-nine different courses, it was found that there was a significant difference in the emotions regarding the programs. When the reason for this difference was examined, it was determined that negative emotions such as anger, contempt, disgust, and sadness were experienced more intensely in the NTMH course, taught for the first time in CPR, and in OOP and MPr courses, taught for 3 years, when compared to many other courses. On the other hand, in the courses (CSP, OSOS, AT) having a complete content and taught by the same instructor for years, positive emotions such as happiness had a higher median, whereas negative emotions had a lower median than other courses. It can be argued that the course content had an impact on the instructor's emotions. Similarly, among the factors affecting the quality of online education is rich and quality course content, namely, learning-teaching resources and materials (Chao et al., 2006). Seaman (2009) argued that one of the factors that cause negative emotions of instructors is the low quality of course materials. This study also revealed that instructors had negative emotions in the lectures, the content of which was not developed sufficiently.

It had been aimed to examine the emotional changes of the instructors during the lectures throughout a semester. However, as the pandemic process started in Turkey after the sixth week, the instructors had to teach their classes from their homes and preferred not to share their own images in most lectures. For this reason, the images of the instructors were limited to six weeks, and it was found that they did not experience a change of emotion during this process depending on weeks. It can be assumed this was due to the fact that the instructors were experienced in distance education.

The study revealed that while students' attendance in the lecture created significant differences in the feelings of anger, contempt, disgust, sadness, it did not create a significant difference in the feelings of fear, happiness, and surprise. Due to the absence of students, the feelings which differed significantly were experienced more. Therefore, it can be claimed that student's attendance during the lecture generally reduced negative emotions. Bolliger and Wasilik (2009) suggested that students' performance and engagement during the lecture in distance education has a positive effect of on the satisfaction levels of the instructors. Similarly, this study revealed that the students participating during the lectures affected the positive emotions of the instructors.

The courses analyzed are divided into two: theoretical courses and the courses with practical application on a software. When the emotions of the instructors were examined according to the type of the course, it was clear that negative emotions such as anger, disgust, contempt, and sadness were experienced more intensely in theoretical courses, and that there was no significant change in the feelings of fear, happiness, and surprise. It is assumed that the courses with practical application can enable the instructor to feel more positive emotions.

It was observed that while the instructors gave a break in some lectures after 25-40 minutes, and then continued to teach in the second session, in some lectures, they completed the lecture in a 50-minute-single session without a break. The study showed that, generally, each instructor had a unique style and the break they gave were approximately at the same time interval every week. The significance of the emotional changes according to the sessions was examined, and no significant difference was found.

Based on the results of this research, the following recommendations are proposed. It is significant that lectures in the distance education environment not be longer than 19 minutes in order for the instructors not to reflect their negative emotions to the students. In this regard, it is recommended that instructors should not allow lecture

duration to exceed 20 minutes. In courses based on verbal knowledge, the lectures can be organized in a way to increase positive emotions. It is essential that the prepared course content should be of high standards. Distance education students can be encouraged to attend the class.

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