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Online Tertiary Education During The COVID-19 Pandemic in Turkey: A Country Profile Based on Survey With 13 Thousand Students[1]

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COVID-19 Pandemisi Döneminde Türkiye'de Yükseköğretim: 13bin Öğrenci ile Yapılan Anket Sonuçları Bazında bir Ülke Profili[2]

Abstract

Turkish higher education system experienced a rapid shift to online education due to the COVID-19 outbreak in March 2020. The present study aims at identifying countrywide variations in online education applications at the aggregate level with the help of a large survey conducted with over 13 thousand participants registered in Turkish universities. Findings are presented in a structured framework aiming to distinguish student-, faculty member-, and institution-related factors that would presumably drive students' satisfaction of online education during the pandemic. Preliminary results of multiple regression analysis in support of findings are complementarily supplemented in Appendix. Investigation of these factors provides important policy suggestions to higher education affiliates.

Keywords : Online Education, Distance Education, Tertiary Education, COVID-19, Turkey.

JEL Classification Codes : A2, I21, I23.

Öz

Mart 2020'de ortaya çıkan COVID-19 salgını nedeniyle Türk Yükseköğretim sistemi, çevrimiçi eğitime hızlı bir geçiş yapmak durumunda kalmıştır. Bu çalışma, salgın döneminde üniversite öğrencilerinin çevrimiçi eğitim memnuniyetini etkilemesi muhtemel faktörleri belirlemeyi amaçlamaktadır. Bu doğrultuda, Türkiye'deki üniversitelere kayıtlı 13 binden fazla öğrenci ile yapılan kapsamlı anket çalışması ile elde edilen bulgular kullanılarak öğrenci, akademisyen ve kurumlarla ilişkili çeşitli faktörlerin varlığı ortaya konulmuş ve tartışılmıştır. Bulguları destekleyen çoklu regresyon analizi sonuçları Ekler kısmında verilmiştir. Bulgular ışığında yükseköğretim paydaşlarına yönelik politika önerileri sunulmaktadır.

Anahtar Sözcükler : Çevrimiçi Eğitim, Uzaktan Eğitim, Yükseköğretim, COVID-19, Türkiye.

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[1] *Data is available upon request.*

[2] *Talep olması halinde veriler paylaşılabilir.*

1. Introduction

Numerous universities switched to online education worldwide around the beginning of 2020 due to the COVID-19 pandemic. Given higher levels of welfare and increased prevalence of technology, it was relatively easier to implement and sustain some mode of online education in universities located in developed countries. Also, university students being familiar to some sort of online education within the default course structure before the pandemic was an experiential plus for both students and lecturers in these countries. However, the rapid adaptation of online university education in developing countries was more demanding. On the one hand, students experienced problems related to insufficient coverage of and uneven access to the Internet, lack of electronic device ownership, populous households, and unfamiliarity to newly implemented systems. On the other side, higher education institutions faced problems related to technological capacity including having reliable online systems and knowledgeable IT staff at hand, instructors inexperienced in online education, and failures to communicate with students. When health and psychological challenges of the pandemic were accounted for, shift to online education in the tertiary level was exhaustive in the developing world.

With close to eight million students registered in 207 higher education institutions, Turkey is one of those developing countries, which experienced an unexpectedly rapid shift to online education in the tertiary level. With the rise of COVID-19 spread, the Council of Higher Education in Turkey announced on March 23, 2020 that all institutions under its conduct will halt face-to-face education and adapt some sort of online education solutions for the rest of the spring semester. Although almost no higher education institution in Turkey, except for a handful of them, were devoid of the problems aforementioned, the rest of the process in which how, at what pace, using which criteria the institutions were to convert into online education was left to the higher education institutions' own preferences. Thus, there appeared great variation among Turkish higher education institutions with regards to the computer/online programs they employed, the date of full implementation of online education, the mode of online lessons-synchronous or asynchronous, the grading method and scheme, the communication channels to students and many more. Moreover, variation in online education practices not only happened among universities, but also among departments within the same university. When differences among university students in, such as, access to the Internet, electronic device ownership, household population during lockdown period are accounted for, the complete transition to online education in Turkish tertiary education experienced great challenges. An overview of important events and corresponding dates in Turkish higher education during the pandemic is provided in the Appendix-A.

Hence, the present study aims at *identifying* the current situation and preferences of university students in Turkey after the rapid shift to mass online education during the pandemic by a comprehensive survey conducted with more than 13 thousand participants. Complementarily, it also aims at *establishing* a quantitative base for future institutional policies specifically related to online tertiary education and regarding catastrophe

management in general for developing countries with similar characteristics. With this perspective in mind, we attempt to report aggregate indicators of and trends in online education that leads to the *identification* of possible factors affecting students` satisfaction from online education during the pandemic. After providing with general trends among students in satisfaction of and their preferences over online education, we next examine factors that carried potential to affect online education in three aspects as (i) student-related factors, (ii) faculty member-related factors, and (iii) institution-related factors. Investigation of these factors eventually leads to important policy suggestions to higher education agents for a smoother transition to and a strengthened maintenance of online education as well as for any unanticipated catastrophic change we might encounter in the future.

The present study is differentiated from some recent works on online education during pandemic in Turkey with respect to its research design, outcomes, and scope. Most previous works on online education-pandemic nexus in Turkey focused only on one specific university (Keskin & Özer-Kaya, 2020; Tarlakazan & Tarlakazan, 2020; İnce, Kabul & Diler, 2020; Sarıtaş & Barutçu, 2020; Aksoğan, 2020; Akbal & Akbal, 2020; Afşar & Büyükdoğan, 2020; Tüzün & Yörük-Toraman, 2020; Tüzün & Yörük-Toraman Forthcoming). While some only focused on one education program among different Turkish universities (Zan & Zan, 2020), some tried to have a grasp of the technological systems employed by Turkish universities during the pandemic (Durak, Çankaya & İzmirli, 2020) and others evaluated the legislative requirements of online education in Turkey (Esgice Gündüz, Kursun, Karaman, & Demirel, 2020). The study closest to ours have been conducted by Karadağ and Yücel (2020) with respect to its scope and sample size. Although they attempted to measure online education satisfaction levels of students registered in universities along Turkey, their study seems to lack providing explanation on the possible sources of the variation in online education satisfaction.

In comparison, thanks to a large dataset, the present work attempts to capture *aggregate* online education trends prevailing *throughout* the country during the pandemic, which allows to provide with stronger and relatively more reliable policy suggestions for the Turkish higher education system as a whole. Second, endeavour to the *identification of the factors* affecting students' online education satisfaction is the prominent feature of the present study distinguishes from previous works conducted in Turkey during the pandemic. Third, the psychological downsides of the pandemic including lockdown applications is examined for the first time in Turkey in relation to mass online education. Thus, as a first comprehensive attempt to examine the transition to online education during the pandemic in Turkey with large survey data, the study signifies importance for the country as well as the other developing ones with similar characteristics, to understand the factors affecting online education from the perspective of higher education students.

The rest of the paper is structured as the following: (ii) Survey Design and Sample section provides a detailed information on survey design, its distribution to the participants and provides with sample statistics; (iii) Survey Results and Implications section reports inferences obtained through survey data and consists of three main sub-sections related to

the factors related to students, faculty members, and institutions; and (iv) Conclusion section lists the policy suggestions for higher education agents and wraps up the article.

2. Survey Design and Sample

A country-wide online survey was conducted with 13330 undergrad and grad students registered in 146 Turkish universities between June-October 2020. First section of the survey consists of 17 questions capturing demographics and basics. The second section of the survey includes 19 questions related to the factual situation of respondents in online education such as how many courses they have taken, what kind of technical difficulties they have experienced, and what type of electronic devices they have used. The third section has 19 questions asking respondents' opinions and preferences regarding online education such as their general satisfaction from online education, their taste in (a) synchronous lessons, their take on fairness in online exams, and their choice of grading method and scheme. The last section of the survey includes seven questions related to COVID-19 and intended to capture the pandemic's psychological effects. The survey also carries two open-ended questions asking respondents' opinions about online education, and about what they learnt in life due to the pandemic. The estimated time required to fill out the whole survey is 8-9 min. Ethics statement was provided and volunteer agreement was taken at the initial phase of the survey. The survey was distributed through the higher education institutions. Applications was submitted to higher education institutions` rectorates in Turkey to obtain approval for sending the survey to their students. After the approval, each higher education institution sent the research survey to their own students through their own school emailing system.

A general profile of participants is presented in Table 1. Female participants slightly overrun males. 90% of participants are at most 25 years old, which closely corresponds to the 94% share of undergraduate students in our sample. While 1% of participants were diagnosed with COVID-19, 32% of them had some diagnosed relative or friend. More than 55% of participants are studying in either a Social Science or a Physical Science program in a broad sense. Slightly over 4.5% of participants' GPA stands lower than 1.5 out of four, which is the failure threshold in the Turkish higher education system. Only about 1% of participants froze their registration during the pandemic, which was given by universities as a right to students in case the student did not have means to continue online education efficiently. This shows that an overwhelming majority of data collected is very like to capture well participants' opinions on online education given that they in fact participated in the online education system. Moreover, a great chunk of participants has not taken any online course within or outside of university before the pandemic.

Table: 1
Participant Profile

	Frequency	Share
Gender		
Female	*7261*	*55.37%*
Male	*5726*	*43.66%*
Not Specificized	*127*	*0.97%*
Age		
17-22	*9128*	*69.61%*
23-25	*2629*	*20.05%*
26-29	*686*	*5.23%*
30≤	*671*	*5.12%*
COVID-19 Diagnosis		
Self	*129*	*0.98%*
Relative (1st degree)	*199*	*1.52%*
Relative (2nd degree)	*210*	*1.60%*
Relative (3rd degree)	*1037*	*7.91%*
Relative (Greater than 3rd degree)	*1961*	*14.95%*
Friend	*2054*	*15.66%*
None	*8759*	*66.79%*
Registration During Pandemic		
Freezed Registration	*151*	*1.15%*
Continued Education	*12963*	*98.85%*
Online Education Experience		
Experienced	*3911*	*29.82%*
No Experience	*9203*	*70.18%*

	Frequency	Share
Field of Study		
Social Sciences, Administrative Sciences, Humanities, Language, Theology	*3179*	*24.35%*
Physical Sciences, Life Sciences, Engineering, Space Sciences, Nautical Sciences, Applied Sciences	*4169*	*31.94%*
Educational Sciences	*1272*	*9.74%*
Architecture, Interior Architecture, Fine Arts, Design	*696*	*5.33%*
Medical Related Areas i.e., Pharmacy, Dentistry, Physiotherapy	*830*	*6.36%*
Medical School	*367*	*2.81%*
Law	*341*	*2.61%*
Forestry, Agriculture, Veterinary	*330*	*2.53%*
Conservatory, Music, Performing Arts	*71*	*0.54%*
Vocational School (2-year)	*1714*	*13.13%*
Other	*85*	*0.65%*
Class		
Prep School	*260*	*1.98%*
1st	*3218*	*24.54%*
2nd	*3443*	*26.26%*
3rd	*2656*	*20.25%*
4th	*2822*	*21.52%*
Masters	*518*	*3.95%*
PhD	*196*	*1.49%*
GPA (out of 4)		
<1.5	*612*	*4.67%*
1.5-1.99	*1657*	*12.64%*
2-2.49	*2950*	*22.50%*
2.5-2.99	*3496*	*26.66%*
3-3.49	*2986*	*22.77%*
≤3.5	*1413*	*10.77%*

3. Survey Results, Implications, and Suggestions

3.1. Students' Stance Toward Online Education During the Pandemic

Reported satisfaction levels on online education and evaluation of online education against face-to-face education were given in Figure 1-2. While around 34% of participants reported that they were either "not satisfied at all" or "satisfied very little", 42% of them said they were "satisfied" or "absolutely satisfied". This shows that overall online education experience during the pandemic varied considerably among students.

Moreover, the participants were asked to evaluate online vs face-to-face education according to different indicators related to their education. A dominating majority of participants reported their evaluation in favour of face-to-face education for all education indicators except one. While the share of participants who evaluated online education as "worse" or "way worse" are between 22%-41%, the share of participants who said it is "better" or "way better" varies only between 9%-14%. In addition, all indicators except one show almost a monotonic distribution in favour of face-to-face education, meaning that the percentages of reported evaluation options are increasing as going from "way better" to "way worse". The only indicator that violates the above evaluation trend was "allocating time on hobbies and other businesses". While slightly over 57% of participants evaluated online education as "better" or "way better", 27% of them reported it is "worse" or "way worse".

Figure: 1
Online Education Satisfaction During the Pandemic

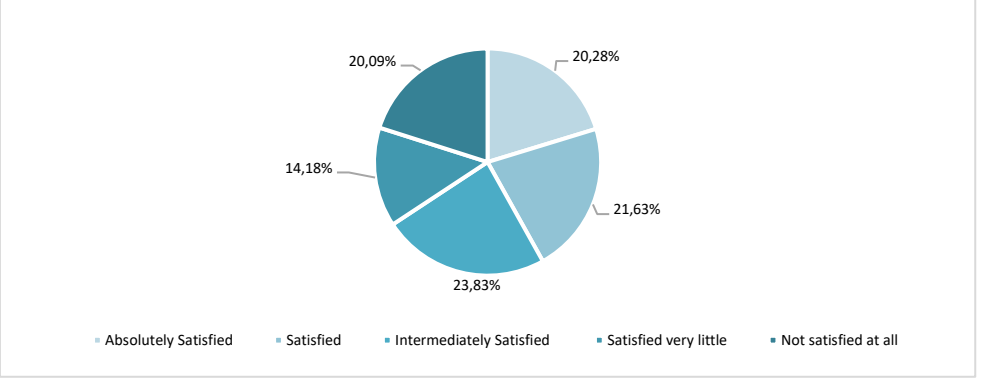
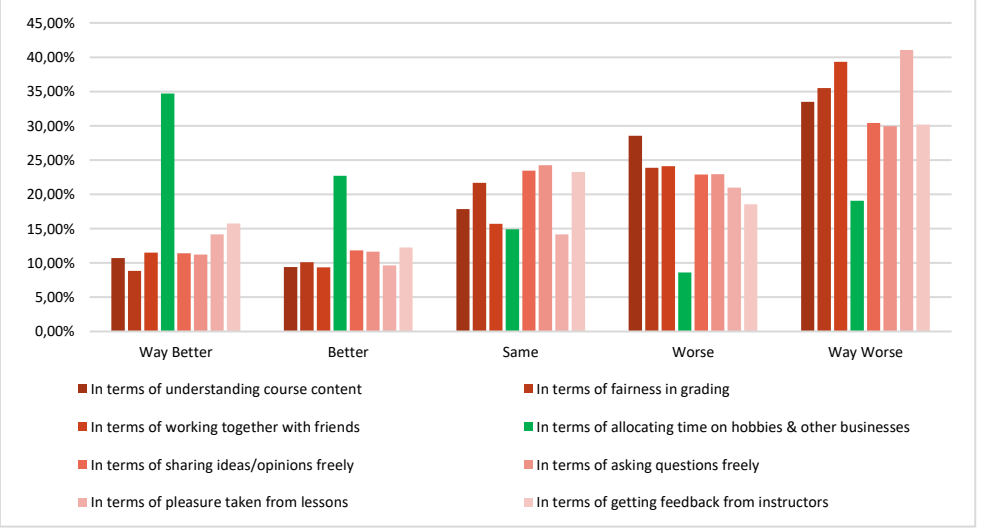


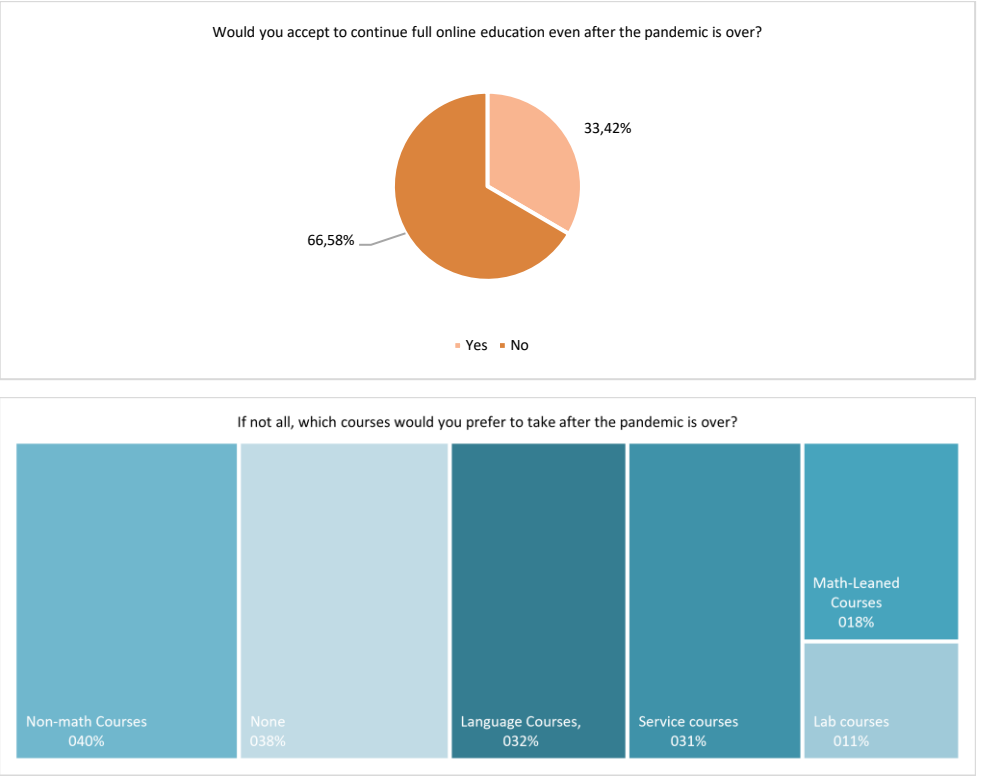
Figure: 2
Evaluation of Online vs Face-to-Face Education



Furthermore, Figure 3 provides with participants anticipated preferences over online education after the pandemic. While slightly over 66% of participants mentioned that they would not accept shifting to full online education even after the pandemic is over, 33% them accepting such a dramatic change in tertiary education shows the potential of online education for some students.

Lastly, the participants were asked about (if not all) which type of courses would they be willing to take online after the pandemic is over. Although not-math courses, language courses, and service courses got the most support towards online education, the share of support still seems relatively low as it varies between 30%-40%. Online education of math-leaned courses and courses that include laboratory applications received the lowest support as about 18% and 11% respectively. Notwithstanding some support toward online education of different courses, 38% of participants reported that they do not want online education at all.

Figure: 3
Anticipated Online Education Preferences After the Pandemic



Overall, participant responses summarized above indicate a negative stance towards online education among higher education students. Where there is not a dominatingly negative stance toward an indicator, there is also not a dominatingly positive one. These results lead to questioning the origins of this negative and varying stance towards online education during the pandemic, which we discuss under the next section.

3.2. Factors Affecting Online Education Satisfaction

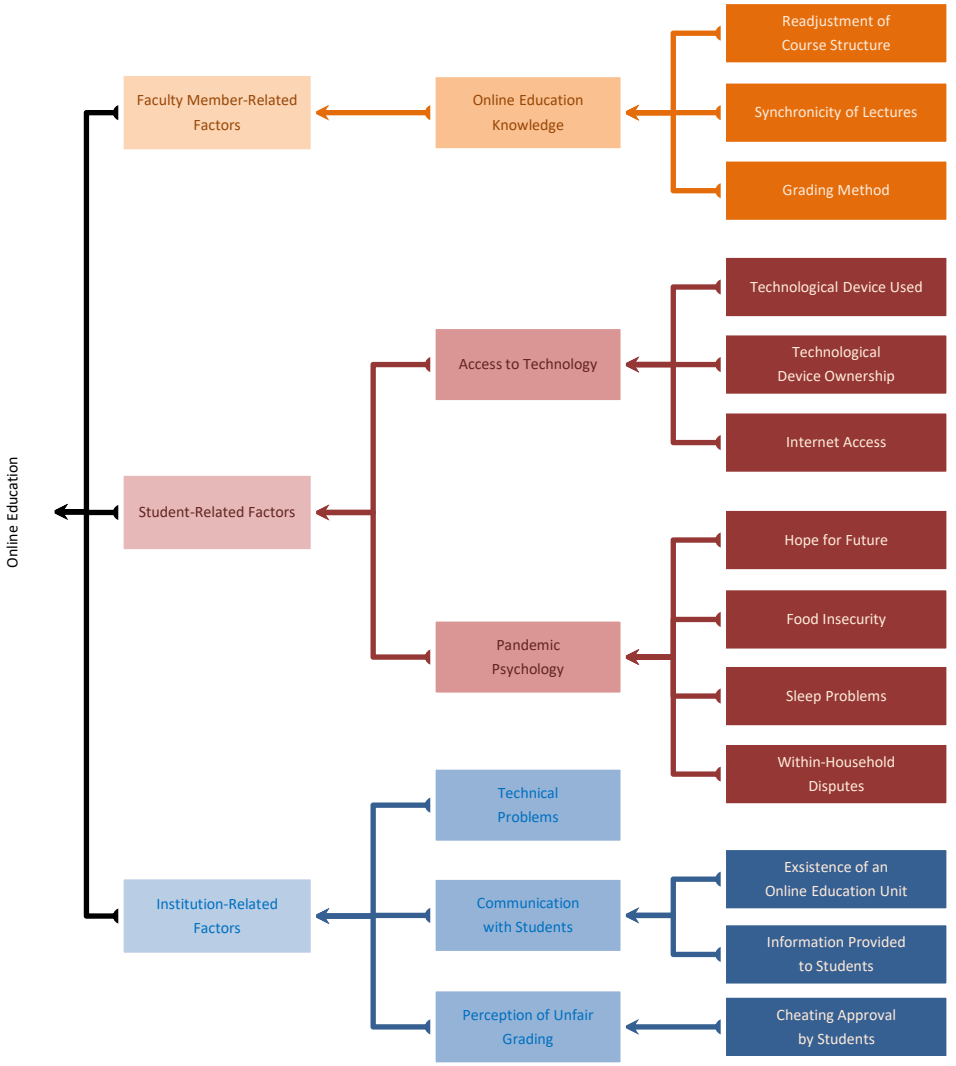
Possible factors affecting online education during the pandemic could be divided into three as student-related, faculty member-related, and institution-related according to which agent the factors are mostly dependent upon. First, student-related factors refer to the factors that are dependent on students` own living situation during the pandemic. As students without proper technological means cannot be included in online education, surveying electronic device types, their ownerships and the extent of Internet access is a prerequisite to investigate the current situation of students. Another student-related factor is the negative changes in psychological well-being due to the pandemic and lockdown applications.

Second, faculty member-related factors refer to their online education knowledge evaluated by students and extracted from their decisions related to the courses they have given during the pandemic. As courses originally structured for face-to-face education often times are not deemed compatible for online education processes, readjustment of course structure during the pandemic is an important decision to make by the faculty members. Moreover, decision over the synchronicity of online lectures is another crucial point when the advantages and shortcomings of the synchronous and asynchronous modes are considered. Lastly, the grading method employed by the faculty members need to be examined since YÖK and university administrations encouraged faculty members to use alternative grading methods such as assignments, presentations, projects, and term papers to avoid possible cheating occurrences in online exams due to lack of proper technological precautions by institutions.

Third, institution-related factors refer to factors that are dependent upon institutional efforts and decision-making processes during the pandemic such as technical problems, communication with students, and the perception of unfair grading due to high prevalence of online exam applications. Note that although these factors have been assigned to different higher education agents, they have been identified through the lenses of students. Thus, we neither claim to have identified *all* problems shouldered by these agents in transition to mass online education, nor reject the existence of some other agents in higher education system such as the technical staff, the administrative staff, YÖK, the government and the judiciary. Rather, we intent to focus on students as the very receiving end of the higher education system and attempt to capture possible factors related to *some* higher education agents through their perspective[3].

[3] *Sometimes relationship between factors and agents are intertwined such as the cases in grading method, perception of unfair grading or synchronicity of lectures since both institutional processes and faculty member decisions might coexist with different weights in taking relevant decisions. In these cases, we attach the factor to the agent according to whom the students most probably hold responsible for the decision made. Notwithstanding, if any of the factors are argued to be dependent on some other agent, it still does not invalidate the existence and importance of the factor.*

Figure: 4
Factors Possibly Affecting Online Education During the Pandemic



3.2.1. Student-Related Factors

3.2.1.1. Access to Technology

As students` access to the technological means is a prerequisite in transition to online education. Table 2 displays access to technology among the sample in mass online education

during the pandemic. A quarter of participants declared that they could only use their cell phones to follow up with online courses, which seems like a great obstacle when one has to watch online lectures or prepare assignments on a phone regardless of how smart it is. Moreover, about 15% of participants needed to ask a family member or a friend for having access to their electronic devices in order to follow up online courses. Although the share seems somewhat acceptable, sharing electronic devices could potentially create problems in case there are more than one people needs to use it at the same time during the pandemic. Lastly, very low share of participants (0.22%) used electronic devices provided by their universities.

It is also worth mentioning that computer prices have been hit hard in Turkey as a computer importing country within the last year. Turkish Lira (TL) has been depreciated against Dollar more than 25% from the beginning of the pandemic in March to November 2020 (TCMB Statistics). According to TurkStat, computer prices have risen about 31% between March and November 2020[4]. Considering that the average monthly income of participants in our sample is around 1500TL and an average laptop is priced around 6000TL, new purchase of computers has been more challenging for university students especially during the pandemic.

Table: 2
Access to Technological Means in Online Education

	Frequency	*Share*
Electronic Device Used for Online Education		
Cell Phone	*3326*	*25.47%*
Computer and/or Tablet	*9733*	*74.53%*
Electronic Device Ownership		
Owned	*11130*	*84.87%*
Belonged to Family or Friend	*1955*	*14.91%*
Belonged to University	*29*	*0.22%*
Internet Quota (Monthly)		
<10GB	*3061*	*23.34%*
10-19,99GB	*1514*	*11.54%*
20-49,99GB	*1120*	*8.54%*
50-99,99GB	*937*	*7.15%*
100≤	*3171*	*24.18%*
Not Aware of	*3311*	*25.25%*

When it comes to access to the Internet, about 44% of participants reported that they had less than 50 GB monthly Internet quota even when Internet access over cell phone providers is accounted for. Considering that a 60 min. high quality video watch requires around 1.5 GB and the average number of courses taken by survey participants is seven, a minimum 42 GB of Internet allowance is required for students to follow up with their courses properly without any Internet usage for other purposes. Although Turkish government took an early action to provide students with 6 GB of free Internet access, it clearly falls short when considering that this allowance is only eligible if the student reaches some course material over a specifically created online system called "YÖK Courses" platform. Thus, Internet access actually seems like another crucial obstacle before an efficient online

[4] *Yearly price change is more tremendous. Computer prices rose about 91% from Nov. 2019 to Nov. 2020.*

education. Moreover, according to Speedtest Global Index (2020), ranking both mobile and fixed broadband speeds from around the world on a monthly basis, Turkey ranks 102nd with a 28.74 Mbps in the fixed broadband, implying that the country performs way below the global average with 87.84 Mbps.

> ***Suggession 1:*** *"Governments should ensure the provision of technological means to students in mass online education since they are responsible of providing equal access to education as a human right to the citizens. This could be done through (i) increasing financial support to students conditional on its usage in technological means or (ii) by providing necessary technological devices in kind to students in need."*
> ***Suggession 2:*** *"Universities should take greater responsibility in providing students with technological means since lack of access to the education they are providing negatively affects their own existence at the first place. Although universities in developing countries like Turkey cannot reach huge funds most the time, they can strive to (i) develop collaboration with the private tech sector, or (ii) pioneer social organizations for an easier redistribution of technological means among their students in specific and throughout the public in general."*
> ***Suggestion 3:*** *"Governments should take further actions to provide students with greater Internet access for free or at a discount. They also need to take immediate action in increasing Internet speed and in expanding coverage even to the remotest areas given that many students are obliged to live in their villages in catastrophic times such as the pandemic. To this end, governments can use regulation and bargaining power over Internet providers since companies would not want to lose privileges in an oligopolistic (and occasionally monopolistic) market with an ever-increasing demand to the Internet after the pandemic."*

3.2.1.2. Pandemic Psychology

Pandemic psychology is thought to be one of the most important factors determining online education motivation and productivity of students. Table 3 presents reported variables related to psychological effect of the pandemic.

A great majority of participants, 62% of them, reported that the pandemic affected their psychological well-being either negatively or very negatively, while only slightly below 8% declared positive psychological effect of the pandemic. When it comes to hope and expectation from the future, only 18% of participants reported that the world would evolve to a better state after the pandemic. Thanks to Turkey being one of the self-sufficient countries around the globe in terms of agriculture, share of participants who worried about food insecurity due to pandemic stayed below 20%.

Approximately 57% of participants reported that they have gained weight during the lockdown period. Some studies (Kivimäki, Singh-Manoux, Shipley & Marmot, 2009)

demonstrated that there is a direct connection from mental disorders to risk of obesity. exist a positive correlation between stress levels and weight gain.

Moreover, slightly over 33% of participants reported that they experienced rise in sleep latency, and 26% of them said that their sleep duration has fallen. As sleep problems are indications of increased anxiety and tension (Plotnik, 2009: 575), these changes in sleep behaviour indicates some potential negative effect of the pandemic psychologically. Moreover, as number of studies (Irwin et al., 1994; Bower, 2002; Plotnik, 2009: 162) show, increased sleep latency and decreased sleep duration are also closely connected to immune system problems, concentration problems and unhappiness, which would most potentially have affected the online education performance of tertiary students during the pandemic. When combined, these indicators show that university students experienced the psychological downside of the pandemic to a great extent.

Table: 3
Indicators of Pandemic Psychology

	Frequency	*Share*		*Frequency*	*Share*
Psychological Effect			***Weight Gain***		
Affected Very Negatively	*4499*	*34.31%*	*Yes*	*7436*	*56.70%*
Affected Negatively	*3668*	*27.97%*	*None*	*5678*	*43.30%*
No Change	*3932*	*29.98%*	***Sleep latency***		
Affectly Very Positively	*624*	*4.76%*	*Decreased a lot*	*1665*	*12.70%*
Affected Very Positively	*391*	*2.98%*	*Decreased*	*1633*	*12.45%*
Hope for Future			*No Change*	*5448*	*41.54%*
World will better than before	*2365*	*18.03%*	*Increased*	*2121*	*16.17%*
World will worse than before	*6350*	*48.42%*	*Increased a lot*	*2247*	*17.13%*
World will be the same	*4399*	*33.54%*	***Sleep duration***		
Feeling of Food Insecurity			*Decreased a lot*	*1559*	*11.89%*
None	*5078*	*38.72%*	*Decreased*	*1839*	*14.02%*
Very Little	*2646*	*20.18%*	*No Change*	*4724*	*36.02%*
Some	*2881*	*21.97%*	*Increased*	*2971*	*22.66%*
Much	*1462*	*11.15%*	*Increased a lot*	*2021*	*15.41%*
Very Much	*1047*	*7.98%*			

As a next step, lockdown dynamics should also be accounted for to understand the psychological well-being of students during the pandemic, because some studies found (Hawryluck et al., 2004; Brooks et al., 2020) that lockdown applications might lead to weakened mental health, stress, and anger. Lockdown applications in major cities and shift to online education led to some temporary internal migration of students within the country. Table 4 summarizes the movement of students during the pandemic. A great majority of participants reported that they stayed at their own/family house during the lockdown, and only slightly less than 5% of participants lived in other places such as jointly rented student houses and dormitories. Also, results indicate that more than 60% of participants moved to a different city while the temporarily moved to a new city. When these two information are combined, it is deemed that most of students who changed city actually decided to live with their families during the lockdown. This, in turn, increased the population of household the participants lived in. Accordingly, 70% of participants reported that they have spent the lockdown period in a household with more than three people.

This leads us to question how number of internal disputes/conflicts within households changed during the lockdown period. About 50% of participants reported that they experienced greater number of household disputes/conflicts, while only around 12% of them reported a decrease. In short, the pandemic seems to have caused movement of students to their family houses that increased household population and in turn disputes/conflicts among household members rose. Thus, even when a student has all the technological means for online education, rise in disputes/conflicts under the same roof could potentially create a psychological obstacle against the learning process.

Table: 4
Lockdown Dynamics

	Frequency	*Share*
Lockdown by Temporary Movement		
Moved to a different city	*8027*	*61.21%*
Stayed in the same city	*5087*	*38.79%*
Moved to a different region	*5240*	*39.96%*
Stayed in the same region	*7874*	*60.04%*
Lockdown by Household Type		
Own or Family House	*12493*	*95.26%*
Relative or Friend House	*66*	*0.50%*
Private Dormitory	*56*	*0.43%*
State Dormitory	*45*	*0.34%*
Student House	*419*	*3.20%*
Other	*35*	*0.27%*
Lockdown by Household Population Lived Together		
1	*393*	*3.00%*
2	*954*	*7.27%*
3	*2625*	*20.02%*
4	*4483*	*34.18%*
5	*2663*	*20.31%*
6	*1174*	*8.95%*
7≤	*822*	*6.27%*
# of Disputes/Conflicts in Household		
Very Increased	*3629*	*27.67%*
Increased	*2894*	*22.07%*
No change	*4918*	*37.50%*
Decreased	*792*	*6.04%*
Very Decreased	*881*	*6.72%*

	Frequency	*Share*
Lockdown by Type of Residential Area Stayed		
Village	*1225*	*9.34%*
Town	*665*	*5.07%*
City Suburb	*2131*	*16.25%*
City Centre	*9093*	*69.34%*
# of Days Gone out during Lockdown		
0	*7021*	*53.54%*
1	*3400*	*25.93%*
2	*1391*	*10.61%*
3	*513*	*3.91%*
4≤	*789*	*6.02%*
Lockdown by Region Stayed		
Marmara	*3865*	*29.47%*
Central Anatolia	*3300*	*25.16%*
Mediterranean Region	*1848*	*14.09%*
Aegean Region	*1814*	*13.83%*
Black Sea Region	*913*	*6.96%*
South-eastern Anatolia	*807*	*6.15%*
Eastern Anatolia	*516*	*3.93%*
Abroad	*51*	*0.39%*
Lockdown by Province Stayed		
İstanbul	*1879*	*14.33%*
Ankara	*1359*	*10.36%*
Bursa	*918*	*7.00%*
İzmir	*860*	*6.56%*
Kayseri	*680*	*5.19%*
Antalya	*438*	*3.34%*
Adana	*423*	*3.23%*
Other provinces	*6506*	*49.61%*
Abroad	*51*	*0.39%*

It is also noteworthy that half the participants spent the lockdown period in the most populous provinces of Turkey and around 70% of participants lived in the city meanwhile. Accordingly, considering higher prevalence of COVID-19 cases in populous places, approximately 90% of participants reported that they only went out at most two days during this period. Thus, students' psychological well-being was thought to be further degraded, which potentially affected their online education performance and motivation negatively.

> ***Suggestion 4:*** *"Governments and universities should take immediate action to improve the quality and coverage of psychological support among the public and students respectively. Although budget constraints intensified due to the pandemic, governments could still meet the increasing need for psychologic support with*

employing more social workers through short-term contracts and further decide the continuation of employment conditional on the pandemic. Universities, on the other side, should reach out its students, especially the ones who have COVID-19 diagnosis in their families, through establishing units dedicated to psychological support and more effective utilization of them if already exist."

3.2.2. Faculty Member-Related Factors

3.2.2.1. Online Education Knowledge

Recent research (Kalaycıoğlu et al., Forthcoming; Demir et al., 2020) investigating faculty members' online education practices in Turkey during the pandemic reveals that about 79% of the sample studied (n=6364) did not have any previous experience of giving an online course. Moreover, a great chunk of faculty members in Turkey also has a strong opposition to online education practices even after the pandemic is over. While around 30% of faculty members agreed on "not using online education at all unless necessary", 53% of them said, "online education should only be used as a complementary/supporting way". Thus, inexperienced and resistant faculty members seem to have found themselves in a very novel and challenging situation when they were required to give their courses online during the pandemic.

As seen in Table 5, between 54%-60% of participants reported lowest three sufficiency levels for their instructors' online education knowledge, course material shared by the instructor, or the lecture duration to understand the course. This makes the connection between students' increased time devotion to the learning process and the course structures that was not readjusted to online education by inexperienced and/or resistant faculty members.

Table: 5
Participants' Evaluation of Instructors

	Frequency	*Share*
Instructor's online education knowledge		
Not sufficient at all	*2081*	*15.87%*
Sufficient very little	*2377*	*18.13%*
Intermediately sufficient	*3207*	*24.45%*
Sufficient	*2972*	*22.66%*
Absolutely sufficient	*2477*	*18.89%*
Course material shared by instructor		
Not sufficient at all	*1930*	*14.72%*
Sufficient very little	*2205*	*16.81%*
Intermediately sufficient	*2930*	*22.34%*
Sufficient	*3022*	*23.04%*
Absolutely sufficient	*3027*	*23.08%*
Lecture duration to understand the course		
Not sufficient at all	*2512*	*19.16%*
Sufficient very little	*1804*	*13.76%*
Intermediately sufficient	*2766*	*21.09%*
Sufficient	*2759*	*21.04%*
Absolutely sufficient	*3273*	*24.96%*

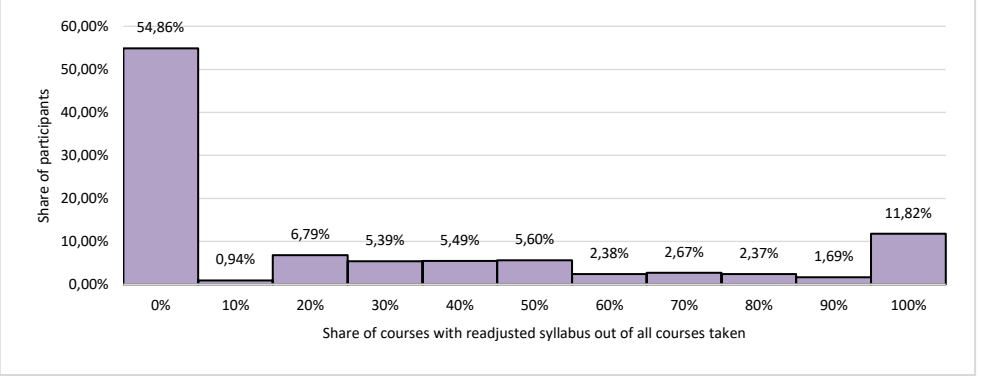
Suggestion 5: *"Universities should dedicate more resources to the education of educators regarding online education as it differs greatly from face-to-face education. They can organize webinars and/or publish guidelines to ensure faculty*

members are aware and knowledgeable of the nature of online education. They can also regulate online education more centrally to make sure education opportunities are accessible to all students and not distorted by faculty members' own choices that are not fitting to online education."

3.2.2.1.1. Readjustment of Course Structure

Course structures that have been designed for face-to-face education were usually directly carried to online education because of the rapid transition in Turkey. While some inexperienced instructors might have thought that any adjustment in content, lecture duration, and grading process would not be needed due to inexperience, others just might have not had time to readjust the course structure given the quick transition. However, since face-to-face and online education differ with respect to communication channels, time devotion, resource intensiveness (Kennedy, 2002), group discussions quality, (Eriksson, Goller & Muchin, 2001; Monk & Newton, 2018), suitability for different demographic and personality profiles (Romero & Usart, 2014), technical requirements, institutional capacity to provide technical supports (Jones, 2005), instructors responsiveness to students (Monk & Newton, 2018; Muramatsu & Wangmo, 2020), exam safety and many more, two modes of education certainly require different approaches to course design. A good online course structure might need to be more student-centred, involve more interactive instruments and require a more pedagogical approach (Erkut, 2020) considering the negative psychological effects of the pandemic.

Figure: 5
Share of Courses with Adjusted Syllabuses After Shift to Online Education
(Figure reads as: Y% of participants had X% of courses with adjusted syllabus)



Accordingly, readjustment of the course syllabus after shifting to online education is a good approximation for capturing if the faculty members considered these differences between online and face-to-face education in course structure. Figure 5 reveals that a dominating share of courses taken by participants did not experience a readjustment in

course syllabuses, which is deemed as forcing a course structure designed for face-to-face education into the online education system without considering possible issues related to the differences between the learning processes in two different concepts. Approximately 55% of participants reported zero readjustment in any of the courses taken. Here, it should be noted that readjustment of course syllabuses by inexperienced instructors who do not possess a comprehensive knowledge of the dynamics of online education might also cause problems and could be considered unappealing by students. For example, incorporation of exhausting number of assignments or a great decrease in topics previously covered might cause feeling of high course burden, discomfort and demotivation in students.

Course structures incompetent to online education might cause obstacles to the learning process of students. Table 6 displays change in time devoted to different sub-categories of the learning process within a course structure. About 42% of participants reported that they spend more time trying to comprehend the course content, which is followed by increased time devotion to doing assignments with a greater share of 53%. Albeit lower than previous two percentages, share of participants who devoted more time studying for exams still represents a great chunk of participants as 32%. It might well be the case that because most course structures did not readjust according to the nature of online education, students experienced difficulties understanding the lectures, which in turn made it difficult to complete assignments and prepare for exams[5].

Table: 6
Participants' Time Devotion to the Learning Process After Shift to Online Education

	Frequency	*Share*
Understanding the course content		
Significantly reduced	*1883*	*14.36%*
Decreased	*2128*	*16.23%*
Not changed	*3574*	*27.25%*
Increased	*2850*	*21.73%*
Significantly increased	*2679*	*20.43%*
Doing assignments		
Significantly decreased	*1414*	*10.78%*
Decreased	*1483*	*11.31%*
Not changed	*3286*	*25.06%*
Increased	*3475*	*26.50%*
Significantly increased	*3456*	*26.35%*
Studying for exams		
Significantly decreased	*2156*	*16.44%*
Decreased	*2810*	*21.43%*
Not changed	*3975*	*30.31%*
Increased	*2510*	*19.14%*
Significantly increased	*1663*	*12.68%*

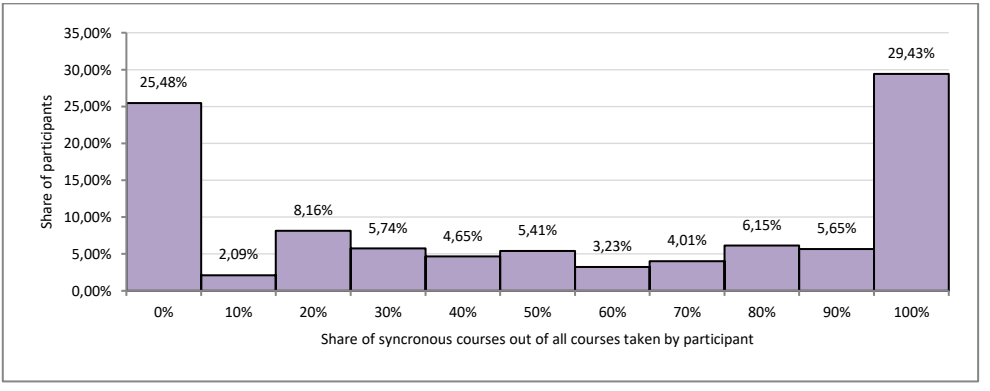
[5] *It might be argued that rise in time devoted to learning is just a reallocation of time saved from not going to campus. However, participants' comments written in response to the open-end question at the end of the survey strongly supports the argument of "course readjustment". Complaints about difficulties regarding understanding course content, information exchange, lecture duration, and assignment intensity far exceeds the positive statements about time saving advantage of online education.*

3.2.2.1.2. Synchronicity of Lectures

The mode of online education during the pandemic, whether it is to be synchronous or asynchronous, is an important decision to be made since both modes have their own advantages and disadvantages. Asynchronous mode is the relatively more flexible one among the two that allows students to adjust the pace of their learning process, maintain a better balance between education and other occupations, and sustain a more evenly distributed student participation in the course (Buxton, 2014; Alexander et al., 2014; Huang & Hsiao, 2012; Hrastinski, 2008). However, it also has some major disadvantages compared to the synchronous mode such as limiting students` critical thinking, existence of lagged communication/feedback, and creating an atmosphere that leads to a sense of loneliness during the learning process (Tunceren et al., 2015; Alexander et al., 2014; Huang & Hsiao, 2012; Chou, 2002; Branon & Essex, 2001). The other alternative, synchronous mode increases the sense of support and togetherness in the learning process due to simultaneous participation of students and the lecturer during online lessons. (Jaggars, 2014; Yamagata-Lynch, 2014; Huang & Hsiao, 2012). In addition, synchronous mode seems more advantageous with respect to providing with faster provision of feedback to students` questions and comments (Martin, Parker & Deale, 2012; Skylar, 2009), and allowing students to receive non-verbal communications signals from the lecturer`s gesticulations and body reactions as a support to their learning processes (Rudd & Rudd, 2014).

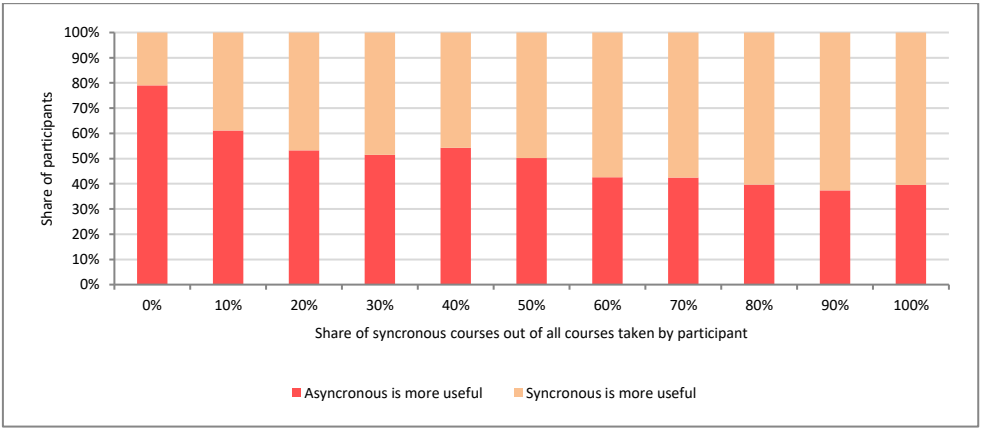
Because the synchronous mode creates a learning atmosphere more resembling to the face-to-face education, it seems more fitting for students in a situation where the transition to online education happened very quickly without any major previous experience. Also, the sense of support and togetherness in the learning process makes the synchronous mode better suited for students who were locked in their houses and minimized their social contact to overcome the psychological side effects of the pandemic.

Figure.6
Exposition to Synchronous Lectures
(Figure reads as: Y% of participants received synchronous courses X% of the times)



First, the share of participants who have received no synchronous lectures at all during the pandemic makes up about a quarter of the whole sample, while the share of participants who were fully exposed to synchronous lectures is about 29% in shown in Figure 6. The remaining 44% of participants had a mixture of synchronous and asynchronous courses. Unequal access to the advantages of the synchronous mode, as well as of the asynchronous mode if viewed from the opposite angle, among these three groups of students seem to a relevant variable that could affect their success in online courses. Figure 7 shows participants' preferences over the two modes of online education categorized by their exposition to synchronous courses. Not very interestingly, as more the students are more exposed to synchronous mode, the more they find the synchronous mode more useful compared to the asynchronous one.

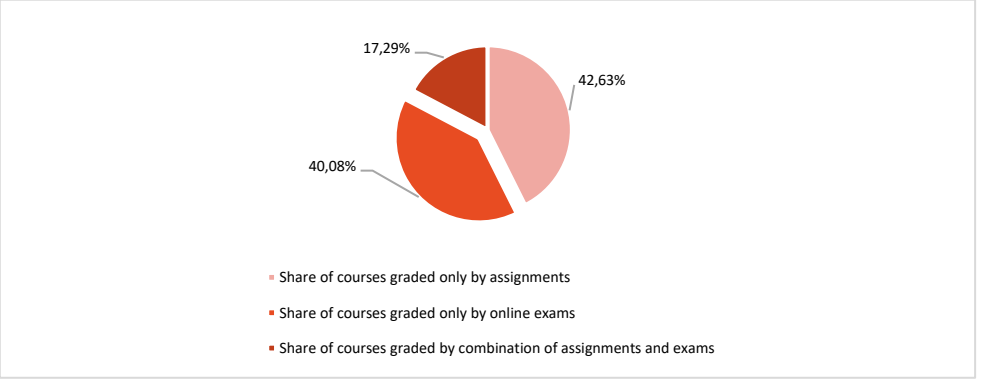
Figure: 7
Participants' Preferences Regarding Synchronicity of Lectures



3.2.2.1.3. Grading Method

Another way to sense faculty members` knowledge in online education is through investigating the grading method they have used in evaluating students` course performance. Organization and execution of online exams was problematic in Turkey during the pandemic due to couple of reasons such as high possibility of cheating among students, institutions` lack of technical/technological capabilities and faculty members` inexperience in designing online exams. Thus, the most appropriate method to evaluate students` course performance was to employ assignments, presentations, and project papers into the grading process whenever possible. Notwithstanding, as shown in Figure 8, share of courses graded only through online examination was as high as 40% on average throughout the sample. Considering that both YÖK and individual Turkish universities encouraged all faculty members to use grading methods different from online exams during the pandemic, the high share of online exam applications also indicates lack of adjustment to online education on the faculty members' side.

Figure: 8
Share of Courses by Grading Method



Suggestion 6: *Faculty members should readjust their course structures according to the nature and requirements of online education. Aspects of readjustment include lecture duration, content intensity, diversification of learning materials and grading procedures fitting to online education. They should also consider employing synchronous mode in online education more often as it creates a more interactive learning atmosphere similar to the face-to-face education. Moreover, faculty members should utilize alternative grading methods since possibility of high cheating prevalence risks properly measuring the students' understanding of the knowledge and skills required by courses.*

3.2.3. Institution-Related Factors

3.2.3.1. Technical Problems

Intensity of the technical problems experienced by students during online education might be regarded as institutions` inability to provide with necessary technical requirements for a proper functioning of education during the pandemic. Although some technical problems might be related to the student/instructor end of online sessions sound and video problems related to own Internet access and quality, many of them are mostly rooted in the server capacity of universities and their own Internet quality.

The share of participants who have experienced problems related to online platform malfunctioning is as high as 45%, which directly indicate technical problems rooted in institutions (Table 7). In addition, the share of participants who have encountered asynchrony between video and sound, and inability to upload assignments/exams are around 25%, which indicate indirect or probable origination of technical problems in institutions` own technical capacity. In comparison, approximately a quarter of participants reported to have had zero technical problems during online education. However, we should note that many of them felt a need to add a comment which says they chose the *`none`* option because their online education was only based on course material uploaded by instructors without

any video lectures. Thus, the real share of participants who reported zero technical problems is thought to have been even lower if they had video lectures as universities without proper technical capacity tend *not* to provide with video lectures. Furthermore, about 49% and 40% of participants reported to have solved technical problems by trial-and-error and by contacting the course instructor respectively, which together indicate a high burden shouldered personally by students and faculty members. In short, problems related to the malfunctioning of the online system, if not all, are deemed as an institutional challenge and could potentially play a role in students` online education satisfaction during the pandemic.

Table: 7
Technical Problems Experienced and Solution Channels

	Frequency	*Share*
Technical problems experienced		
Online platform extreme slowing down, freezing, crushing	*4533*	*44.45%*
Video problems	*2987*	*29.29%*
Sound problems	*2936*	*28.79%*
Asynchrony between video and sound	*2584*	*25.34%*
Internet problems	*3478*	*34.10%*
Inability to upload assignments	*2635*	*25.84%*
Inability to download or open course material	*1870*	*18.34%*
Other	*156*	*1.53%*
None	*2628*	*25.77%*

	Frequency	*Share*
Technical problems solved by		
Trial-and-error	*6471*	*49.34%*
Communicating with the instructor of the course	*5309*	*40.48%*
Getting support from friends	*5051*	*38.52%*
Communicating with own student advisor at the university	*1905*	*14.53%*
Communicating with the relevant unit at the university	*1895*	*14.45%*
Watching videos from YouTube	*1694*	*12.92%*
Checking websites of online platforms	*1542*	*11.76%*
Getting support from family members	*984*	*7.50%*
Communicating the assistant of the course	*737*	*5.62%*
Communicating with other faculty members	*393*	*3.00%*

Suggestion 7: *Universities should improve their technological capability including server capacity, Internet quality, and other services provided via integrated online platforms. Since every step in online education requires technical knowledge in computer engineering and software development, universities should also employ more IT staff for proper implementation and a continued maintenance of online education.*

3.2.3.2. Communication with Students

Since transition to online education during the pandemic happened very suddenly, many university students found themselves unexperienced and unknowledgeable about how to download and use online platforms, register for online courses, join online lessons, and enter online exams. In this situation, universities had greater responsibility of leading students by increased communication. Table 8 provides with insights on how successful universities were in communicating with students based on participant responses.

Although all public universities had a distance education centre in Turkey, only 58% of participants reported that there was not a special unit under their institution dedicated to online education[6]. Moreover, only 14% of participants reported that they contacted and/or

[6] *Around 88% of participants were registered in public universities. As indicated in Appendix-A, YÖK announced on June 4th that all public universities have a distance education centre with the establishment of 20 more during the pandemic. Knowledge on private universities is not available to the authors. However, they are likely to have some specific department overseeing online education during the pandemic given their competitively*

benefitted from the institutional unit dedicated to online education when faced a technical problem (See Table 8). Not knowing an existent institutional unit and thus not benefitting from it indicates an important shortcoming of good communication with students during the pandemic. Complementarily, more than half of participants reported that online education information provided by university was not at a sufficient level. This lack of good communication might be a source why around 62% of participants found their universities not prepared well for online education during the pandemic.

Table: 8
University Communication with Students During Transition to Online Education

	Frequency	*Share*
Existence of a special unit dedicated to online education		
Yes	*7648*	*58.32%*
No	*5466*	*41.68%*
Sufficiency of online education information provided by university		
Not sufficient at all	*1902*	*14.50%*
Sufficient very little	*2163*	*16.49%*
Intermediately sufficient	*2857*	*21.79%*
Sufficient	*2926*	*22.31%*
Absolutely sufficient	*3266*	*24.90%*
Preparedness of university for online education		
Not prepared at all	*2994*	*22.83%*
Prepared very little	*2252*	*17.17%*
Intermediately prepared	*2873*	*21.91%*
Prepared	*2571*	*19.61%*
Absolutely prepared	*2424*	*18.48%*

Suggestion 8: *"Universities should improve communication with students in order to lead them through rapid changes in extraordinary times. Quantity of communication channels should also be broadened by employing a greater variety of tools such as social media and SMSs beside regular emails and website announcements[7]. On the other hand, quality of communication can also be improved by employing a greater variety of tools such as infographics and handy informing videos."*

3.2.3.3. Perception of Unfair Grading

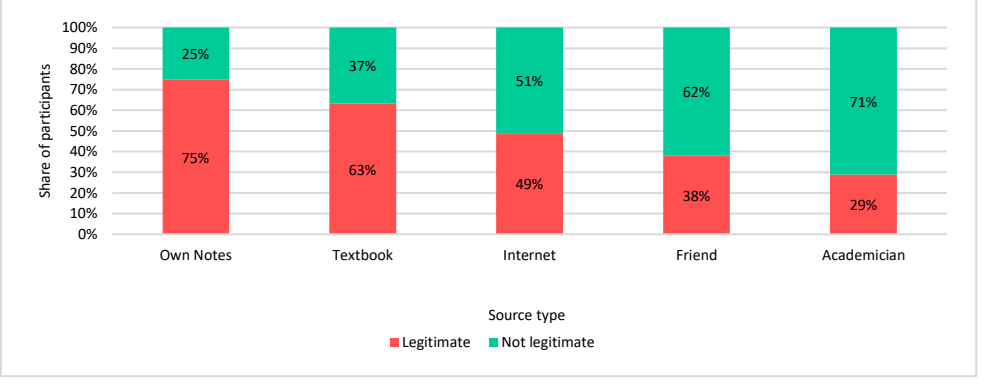
Cheating by students is a very probably case in online exam applications especially in a period where the whole order of life was unfairly changed against students. It might well be the case that university students regarded the rapid transition to online education unfair, given that most of them prefer face-to-face education with respect to different aspects of the educational process as shown previously. In turn, they might use this unfairness perception

dynamic nature to adjust compared to public universities, which are slower and more bureaucratic in decision-making processes.

[7] *Although the share of participants who checked their emails at least every two days increased from 38% to 77% before and after the pandemic respectively, information about online education applications provided by their universities was not at a sufficient level for 62% of participants. This leads to two possibilities. One is that students might just deem regularly continuous administrative emails unimportant. In this case, diversification of communication channels is a good step to hook students` attention. The second possibility is that students actually read administrative emails, but the content is not really informative or not written in way that could be easily followed. In this case, quality of communication becomes important.*

as a personal justification for cheating. Although we cannot exactly pinpoint the existence of cheating in online exams, some indicators suggest high possibility of cheating. As shown in Figure 9, majority of participants confirm the legitimacy of receiving help from textbook or own notes, while share of participants who give approval to benefitting from Internet resources or a friend ranges between 38%-49%. Albeit relatively low compared to other cheating types, the 29% approval rate of help from an academician might make the most crucial point, since it hints the existence of such an inadmissible cheating type[8]. The situation becomes clearer in Figure 10 where participants' evaluation over the success of online exams is examined. The share of participants who evaluate online exams as unsuccessful or completely unsuccessful in assessing the learnt course content is over 56%, while only 21% of participants evaluate online exams as successful or completely successful.

Figure: 9
Legitimacy of Receiving Help from Different Sources During an Online Exam



The relationship might be in both directions from cheating approval to online exam evaluation and vice versa. Cheating students might have assessed online exam as unsuccessful due to their internal knowledge about the existence of cheating. Another possibility is that students who normally do not tend to cheat but have struggled understanding course content due to previously discussed factors might have established justification for cheating, after the exams. Notwithstanding, cheating approval and online exam evaluation together are thought to shape a perception of unfair grading in online education when compared to face-to-face education. Indeed, existence of a perception of unfair grading among participants do seem exist within our sample. Almost 60% of participants reported online education as worse or a lot worse in terms of fair grading, and only around 20% of participants reported to be in favour of online education regarding fair grading.

[8] *The question was posed as `Is it appropriate to receive help from people working in the academia during an online exam?`.*

Figure: 10
Participants' Evaluation of Online Exam Success in Measuring Learnt Course Content

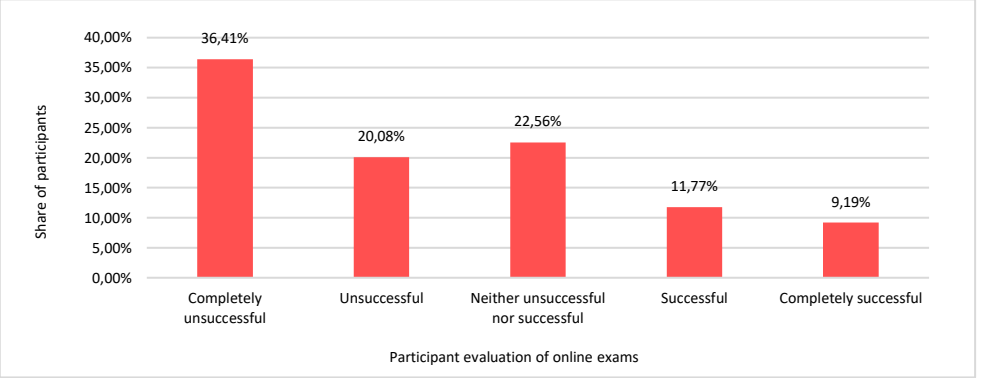
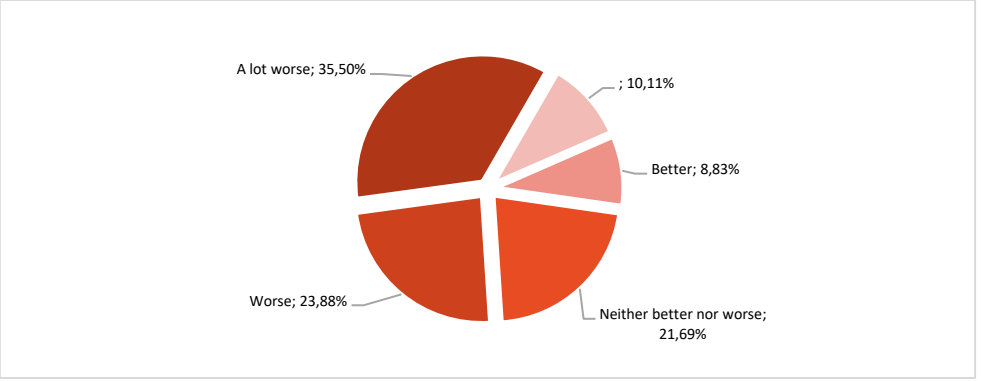


Figure: 11
Perception of Unfair Grading



Suggestion 9: *"Universities should ensure the integrity of online exams in order to prevent perception of unfair grading among students. They could encourage or even enforce faculty members to lean more on assignments, terms papers, and presentations in the grading process. If online exams are inescapable, they could still be organized to prevent cheating such as subjecting different questions to each student and shifting the order of questions using online tools. Otherwise, hard-working students will be subjected to injustice and discouraged in the short run. Its effect in the long run will be more pronounced. Entrance of graduates who have indulged in cheating in online exams will deplete the work force. As a university diploma will less powerfully signal the existence of knowledge and skills, differentiation between skilled and unskilled workers will be harder for employers. This, in turn, will further decrease the returns to higher education."*

4. Conclusion

By utilizing a country-wide representative survey with university students, the present study illustrated the online education experience en masse after the COVID-19 outbreak in Turkish tertiary education. After providing with students' satisfaction of and their preferences over online education, we attempted to identify factors associated with students, faculty members, and institutions that are deemed crucial for the proper functioning and maintenance of online education in universities. For the sake of brevity, multiple regression models related the significance of these factors are provided in Appendix-B. Examination of data and related regression results led to some important policy suggestions for the university administrations and the Turkish government. These policy suggestions also construct an initial framework for other developing country governments to start with implementing measures related to higher education ecosystems during and/or after the pandemic.

In a nutshell, close to 60% of the participants is, at most, intermediately satisfied with the mass tertiary online education implemented in Turkey after the pandemic. Between 49%-64% of them reported to have found online education *worse* or *way* worse than the face-to face education in terms of different educational processes including understanding the course content, sharing ideas freely, getting feedback from instructors and fairness in grading. With respect to online education preferences conditional on the end of the pandemic, support to the continuation of *full* online education by one third of the participants represents potential of the future implementation of the system as a whole. On the contrary, 38% of the participants rejecting to take *none* of the courses online after the pandemic signifies the resistance to even a *partially* online education system. This mix of support to and dissatisfaction from online education leads to the investigation of agent-specific factors that had potential to have affected the mass online education in the Turkish tertiary education during the pandemic.

We have categorized these factors as student-related, faculty member-related, and institution-related based on whose situation and/or whom scope of responsibility best encapsulate the variables associated to the factors. Insufficient access to proper technological means and the negatively affected psychological well-being due to the pandemic have been identified as the student-related factors. Instructors` applications in online courses during the pandemic including readjustment of course structure, synchronicity of lectures, and grading method represent poor online education knowledge on the instructors` side and have been identified as faculty member-related factors. Institution-related factors that could be captured through the lenses of students have been shown as technical problems, unsatisfactory communication with students, and the perception of unfair grading.

Appendix-A
Chronological Transition to Online Education in Turkey during the Pandemic

The Council of Higher Education (YOK) is an autonomous institution governing 207 higher education institutions with close to eight million students in Turkey. Although YOK's decrees are binding, they generally tend to lay principles and frameworks while leaving great room to rectorates and senates of individual higher education institutions for their own educational and administrative decisions. Starting from the pandemic at the beginning of 2020, measures taken by YOK are summarized in Table 9.

Table: 9
Important Events and Corresponding Dates Related to Turkish Higher Education During the Pandemic

Feb. 4th	• YÖK required from universities to take necessary measures to protect staff and students against the pandemic in advance.
Mar. 6th	• YÖK required from universities to establish "Coronavirus Commissions" in order to increase coordination. • YÖK asked universities to revaluate any visit abroad by their students and staff and cancel them if not deemed vital.
Mar. 11th	• First COVID-19 case was identified in Turkey.
Mar. 13th	• YÖK announced that higher education was to be suspended for three weeks starting from March 16 in order to evaluate technical and human resource capacities of universities in case of a possible transition to full online education if the pandemic was to worsen in the upcoming days. • YÖK announced that university staff over the age of 60, disabled staff and disadvantaged staff who has chronic illnesses could take 12 days off. • YÖK moreover asked universities to provide convenience for staff with children in preschool or elementary school to take a paid leave.
Mar. 17th	• YÖK decided to gather all available online education resources from different universities and give public access to them over an online system called "YÖK Courses" in the upcoming days. • YÖK announced that universities are free to choose between implementing synchronous and asynchronous methods and to determine which online platform to use in case of a full transition to online education in the prevailing days.
Mar. 19th	• YÖK decided that the entrance exams in postgraduate programs, regular thesis meetings, and thesis defences could be held online over the Internet.
Mar. 23rd	• Instead, YÖK announced to the transition to full online education as of March 30. • "YÖK Courses" platform was given public access for the usage of academic staff and students in online education.
Mar. 30th	• All universities started full online education.
Apr. 1st	• Considering that some students might not have appropriate digital means for online education in a very short notice, YÖK decided to allow university students to take a leave/freeze registration for the 2020 Spring semester.
Apr. 10th	• Government decided a general lockdown in 31 provinces during weekends, which later on extends to three to four days in the upcoming days[9]. This decision came after previous restrictions limited to the elderly and the children.
Apr. 29th	• YÖK announced that a 6 GB internet allowance was provided to all students by mobile operators run in Turkey for the usage of YÖK Courses platform.
May 5th	• YÖK announced that universities might return to face-to-face education as of June 15 if the pandemic was to be controlled (which was not implemented due to increased number of Covid-19 diagnosis in Turkey at the time)
May 7th	• YÖK asked universities to improve quality and quantity of course materials for students with disabilities in online education.
May 11th	• YÖK announced that no face-to-face exam was to be done during the 2020 Spring semester. Instead, universities were asked to utilize digital space for exams or make use of alternative methods such as homework and/or projects for the evaluation of the courses.
May 30th	• YÖK announced that Turkish students registered in universities abroad are given a one-shot opportunity to transfer into Turkish universities for the upcoming 2020 Fall semester without quota.
Jun. 3rd	• Lockdown was totally lifted including the elderly.

[9] *We refer to the period between the date of first COVID-19 diagnosis and the date of lockdown lift as the "lockdown period" throughout the paper. Although lockdown was only implemented during weekends and sometimes extended to three to four days, there was a clear shift in people's take on the pandemic due to the lockdown decision. For example, survey participants reported that they went out way less frequently during the lockdown period. While they were able to go out during weekdays, almost 80% of participants decided to go out just one day a week or none.*

Jun. 4th	• YÖK announced that the ratio of credits that could be taken from online courses over all credits required by undergraduate and graduate programs was increased from 30% to 40% in an attempt to enhance online education even after the pandemic. • YÖK also announced that all universities in Turkey have currently a "Distance Education Centre" with the establishment of 20 more of them from the beginning of the pandemic.
Jul. 30th	• YÖK published "New Normalization Process in the Wake of Pandemic[10]" as a guide to help for higher education institutions in Turkey to adapt the "new normal". • The guide provided suggestions on different subtopics as "Distance Education Applications", "Applied Education", "Assessment and Evaluation Applications", "Foreign Students", "Meetings", and "Congresses and Exchange Programs".
Aug. 13th	• YÖK required all universities to start 2020 Fall term as of Oct. 1 at the earliest. • While YÖK endorsed universities to continue online education in the upcoming semester, it allowed universities to decide whether to return face-to-face education, implement a mixture of online and face-to-face education, or continue online education over their preferred digital platforms and/ methods.

Sources: <yok.gov.tr>, <covid19.yok.gov.tr>.

Appendix-B
Preliminary Regression Analyses

Although the present paper is designed to provide with general trends and insights by reporting the survey results in a descriptive and illustrative manner, preliminary results of a simple regression analysis based on below specification is given in Table 10. Summary statistics and variable definitions are given in Table 11 and Table 12, respectively. Due to the existence of different scales used for certain variables, the standardized coefficient (Coeff.-Std. in Table 10) should be referred. Briefly, the standardized coefficient should be interpreted as a one standard deviation change in independent variable results in a standard deviation change in dependent variable by the standardized coefficient" (Dodge, 2008).

$$Online\ education\ satisfaction_i = \beta_0 + \left(\sum_{j=1}^{8} \alpha_j\left(Demographic_{i.j}\right)\right) + \left(\sum_{j=1}^{9} \beta_j\left(Student\ related_{i,j}\right)\right) + \left(\sum_{j=1}^{8} \gamma_j\left(Faculty\ member\ related_{i,j}\right)\right) + \left(\sum_{j=1}^{4} \theta_j\left(Institution\ related_{i,j}\right)\right) + \varepsilon_i$$

$$\varepsilon = iid\ error\ term$$

$$i = Number\ of\ observation$$

$$j = Number\ of\ explanatory\ variable$$

[10] *To reach the guideline: <https://www.yok.gov.tr/Documents/Yayinlar/Yayinlarimiz/2020/kuresel-salginda-yeni-normallesme-sureci-2020.pdf>.*

Table: 10
Regression Results Based On OLS

	Variables	Coeff.	Std. Err.	Coeff.-Std.	t-stat	Sig
	Constant	.563	.066		8.574	.000
Demographic	Gender	.008	.017	.003	.489	.625
	Level of education	.081	.037	.013	2.209	.027
	University type	-.186	.027	-.041	-6.938	.000
	GPA	-.023	.006	-.022	-3.658	.000
	Employment	-.011	.024	-.003	-.464	.643
	Income	.001	.002	.002	0.318	.751
	Lockdown place type	.031	.017	.010	1.812	.070
	Covid-19 diagnosis	.011	.077	0.0007939	0.145	.885
Student-related	Electronic device type	-.020	.019	-.006	-1.027	.304
	Electronic device ownership	-.014	.023	-.004	-.623	.534
	Internet quota	.028	.007	.024	3.791	.000
	COVID psychology	.061	.008	.045	7.222	.000
	Hope for future	.001	.011	.000	.081	.936
	Domestic conflict	-.055	.017	-.019	-3.191	.001
	Sleep latency	-.017	.017	-.006	-1.023	.306
	Sleep duration	-.015	.018	-.005	-.840	.401
	Food insecurity	.017	.006	.016	2.826	.005
Faculty member-related	Instructor online education knowledge	.122	.009	.117	13.167	0.000
	Sufficiency of material shared by instructor	.137	.009	.133	15.859	0.000
	# of readjusted courses	-.011	.004	-.017	-2.948	0.003
	% of readjusted courses	-.023	.018	-.007	-1.291	0.197
	# of synchronous courses	.017	.004	.026	4.423	0.000
	% of synchronous courses	.031	.016	.011	1.963	0.050
	# of courses with only online exam	-.002	.004	-.003	-.403	.687
	% of courses with only online exam	-.072	.024	-.025	-2.963	0.003
Institution-related	Sufficiency of information provided by university	.176	.009	.172	20.066	.000
	Preparedness of university for online education	.444	.009	.450	51.362	.000
	Existence of technical unit in university	.065	.017	.023	3.770	.000
	Perception of unfair grading	-.101	.007	-.093	-14.639	.000
Dependent Variable: Online education satisfaction N=9310 Adj. R^2: 0.721 Durbin-Watson: 1.974						

Table: 11
Summary Statistics

	N	Min.	Max.	Mean		Std. Dev.	Variance	Skewness		Kurtosis	
	Stat.	Stat.	Stat.	Stat.	Std. Er.	Stat.	Stat.	Stat.	Std. Er.	Stat.	Std. Er.
Online education satisfaction	13114	1	5	3.08	.012	1.402	1.967	-.135	.021	-1.226	.043
Gender	12987	0	1	.56	.004	.497	.247	-.238	.021	-1.944	.043
Level of education	13114	0	1	.05	.002	.227	.051	3.928	.021	13.430	.043
University type	13114	0	1	.12	.003	.321	.103	2.384	.021	3.683	.043
GPA	13114	1	6	3.83	.012	1.334	1.779	-.198	.021	-.684	.043
Employment	13114	0	1	.14	.003	.345	.119	2.093	.021	2.380	.043
Income	13114	1	13	4.76	.031	3.579	12.815	.741	.021	-.789	.043
Lockdown place type	13114	0	1	.69	.004	.461	.213	-.839	.021	-1.296	.043
Covid 19 diagnosis	13114	0	1	.01	.001	.102	.010	9.631	.021	90.768	.043
Electronic device type	13058	0	1	.25	.004	.436	.190	1.125	.021	-.735	.043
Electronic device ownership	13114	0	1	.15	.003	.358	.128	1.947	.021	1.789	.043
Internet quota	9803	1	5	4.04	.012	1.212	1.468	-.953	.025	-.314	.049
COVID psychology	13114	1	5	2.14	.009	1.040	1.082	.605	.021	-.175	.043
Hope for future	13114	1	3	1.70	.007	.756	.572	.568	.021	-1.052	.043
Domestic conflict	13114	0	1	.50	.004	.500	.250	.010	.021	-2.000	.043
Sleep latency	13114	0	1	.33	.004	.471	.222	.708	.021	-1.498	.043
Sleep duration	13114	0	1	.26	.004	.438	.192	1.100	.021	-.791	.043
Food insecurity	13114	1	5	2.29	.011	1.298	1.685	.624	.021	-.758	.043
Instructor online education knowledge	13114	1	5	3.11	.012	1.337	1.787	-.118	.021	-1.131	.043
Sufficiency of material shared by instructor	13114	1	5	3.23	.012	1.363	1.858	-.221	.021	-1.154	.043
# of readjusted courses	13114	0	6	1.65	.019	2.212	4.892	.997	.021	-.567	.043
% of readjusted courses	13008	0	10	.27	.004	.428	.184	5.304	.021	83.185	.043
# of synchronous courses	13114	0	5	2.75	.018	2.097	4.399	-.165	.021	-1.670	.043

% of synchronous courses	13114	0	3	.53	.004	.500	.250	-.103	.021	-1.815	.043
# of courses with only online exam	12716	0	10	3.04	.026	2.984	8.905	.640	.022	-.773	.043
% of courses with only online exam	13092	0	10	.46	.005	.555	.308	7.031	.021	104.206	.043
Sufficiency of information provided by university	13114	1	5	3.27	.012	1.376	1.894	-.246	.021	-1.169	.043
Preparedness of university	13114	1	5	2.94	.012	1.420	2.017	.019	.021	-1.292	.043
Existence of technical unit in university	13114	0	1	.58	.004	.493	.243	-.338	.021	-1.886	.043
Perception of unfair grading	13114	1	5	3.67	.011	1.290	1.663	-.643	.021	-.672	.043

Table: 12
Variable Definitions

Variables	Definitions
Online education satisfaction	Completely unsatisfied=1, Unsatisfied=2, Neither unsatisfied nor satisfied=3, Satisfied=4, Completely satisfied=5
Gender	Female=1, Male=0
Level of education	Undergraduate=0, Graduate=1
University type	Private=1, Public=0
GPA	< 1.50=1, 1.50-1.99=2, 2-2.49=3, 2.50-2.99=4 ,3-3.49=5, > 3.50=6)
Employment	Employed=1, Not employed=0
Income	0-250=1, 251-500=2, 501-750=3, 751-1000=4, 1001-1250=5, 1251-1500=6, 1501-1750=7, 1751-2000=8, 2001-3000=9, 3001-4000=10, 4001-6000=11, 6001-10000=12, >10000=13 (Turkish Lira)
Lockdown place type	City centre=1, Out of city centre=0
COVID-19 diagnosis	Diagnosed=1, Not diagnosed=0
Electronic device type	Cell Phone=1, Computer or tablet=0 (Electronic device used for online education)
Electronic device ownership	Belonged to family member, friend or university=1, Belonged to participant=0
Internet quota	0-1.99 GB=1, 2-4.99 GB=2, 5-9.99 GB=3, 10-19.99 GB=4 and more than 20 GB=5 (Monthly)
COVID-19 psychology	Very Negatively=1, Negatively=2, Neither negatively nor positively=3, Positively=4, Very Positively=5 (Psychology was affected by the pandemic…)
Hope for future	Way worse =1, Worse =2, Neither worse not better=3, Better=4, Way better =5 (World will be … than before after the pandemic)
Domestic conflict	Decreased=1, Neither increased nor decreased=2, Increased=3 (Change in conflicts in household after the pandemic)
Sleep latency	Increased=1, Same or decreased=0
Sleep duration	Decreased=1, Same or increased=0
Food insecurity felt	None=1, Little=2, Moderate=3, A lot=4, Overwhelming=5
Instructors' online education knowledge	Completely insufficient=1, Insufficient=2, Neither insufficient nor sufficient=3, Sufficient=4, Completely sufficient=5
Sufficiency of materials shared by instructor	Completely insufficient=1, Insufficient=2, Neither insufficient nor sufficient=3, Sufficient=4, Completely sufficient=5
# of readjusted courses	Number of readjusted courses the participant takes during online education
% of readjusted courses	Share of readjusted courses out of all courses the participant takes during online education
# of synchronous courses	Number of synchronous courses the participant takes during online education
% of synchronous courses	Share of synchronous courses out of all courses the participant takes during online education
# of courses with only online exam	Number of courses graded only by the exam (Not by homework or other methods)
% of courses with only online exam	Share of courses graded only by online exam (Not by homework or other methods) out of all courses taken
Sufficiency of information provided by university	Completely insufficient=1, Insufficient=2, Neither insufficient nor sufficient=3, Sufficient=4, Completely sufficient=5
Preparedness of university for online education	Completely insufficient=1, Insufficient=2, Neither insufficient nor sufficient=3, Sufficient=4, Completely sufficient=5
Existence of technical unit in university	Existent=1, Non-existent=0
Perception of unfair grading	Way better=1, Better=2, Neither better nor worse=3, Worse=4, Way worse=5 (Online education is … than face-to-face education with respect to fair grading)

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