Comparison of the Grades of Health Sciences Students in Online Versus Face-To-Face Education Between Before and During the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has had widespread impacts on various aspects of human life. Since its outbreak, a wide range of restrictions and regulations have been implemented to reduce the spread of the virus. This study aims to investigate grade-based differences in academic performance among Health Sciences students during the years 2019, 2020, and 2021, specifically in relation to the pandemic. Academic performance was measured for students who received 'pass grades' between 2019 and 2021. The study sample consisted of 845 full-time students, with 418 from the Health Science Faculty and the remaining from the Vocational School of Health Services. Of the 845 participants, 342 were online students, while the remaining 503 were traditional face-to-face students. The results indicate that online education has led to an improvement in grade-based academic performance compared to the conventional face-to-face system (95% Confidence Interval of the Difference: Lower -13.34, Upper -10.32; t-test: -15.40; p=0.012). Therefore, we recommend that universities incorporate online education into their academic curriculum.

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Introduction

The COVID-19 pandemic has resulted in millions of deaths worldwide (World Health Organization, 2021). To prevent the virus from spreading excessively, many countries have implemented sector shutdowns, including medical and health education. Due to the COVID-19 pandemic, many universities in advanced and emerging market economies have suspended face-to-face learning and have transitioned to online learning (OL). In some cases, universities have even graduated medical intern students early to assist with the treatment of the high number of COVID-19 patients (Masood Shah, Waseem & Association of American Medical Colleges, 2021; United States Medical Licensing Examination Announcement, 2021). As a result, many universities in advanced and emerging market economies have suspended face-to-face learning and transitioned to online learning (OL) instead. Some universities have even had to graduate their medical intern students early in order to treat the large number of COVID-19 patients (Masood Shah, Waseem & Yaqoob, 2021; Murphy, 2021; De Witt, 2020).

During this period, various web-based educational software tools have been developed and improved, including online Learning Management System (LMS) software and e-learning software. Comprehensive LMS programs offer virtual classrooms, laboratories, clinical procedures, patient treatment simulations, and smart blackboards. As an alternative to a purely online system, Uskudar University has combined both face-to-face (F2F) and online learning, creating a hybrid education model known as FIJITAL® (`**FI**ziki` is a type of F2F education + di**JITAL** [Digital]). Currently, there is a significant amount of literature that attempts to determine the difference in academic performance between 'Face to Face' and online learning education (Masood Shah, Waseem & Yaqoob, 2021; Murphy, 2021; De Witt, 2020; Deokar, Dodamani, Vishwakarma, Jadhav, Khairnar, Marathe, Bhandari & Khobragade, 2021).

This study aims to evaluate the grade-based differences in academic performance of students using Face to Face and Online Learning systems across four different courses. The aim of this study was to investigate whether there are significant differences in academic performance between students using face-to-face (F2F) and online learning systems in health science programs. This report presents preliminary results, which will be further analysed in future research.

Method

This research was conducted at Uskudar University between 2019 and 2021, focusing on two courses. The Health Sciences Faculty and Vocational Schools of Health Sciences offered two courses, namely 'Research Methods in Health Science' and 'Emergency Health Services', respectively. Both courses were taught by the same professor and followed identical curriculums for three years. The study evaluated student performance based on their homework, class participation, oral interviews, tests, project submissions, and final examination grades.

The academic performance of students was measured using 'pass grade' values. The corresponding values were obtained from the 'Student Knowledge System' (SKS) webpage (https://obs.uskudar.edu.tr/).

Ethics Statement

The studies involving human participants were reviewed and approved by the Uskudar University Non-Interventional Research Ethics Board (Ethical approval number 61351342/ April 2021-75, dated 30/04/2021). Written informed consent was not required for participation in this study, in accordance with national legislation and institutional requirements.

Participants

The study analysed the grade-based exam results of students from 2019 to 2021. The study's sample space comprises 845 full-time students, of which 418 are enrolled in the Health Science Faculty (182 in Midwifery and 236 in Physiotherapy and Rehabilitation), while the remaining 427 students are enrolled in the Vocational School of Health Services' First Aid and Emergency Prehospital Emergency Services Program. Out of the 845 participants, 342 were OL students, while the remaining 503 were traditional F2F students. Among the F2F students, there were 111 Midwifery

(M) students and 146 Physiotherapy and Rehabilitation (PR) students. On the other hand, among the OL students, there were 71 M students and 90 PR students. Additionally, there were 246 F2F students and 181 OL students enrolled in the First Aid and Emergency Prehospital Emergency Services Program (FA). The gender distribution of the students was 253 males and 592 females. It is important to note that gender was not considered a significant variable throughout the study. The study excluded students who did not take the final exam. All students whose names were on the class exam lists and who took the exam were included in the study.

Data analysis

The dataset was analysed using mean, standard deviation, and p-value to compare the grade-based performance of students before and during the COVID-19 pandemic. We used SPSS 11.0 for Windows in the statistical analysis procedure, implementing descriptive statistical methods and the t-test. The significance level was set at $p<0.05$.

Findings

Table 1 summarises the obtained results. The grade-based performances of students with Online Learning and F2F learning systems were compared using an independent sample t-test. The results for the whole group of students were statistically significant (95% Confidence Interval of the Difference: -13.34 (Lower) -10.32 (Upper; t-test: -15.40; p=0.012)). However, when analyzing the results in segments, there is no statistically significant difference between the performance of students in *the Vocational Schools of Health Sciences First Aid and Emergency Prehospital Emergency Services Program and those in the Vocational Schools of Health Sciences First Aid and Emergency Prehospital Emergency Services Evening Education Program* (0.58 and 0.458 respectively). As shown in Table 1, students in the Faculty of Health Sciences Online Learning program have the highest performance values for each grade group. The results of the T-test indicate that there is no significant difference in class rank performance between online and face-to-face students studying at the Vocational School of Health Services.

The results of the t-test indicate that there is no significant difference in class rank performance between online and face-to-face students studying at the Vocational School of Health Services. Table 1 shows the t-test results for this hypothesis. Therefore, we must accept the null hypothesis and reject the alternative hypothesis. However, there is a significant difference in class ranking between online and face-to-face students of the Faculty of Health Sciences.

Table 1. The performance measures of 'Online (OL)' and 'Face to Face (F2F)' students by their grades.

Years and Programs	Midterm exam Mean%	Final exam Mean %	Pass Grade Mean%	Number of Students	Standard deviation	t-test	Sig [p]
M 2019 F2F	79.2	58.98	69.02	44	9.48		
M 2020 F2F	78.47	61	72.58	67	10.04	-7.12	0.031
M 2021 OL	83.97	79.58	81.18	71	7.87		
PR 2019 F2F	85.42	66.1	73.83	59	10.43		
PR 2020 F2F	76.92	66.61	72.03	87	10.31	-11.29	0.005
PR 2021 OL	90.11	86.21	88.17	90	8.2		
Total				418			
FA 2020 F2F	68.1	81.54	75.33	122	10.72	-4.84	0.581
FAs 2021 OL	78.32	88.1	84.43	115	9.05		
FA 2020 F2F	65.24	82.14	73.69	124	10.02		
FAs 2021 OL	80.68	92.19	87.69	66	7.82	-7.01	0.458
Total				427			
TOTAL				845		-15.40	0.012

M: Health Science Faculty, Midwifery Program,
PR: Health Science Faculty, Physiotherapy and Rehabilitation Program,
FA: Vocational Schools of Health Sciences, First Aid and Emergency Prehospital Emergency Services Program
FAs: Vocational Schools of Health Sciences, First Aid and Emergency Prehospital Emergency Services Program (Second Evening Education)

Discussion, Conclusion and Suggestions

The need for online learning has increased since the outbreak of the pandemic and particularly after the implementation of lockdowns and restrictions. Some university programs have reduced the number of students attending lectures that require practical education, while others have developed virtual programs for conventional classes, laboratories, and clinical practices.

Online learning and traditional face-to-face education share many common features. Both systems provide students with the opportunity to attend lectures, learn course material, complete group projects, and submit assignments. Additionally, lecturers are expected to organize their curriculums effectively, maximize the quality of their teaching, and motivate students in various ways. Exams are also administered and graded. Despite these basic similarities, there are also differences between the two types of learning models. Teaching in a classroom is conventionally known to be a teacher-centric education system that mostly requires passive learning by the student, while online learning is usually student-centric and requires active learning.

In addition, both face-to-face and online learning education models have their own advantages and disadvantages. Traditional education in a classroom is a well-established teaching environment that has been implemented for many years. The face-to-face system has many benefits compared to online learning (Xu and Jaggars, 2016). Education in a classroom is dynamic, with real-time face-to-face instruction and active student participation. It allows teachers to respond instantly and deliver flexible content. Instruction in online learning can limit students' ability to ask questions and participate in discussions with their teacher and classmates. Online learning instruction can limit students' opportunities to ask questions and respond to their teacher and classmates, negatively impacting the teaching method (Salcedo, 2010).

Despite the convenience of being accessible from anywhere and at any time, the COVID-19 pandemic has transformed university education into various forms of online learning. During the curfew and coronavirus quarantine period, students were able to access their lessons, friends, and teachers online from their homes. This has resulted in more study time, as there is no need to spend time on transportation to school, which can lead to better classroom performance. Online Learning provides students with the opportunity to read more chapters and benefit from high-quality digital courses. However, it is important to note that online learning should not be considered easier to understand than traditional learning methods. Studies on the relationship between working time and performance are limited. However, it is often assumed that online students will use extra time to improve their grades (Bigelow, 2009). We found that several factors contributed to exam success in online learning groups. All online learning lessons were recorded by software programs, allowing students to watch them at their convenience. The opportunity provided students with more comprehensible lessons and additional study time. Furthermore, the online learning platform offers more detailed and visually appealing content compared to face-to-face lessons. Due to the COVID-19 lockdown, online learning students were able to stay with their parents, resulting in better concentration during lessons and more time for studying without the need for transportation. Additionally, they were less fatigued due to reduced travel time. Online Learning students have more sleep time compared to Face-to-Face (F2F) students. They receive individualised instruction in their OL lessons. Despite the positive outcomes, there is a risk of criminal activity.

Cheating during exams is a risk in both online and face-to-face education. Students may form groups to cheat using their smartphones and social media software. Our university uses LMS exam software that records the entire examination period in detail, including the students' computer screens. The text describes the exam entrance and finishing times, the number of exam entrances, the answering time for each question, and the similarity ratio of open-ended questions used to detect cheating and prevent copying.

The study conducted by Gonzales showed similar results to our study, with greater academic performance observed in the online education group compared to face-to-face instruction among medical school students. The study by Gonzalez et al. (2021) suggests that COVID-19 confinement has led to changes in students' learning strategies, resulting in improved efficiency.

The statistical significance of these changes was particularly interesting among the Health Sciences Faculty. Notably, online learning students scored relatively higher in the pass grade category. Additionally, the study found that bachelor's degree students were more adaptable to the new type of digital education. All of our undergraduate students were first-term students, which may have contributed to their difficulty adapting to online learning. These findings align with Tanyel and Griffin's research (2014). In 2020, Fernandez et al. reported an 8.89% increase in student pass rates for online learning, compared to only 1.21% in the second year (Fernandez-Altuna, Gutierrez Rayon, Cruz Mendez, Ramirez Resendiz, Angeles Diaz, Tovar Lopez &Pantoja-Melendez, 2021). The study conducted by the authors yielded similar results to ours. The authors suggest that there is no clear explanation for the better performance of students at home, as the time allotted for online evaluations would not allow them to access external information during the exam (cheating), or it could be due to reduced stress levels when taking exams at home. We concur with their assessment. Future studies should investigate the various legal and illegal factors that may affect academic performance.

 Elzainy et al. observed that e-learning and assessment led to higher student achievements, improved technological skills, and promising staff perceptions. These findings support the implementation of more online medical courses in the future (Elzainy, Sadik & Abdulmonem, 2021). Based on our results, we concur with these statements.

Overall, the students unanimously agreed that online learning was valuable to them, despite it being their first experience during the COVID-19 pandemic (Agarwal & Kaushik, 2020; Rajabalee & Santally, 2021).

During these unprecedented times, universities should take necessary measures to ensure optimal results. For universities to enhance online learning, they should focus on increasing internet bandwidth and data centre capacity, acquiring licensed online learning tools, and providing training to students and faculty members to improve their computer skills.

It is important to prioritize online learning and training workshops to supplement on-campus activities. Additionally, IT should offer efficient and responsive technical support and troubleshooting services to students, particularly during tests and exams (El Said, 2021).

Our study demonstrates that changes in online learning are achievable. However, due to the impact of the COVID-19 pandemic on education, further research is necessary to analyse the educational structure.

It is important to note that the pandemic is more severe and prolonged than previous outbreaks, and therefore, we lack experience in using it as a background. The COVID-19 pandemic is a more severe and prolonged outbreak than previous ones. Therefore, it cannot be used as a background for e-learning education. However, we can implement and continue e-learning education with a well-integrated and well-trained team that understands the needs of students and teachers. They can quickly respond and provide support through digital tools. It is concluded that OL education will continue after the COVID-19 pandemic. It is believed that future academic programs will also include some OL education sections. It is important to conduct such research again in curricula that include increasing rates of online education, to conduct more reliable and comprehensive ones, as one of the most important features of scientific research is reproducibility. This paper discusses the implications of these developments and offers suggestions for future research.

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