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Online Course Viewings and Their Effects on Performances in Covid-19 Distance Education Period

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Abstract: Despite numerous studies examining student preferences in terms of live and recorded lecture viewings, the effects of lesson viewings on online platforms have been limitedly studied. In this study, the rates of attending live lectures and viewing lecture recordings in the Covid-19 era were examined, and attendance and viewings effects on final scores in these courses were evaluated. For this purpose, data from online education systems of live and record viewings for Turkish Literature, mathematics, and biostatistics classes in the spring semester of 2021-2022, belonging to 13 Turkish universities and 2082 students, were utilized. We found that (1) Thirteen percent of the students did not view any live or recorded courses, and approximately one-third did not enter the final exam; (2) The students in state universities have significantly higher record viewing rates than those in private universities with medium effect size, (3) Females present significantly higher live viewings and record viewing rates than males with small effect sizes; (4) Biostatistics has moderate-high correlations between viewing rates and final scores. On the other hand, there are no or weak relationships between the viewing rates and final scores for Turkish literature and mathematics, in which study materials can be widely accessed from many sources different from biostatistics.

Keywords: distance education, final scores, live lecture attendance, recorded lecture viewing.

Introduction

It is believed that increasing class attendance enhances class engagement and success (Moores, Birdi and Higson, 2019; Wongtrakul and Dangprapai, 2020). Hence, minimum attendance requirement to classes is mandatory in most universities. While some studies support this fact, some studies have concluded that attendance does not affect course success (Gomis-Porqueras and Rodrigues-Neto, 2018; Kaushik, Kumar and Kumar, 2021). Even if the students physically attend the lessons, they may not provide behavior engagement, emotional engagement, and cognitive engagement, which are three dimensions of class engagement (Hu and Li, 2017; Qiping Kong, 2003). Compulsory attendance to the course may lead the students to attend the course without listening to the course, such as surfing the internet, and so this does not contribute to their success (Nieuwoudt, 2020). Kaushik, Kumar and Kumar (2021), stating that compulsory attendance may hinder academic success, defined the reasons for this as students wasting the interval when the course intervals are long, spending too much time on their way to and from school, and thinking that asynchronous courses would be sufficient for some courses. Some of these reasons do not apply to distance education. Because in online education, time is not spent going to school; the students can watch the lectures anywhere and anytime they want. So the effects of physical attendance on success can be different for online courses.

So far, the comparison of live and recorded lecture viewing is mostly about students' preferences, and studies measuring their effects on academic achievement are limited (Islam, Kim and Kwon, 2020; Howard, Meehan and Parnell, 2018; Trenholm, Alcock and Robinson, 2012; Nieuwoudt, 2020; Kahui et al., 2022; Le, 2022). In addition, generally studies in literature are limited mostly with schools or lectures. We want to evaluate student live and recorded course viewings, which are very important parts of the distance education system, especially in the Covid-19 period. We hope that this study will be beneficial for policy makers, education system developers and educators interested in online lesson viewings in

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universities' distance education. This study is important for the evaluation of selected three courses in 13 universities. First we have seen that in the literature (For example: Shahabadi and Uplane, 2015), students have different perspectives for synchronized and recorded lectures. Hence, we classified our viewed classes in two classes as synchronized and live lectures. Existing studies indicated that based on gender, there would be some differences in distance education as well (Gupta and Saks, 2013; Kahui et al., 2022). Hence, we created a category for gender. On the other hand, we have not come up with any literature regarding the differences in public and private university students' interests in viewing the online lectures. In order to provide support to the literature, we also investigated public and private university difference in our study. Finally, whether students attend the final or not was the third category in our study. We also investigated the participants online class participation in all these categories specifically for Covid 19 period. Hence, we propose the following hypothesis.

RQ1- What are the rates of viewings (live & record) and entering final exams of the students in the Covid-19 in Turkey?

RQ2- Are there any significant differences between viewings (live & record) based on gender, university type, and final taking tendency?

RQ3- Are there significant relations between viewings (live & record) and final scores?

The remain of this study continues with literature review. In the third section of this study, download and data preparation processes are explained. In the fourth section, analyzes and findings are provided. In this section, first of all, descriptive statistics about lesson viewings, and the distribution of student lecture viewings and entering the final exam are given. Afterward, we investigated whether there were significant differences in lesson viewings according to gender, type of university, and entering the final exam. Later, it was investigated whether the lectures' viewing rates had an effect on final scores. In the last section, the findings were also elaborated.

Literature Review

With Covid-19, face-to-face teaching was suspended in schools to a large extent, and distance education decisions were taken not to interrupt education during this period. Universities in Turkey also followed this suit and carried out the 2020-2021 spring academic period with online courses to prevent the risk of Covid-19 contamination in the classroom environment and to ensure the continuation of the education. In distance education, teachers and students work on educational materials in different places and sometimes at different times (Gunawardena and McIsaac, 2013). Distance education, which was previously carried out through channels such as radio and television, continues with web-based training widely with the development of information technology and the spread of the Internet. Web-based online courses can be given as synchronously or asynchronously. While synchronous education offers the opportunity to interact between the teacher and the student, asynchronous education offers the option of using course records that can be watched at any time by adjusting the video speed and moving back and forth. When these educations with different advantages are compared, students generally preferred recorded video lectures to live lectures (Islam, Kim and Kwon, 2020; Howard, Meehan and Parnell, 2018; Trenholm, Alcock and Robinson, 2012). However, students stated that they still attach importance to live lectures for existence of sense of community and quick feedback (Trenholm, Alcock and Robinson, 2012). Motivations and cognitive strategies affect students' decision whether to attend the courses face-to-face or online (Bassili, 2008; McKenna and Kopittke, 2018). Since most students consider the interaction in face-to-face courses important, they continue to attend the lessons even though online accessible class records are uploaded to the system (Yoon, Oates and Sneddon, 2014; Fei et al., 2013; Gysbers et al., 2011; Alamer and Alharbi, 2021). For example, only 58 per cent of university students, who can take distance or face-to-face education, preferred and participated in face-to-face education, and less than 15 per cent of those who did not take the any preference to downloaded courses, yet did not watch them (McKenna and Kopittke, 2018).

At the beginning of the Covid-19 period in Turkey, students stated that both theoretical and practical courses would be insufficient with distance education. They did not think of suspending study, but thought that the school time would be extended (Kursuncu and Kurt, 2020). Although the students did not encounter any technical problems in the distance exams, they stated that they were worried because they would deal with power cuts and internet connection problems before the exam (Ilgaz and Afacan Adanır, 2020). Different results were obtained to student satisfaction in the studies conducted during the Covid period. In a survey evaluating the distance education of undergraduate dentistry students in Turkey during pandemic, students complained that practical training could not be given online and the lectures

were inefficient (Cirakoglu and Ozbay, 2022). On the other hand, Tayem et al. (2022) reported that most of the students were satisfied with distance education and would prefer the theoretical courses to be given remotely and the practical courses to be given face-to-face. With a similar inference, educators who give anatomy education think that the loss of quality experienced in the distance teaching in theoretical courses will be less than that of distance practical courses (Ozen, Erdoğan and Malas, 2022). For some courses, distance education can be as effective as traditional education, if it is supported by simultaneous education (Alamer and Alharbi, 2021). In the distance education system, it was observed that especially male students were more satisfied and found the lectures more effective and flexible (Buluk and Equalti, 2020; Turan, Kucuk and Cilligol Karabey, 2022). In another survey conducted with undergraduate students, students stated that they were provided time flexibility and course content flexibility in distance education. Yet, student satisfaction was generally low because of the complexity of teaching materials (Turan, Kucuk and Cilligol Karabey, 2022). On the other hand, in Nieuwoudt's study, it is found that viewing live lectures or watching videos of course recordings can have the same effect as face-to-face education. It is emphasized that there may be different reasons for students not attending the live courses in distance education, therefore they should be given the right to attend the course by watching the lecture records (Nieuwoudt, 2020).

Data Preprocessing

ALMS is one of the two most used learning management systems in Turkey (Durak, Çankaya and İzmirli, 2020). The system records data of the students and teachers in order to measure the efficiency of their online activities. To examine the course viewing rates of students and their effects on their success in the 2020-2021 spring semester of Covid period, we selected the courses that are commonly given in different departments of universities. We preferred these courses to be in different categories: numerical, verbal, and departmental. These courses were mathematics, Turkish literature and biostatistics. We downloaded the records of these courses given in 13 different universities and 21 different departments. We filtered the dataset in such a way that the names of the courses included as mathematics, Turkish literature, biostatistics, or the words with the same meaning as them, such as calculus. In addition, we have removed the courses that evaluate the final of the courses as homework from the dataset. All characters in the downloaded dataset texts are converted to lowercase. Since some of the gender data of the users was missing from the database, the missing places were added manually.

Each lecture recorded by the teachers in the dataset is added to the system as a separate record for each student. These records include student times of viewing live lectures. Viewing recorded lectures are assigned as zero at first. As viewing activities of students' change, these values are altered. We summed students' live attendance times and also summed up their replay (record viewing) times for each lecture and saved them in a new database. So in the new database, there was a single record for each student-lecture. In addition, we summed the recording times of the teacher in the live lectures for each lecture during 14-weeks and we found the total live time for each lecture. In some lectures, we observed that the live lectures were not given, instead, the videos uploaded or recorded by the teacher to the system were watched. We removed these course records from the prepared dataset. Afterward, we divided the total live viewing time and the total record viewing time of the courses by the total recording time of the live lectures and multiplied by 100 (1, 2). So we normalized the viewings by replacing them with their percentages. These records were joined on the dataset containing the final scores of the students where student numbers and course numbers were equal, and the data set preparation process was completed.

$$\text{Live Attendance (\%)} = \sum \text{Live Viewing Time} / \sum \text{Live Lecture Time} \times 100 \quad (1)$$

$$\text{Record Viewing Rate} = \sum \text{Record Viewing Time} / \sum \text{Live Lecture Time} \times 100 \quad (2)$$

Analyzes and Findings

Descriptive Analyses with Student Rates of Viewing Lessons and Entering Final

There are 2082 records in the prepared dataset. In this prepared dataset, the numbers of records for mathematics, Turkish literature, and biostatistics are respectively; 251, 1277 and 604. While the numbers of females and males are 1374 and 708, respectively, there are 1434 state, 648 private university

students. At the end of the semester, 1410 of the 2082 students entered the final exam, 672 of them did not. All variables are not normally distributed. The average percentage of viewing for live lectures is 28.1 per cent and for viewing recorded lectures' range is 46.4. The highest average viewings, belonging to biostatistics, female, state schools' courses and students entered the final are presented below (Table 1).

Table 1
Descriptive Statistics

				Live Attendance (%)			Record Viewing Rate		
		n	**%**	**Mean**	**Sd**	**p**	**Mean**	**Sd**	**p**
All		2082	100.0	28.1	28.9	0.00	46.4	87.2	0.00
Lesson	**T. literature**	1227	58.9	27.7	28.8	0.00	47.3	97.8	0.00
	biostatistics	604	29.0	32.5	29.6	0.00	54.3	74.3	0.00
	math	251	12.1	19.5	25.6	0.00	22.6	48.3	0.00
Gender	**female**	1374	66.0	31.2	29.8	0.00	51.7	90.8	0.00
	male	708	34.0	22.1	26.2	0.00	35.9	78.7	0.00
Type	**state**	1434	68.9	29.0	29.9	0.00	57.9	97.0	0.00
	private	648	31.1	26.1	26.6	0.00	20.7	51.5	0.00
Exam	**entered**	1410	67.7	28.5	31.4	0.00	48.3	91.4	0.00
	not entered	672	32.3	27.1	22.9	0.00	42.4	77.7	0.00

We want to investigate students' attention to the online lectures. To evaluate this, we examined viewing and entering final rates. We observed that,13,4 per cent of the students did not attend any live classes in the chosen courses and did not view any video lectures (Table 2). The percentage of students in private universities not viewing any lectures is the highest with 32.25 per cent. In the Turkish literature course, 19.8 per cent of the students did not view any lecture. On the other hand, biostatistics has the lowest percentages of not to watch course with 2.48 per cent. One third of the students approximately (32.28 per cent), did not enter the final. 251 of 708 (35.45 per cent) male students, 421 of 1374 (30.64 per cent) female students, 326 of the 1434 (24.73 per cent) state university students, and 346 of the 648 (53.4 per cent) private university students did not take the final exam (Table 2).

Table 2
Rates of students who didn't watched any online classes and did not enter the finals

		Univ. Type		**Gender**		**Course**		
	all	**state**	**private**	**female**	**male**	**T. literature**	**biostatistics**	**math**
N	2082	1434	648	1374	708	1227	604	251
N (Never Watched)	280	71	209	187	93	243	15	22
% (Never Watched)	13.4	4.95	32.25	13.61	13.14	19.8	2.48	8.76
N (Not Entered Final)	672	326	346	421	251	281	337	54
% (Not Entered Final)	32.28	22.73	53.4	30.64	35.45	22.9	55.79	21.51

Differences Analyses

We want to analyze differences for viewing rates with different features. These features are male and female, type of universities as state and private universities, entering final exam and not entering final exam. Each student attends only one course in the dataset, so each record is independent from the other courses and the data values in each group are nonparametric. Thus, we applied the Mann-Whitney U Test for all to see if there was a significant difference between two groups in live attendance rates (record viewing rates).

H1: There is a significant difference between male and female students' live attendances.
H2: There is a significant difference between male and female students' record viewings.
H3: There is a significant difference between state and private university students' live attendances.
H4: There is a significant difference between state and private university students' record viewings.
H5: There is a significant difference between the students' who taking final and who the students' not taking final live attendances.
H6: There is a significant difference between the students' who taking final and who the students' not taking final students' record viewings.

We evaluated the significance level at the 0.01 value and we calculated the effect sizes (r) of through division of Z on N square (Corder and Foreman, 2009) for significant tests. It was seen that the group with the most different viewing rates, with a medium effect size (r=- 0.371), was between state and private university students' record viewings (Table 3). That is, the rate of record viewings of students at state universities (15.70) is significantly higher than those at private universities (0.13) (U=250635, p=0.00). Also, the percentage of female students' live attendance (24.23 per cent) is significantly higher than the percentage of male students' live attendance (10.64 per cent) (U=403653, p=0.00). Likewise, the rate of female students' record viewing (11.945) is significantly higher than the record viewing rates of male students (3.195) (U=414842, p=0.00). However, the effect sizes of gender differences for both live and record viewings are small (r=-0.141 and -0.121sequentially). While there is a significant difference between state university students (18.49) and private university students in the live viewing, the effect size of this difference is also small (r=-0.06). On the other hand, there are no significant differences between the rates of those who took the final and those did not take the final in both live and record viewings.

Table 3
Evaluation of the differences in viewing percentages between Female-Male, State-Private, and Taking Exam-Not Taking Exam

		N	Median	Mean Rank	Mann-Whitney U	P	Z-score	r
Live Attendance (%)	Male	708	10.64	924.6	403653	0.000	-6.434	-0.141
	Female	1374	24.23	1101.7				
	State	1434	18.49	1065.8	429829	0.006	-2.768	-0.060
	Private	648	20.26	987.8				
	Taking Exam	1410	15.97	1021.9	446236	0.030		
	Not Taking Exam	672	24.96	1082.5				
Record Viewing Rate	Male	708	3.195	940.4	414842	0.000	-5.529	-0.121
	Female	1374	11.945	1093.6				
	State	1434	15.79	1190.7	250635	0.000	-16.919	-0.371
	Private	648	0.13	711.3				
	Taking Exam	1410	9.505	1060.9	446354	0.031		
	Not Taking Exam	672	4.675	1000.7				

Correlations Between Final Scores and Viewings

For Turkish literature, biostatistics, and mathematics courses, we desired to examine the relationships between online course viewings and students' performances. For the evaluation of student performance, the final exam grades entered by the students at the end of the semester and were taken as a basis, and the data of the students who did not participate the final were excluded from the analysis.

H7: There is a relationship between the live viewing rates and Turkish Literature final scores.
H8: There is a relationship between the record viewing rates and Turkish Literature final scores.
H9: There is a relationship between the live viewing rates and biostatistics final scores.
H10: There is a relationship between the record viewing rates and biostatistics final scores.
H11: There is a relationship between the live viewing rates and mathematics final scores.
H12: There is a relationship between the record viewing rates and mathematics final scores.

When the data of the students who took the final exam were filtered, and the distributions of live viewing and recording of the Turkish literature, biostatistics, and mathematics courses were examined, we have seen that all distributions did not fit with the normal distribution (Table 1). Hence, Spearman's Correlation method was run to see the relations. The highest correlation is found, as 0.665 at a 0.01 significant level, between biostatistics live viewings and final scores (Table 4). The second highest correlation is 0.1962, also between the biostatistics course live viewings and the record viewing rates, at a 0.01 significant level. Mathematics' final scores have no significant correlation with live viewings, but a positive low correlation (r= 0.1885) with record viewings. For Turkish literature course, there are again low, but positive (r=0.1164) correlations between final scores and live attendance rates and negative correlations (r=-0.1128) between final scores and record viewing rates.

Table 4

The correlations between the rates of (live-record) viewing and final scores for the students who entered the final

Spearman's rho		Final Score		
		T. Lit.	Bio.	Math.
	n	946	267	197
Live Attendance (%)	Cor Coeff	**0.1164**	**0.6651**	-0.0358
	Sig	**0.00**	**0.00**	0.6179(n.s)
Record Viewing Rate	Cor Coeff	**-0.1128**	**0.1962**	**0.1885**
	Sig	**0.00**	**0.0013**	**0.008**

Discussion and Conclusion

The average live and record viewing rate values, which are found to be 28.1 per cent and 46.4 respectively. These values present that attendances to lectures in Turkish universities are low during the pandemic period. A significant number of students (13.4 per cent) have never attended any live lecture and watched any recording lecture. A similar conclusion is also reached in the study belongs to the beginning period of Covid19 for Turkey. Can (2020) concluded that the course data for five courses in the first weeks of distance education due to the pandemic in Turkey (23 March 2020-07 April 2020) and students' participation in live virtual classrooms and record viewing rates are low. Students mainly preferred access to written materials and course presentations during this period (Can, 2020). Before the pandemic, universities in Turkey required attendance to classes based on the institutional requirements and regulations, and students who did not achieve a certain attendance rate would fail the class. Since the sudden transition to distance education during the Covid-19 period could cause problems on an institutional and individual basis, this obligation was suspended in Turkey. However, in countries where attendance is mandatory, during Covid 19 pandemic, the online class attendances are observed to be low as well. For example, although dentistry students attending a prosthetics course in China must attend 95 per cent of the lectures to pass the course in Covid-19 period, about a third of the students did not attend almost any lecture, and half of them attended only 10 per cent of the lectures (Yang et al., 2021). Similarly, in New Zeland during 2020 lockdown period because of Covid 19, 34 per cent of students did not view any live or recorded lectures (Kahui, 2022). This may indicate the existence of some technical, social, or cultural difficulties for countries in distance education. Lack of strong telecommunication infrastructure, inability to abandon cultural habits, insufficient technical personnel, and financial reasons can be seen as the main problems encountered in distance education to be overcome (Mirza and Al-Abdulkareem, 2011; Basha, Hussein and Maklad, 2021).

When females and males are compared in terms of both live and record viewing rates in Turkey during the Covid 19 period, it is seen that females' viewing rates are significantly higher than those of males. But these differences have low effect size (r=-0.141 and r=-0121 for live and record viewings sequentially) and variables don't explain each other very well (Table 3). In Kahui, Kumar and Kumar (2020) study for Covid 19 lockdown, New Zealand's students attended only 20 to 23 per cent of the live lectures, and this figure is three times higher for females than males. On the other hand, in 2013 study of medical students found that while females attended more live lectures than males, they viewed fewer recorded lectures (Gupta and Saks, 2013). Yet, the widespread use of computers may have probably increased women's ability to access and use computers since then.

Our results also indicate that approximately one-third (32.28 per cent) of the students didn't take the final in the spring semester of 2021-2022 semester (Table 2). More than half of the private university students did not take their final exams (53.4 per cent), and in state universities, we saw that this ratio is somewhat lower (22.73 per cent),(Table 2). We couldn't find a significant relationship between students' live classes attendance and taking final exams. Similarly, we couldn't find a significant relationship either between students taking their final exams and recorded lecture viewings (Table 3). This is surprising and why students do not take the exam is an issue that needs to be investigated. We may think that some students did not intend to fail some classes, do their viewings normally like other students, and yet at the end of the semester, prefer not to take their final exams. Biostatistics is the class, the highest ratio of students missed final exam (53.4 per cent), at the same time has the highest ratio of live attendance (32.5 per cent) and recorded lecture viewings (54.3 per cent). We may conclude here that although students largely viewed live and recorded classes, since some students did not understand the lectures, they preferred not to take the final exam.

Another remarkable result is that, in state and private universities, students' lecture records viewing have differentiated as middle effect (r = -0.371) in viewing class recordings (Table 3). The median value of recorded lecture viewings in private universities is close to zero (0.13). The issue of why students in private universities in Turkey do not watch recorded lectures despite their participation in live online lectures also needs to be studied and understood.

In mathematics and Turkish literature classes, zero to low correlations were found between live/recorded viewings and final scores (Table 4). Similar results were obtained for 31 students, enrolling in the "Volcanology and Geohazards" course at the University of Liverpool. In that study, no positive or negative relationship was observed between live and recorded viewing rates and performances (Jones, 2022). Therefore, the authors think that instead of observing these statistics, it would be better to invest in systems where students can monitor active participation, such as answering questions in live lessons. In addition, the author also states that students who know that statistics such as clicks and page refreshes are measured may be inclined to cheat the system. With new technologies such as the use of face recognition systems may students' entry into the system be controlled in the future (Ozdemir and Ugur, 2021), but these technologies have not become widespread yet. On the other hand, in the bio-statistics course, which has more limited learning resources, a moderate-high correlation was found between students' viewings and final scores. For the biostatistics course, live viewings have a much more significant impact on final grades than recorded lecture viewings. Le (2022), in his study, compared the academic success of those who watch only live lectures with those who watch only video lectures, and similarly, she found that those who watch live lectures become more successful. We observed from the results that for the Turkish literature course also, online live attendance has a higher effect on the final score than the record viewing rate. The low correlations in mathematics and Turkish literature courses could be because these courses are taught as a repetition of the similar courses in high school, and the content of these courses can be accessed from different sources easily.

When the survey studies between January 2000 and May 2021 were examined, teachers evaluated their digital competence as low or medium-low and admitted that they did not have some competence in educational practices (Basilotta-Gómez-Pablos, 2022). The highest negative factor among teachers in distance education was evaluated as the difficulty in preparing the lesson technically and attracting the attention of the student (Sorochinsky, 2021). More frequent and effective use of distance educational systems' features such as polls, chats, breakout rooms, and giving extra time to gather their courage after questions asked can enable students to participate more actively in the lesson (Nichols et al., 2022). It will be also beneficial for scientists, psychologists, game developers, teachers and software developers to work together in order to increase students' active participation in classes and teaching achievements in future.

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Conflict of interests

The authors declare no conflict of interest.

Author Contributions

Conceptualization, E.D. and Ç.E.; resources, E.D.; methodology, E.D. and Ç.E.; software, E.D.; formal analysis, E.D. and Ç.E; supervision, A.H.T.; writing—original draft preparation, E.D. and Ç.E; writing—review and editing, Ç.E. and A.H.T. All authors have read and agreed to the published version of the manuscript.

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