

The effect of online education on the academic performance of students during COVID-19 pandemic: evidence from Kazakhstan

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Online education became a completely new way of getting knowledge today, especially when students worldwide were suddenly switched into remote learning. It is important to understand the consequences resulting from such a type of education. This study seeks to evaluate the effect of switching from on-campus to online learning by examining a reach panel dataset on a student body from a private university in Kazakhstan.

On March 13, 2020, two first COVID19 cases were registered in Kazakhstan. On March 16, the lockdown was announced and universities and schools suddenly switched to online teaching and learning that continued for the whole 2020/21 academic year. Zoom was commonly used by Kazakh HEIs for online teaching over the whole period, and some universities have invested in licensed full versions of it.

We examine the data on 61 senior undergraduate students representing four majors who attended via Zoom classes for 53 subjects during the Autumn semester 2020/21.

Using the data directly extracted from the Zoom dashboard which records information about each student, we easily checked the involvement in education of each particular student recorded. The system creates, keeps and updates logs by each student and all of them are identifiable. Using a standard report from Zoom we could extract the data related to their location, type of the device used, courses enrolled and technical details considering quality of connection, latency etc. This data was linked with the data on the students' academic performance from the university learning management system. To reinforce the effect of analysis we also conducted a brief survey evaluating feedback of students and professors regarding the effect of online teaching and learning.

The study employs two empirical strategies.

To employ the first approach, we merge the post-COVID data on a students' performance with the sample of the pre-COVID students who attended the same courses taught by the same lecturers a year earlier in on-campus mode. We then match pre- and post-COVID students based on observed characteristics (major, scholarship holder status, language of instruction at a secondary school, university entry test score, GPA, gender) and a subject with the nearest-neighbour propensity score matching and run the OLS model explaining the students' final grade per subject with a dummy variable for post-COVID semester on a matched sample.

The second approach seeks to estimate the effect of the Zoom sessions' technical characteristics - duration of a Zoom session, connection errors, use of PC vs. mobile phone, audio and video latency, a student's locality - on students' performance during the COVID19 imposed online teaching. Since the main explanatory variables are observed at a Zoom session level and performance is observed at an aggregate level (midterms that include several sessions each), we use a latent variable multilevel model. To ensure more data points, we use midterm grades corresponding to specific time-frames and link them with the Zoom sessions.

Our results are suggestive that an academic performance likely drops with the COVID19 imposed online teaching when we compare two groups of similar students studying the same set of subjects, but the result is not statistically significant. Some technical variables characterising the Zoom sessions are consistent and significant even after controlling for all observed students' characteristics, particularly, the use of PC vs. mobile device. However, the vast majority of the variables turned to be statistically insignificant.

Assuming that statistical significance might suffer from using a small dataset and data aggregation and keeping in mind possible alternative explanations arising from data or methodology limitation, we conclude that more research is needed.