

# The Impact of Mandatory Distance Education on Teaching and Learning Macroeconomics and International Economics, at Budapest Business School, during the Covid-19 Epidemic

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*Abstract: In our study, we explore the impacts of remote and online education framework introduced as a result of the Covid-19 epidemic in the case of two subjects (Macroeconomics and International Economics) taught at the Faculty of Commerce, Hospitality and Tourism, Budapest Business School. We analyzed the measures of the education change, the effects of the change on the final results of the students and introduced the experiences of our students and teachers in this period. The primary data required for the analysis were diaries maintained by teachers and information available through the electronic study systems supporting online learning (CooSpace, Neptun), as well as student and teacher questionnaires and teacher interviews. The results for both subjects show that, despite the unmodified difficulty level of the exam questions, student performance improved during the remote learning period. The implications of the study are therefore as follows: the coronavirus changed the educational framework of our university; the performance of students improved on both subjects; preparation time for teachers has increased, exam preparation time for students has also increased; consequently, the online solutions used in the distance learning period, have changed the attitudes of the students and teachers, as well.*

*Keywords: COVID-19 pandemic; online learning; distance education; teaching methods; universities; efficiency*

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## 1 Introduction

The coronavirus pandemic urged countries to compose and adopt new laws, having a grave effect on the higher education sphere. After the SARS-CoV and H1N1, Covid-19 was the third epidemic to be classified by WHO as a pandemic in

the 21<sup>st</sup> Century. The global pandemic is, however, not only a severe public health emergency, but a political, economic and social crisis at the same time [1]. According to the data recorded on October 12, 2020, almost 37.5 million people tested positive for the disease, and it caused the death of more than 1 million patients [2]. Politicians, health care professionals and other experts introduced numerous measures to control the epidemic and to provide the best possible care to the infected [3]. The first measures of the kind were imposed in Wuhan, and then, the entire city went into lockdown on January 23, 2020 [4].

Thus, the interpersonal contacts promoting the spread of the virus were reduced significantly by shutting universities down [5]. The closing of educational institutions affected millions of students all across the globe [6]. Even though online education is far from being a new method in higher education, its emergency extension to all university courses still imposed a vast challenge [7] [8].

Some courses, laboratory sessions, visual arts, office work, dance, art, and music classes cannot be taught online. In such cases, teachers could either evaluate their students based on their performance up to that point or could opt for suspending their courses until things returned to normal [9].

## 2 Literature Review

Although a relatively short time has passed since the outbreak of the global pandemic, there are numerous academic publications examining the transition of institutions or national educational systems to distance learning and the digitization that followed [11]. New adaptation strategies had to be developed on the level of both micro and macro-organizations [57]. The survey monitoring the opinion of the students in the United States serves as a fine example of presenting a complex view from the point of view of students [11]. A similar study was made with a more general scope, approaching the topic in a nation-state context, processing cases in the Philippines [12], Vietnam [13], Australia [14], India [15], Spain [16], Georgia [17], United Kingdom [18], and China [19]. After introducing government measures in the respective countries, these studies usually analyze primary data to understand how the intervention and transition practices of institutions effect student and in some cases teacher communities.

The impacts of the Covid-19 epidemic on education have also been studied encompassing a narrower scope. Ute Kaden's 2020 study [20] examined the performance and reactions of a number of students in the case of specific subjects in the form of a case study conducted in a Canadian small-town environment. The transformation challenges of the educational processes of special fields were examined in the fields of neurosurgery [21], optometry [22], neuroanatomy [23], traditional Chinese medicine [24] and business training [25].

The studies on different levels examining the impacts of the epidemic on different fields arrived at similar conclusions concerning the society as a whole. One of the most dominant phenomena was the inequality of access to digital learning, also referred to as digital inequality [26-28]. Digital inequalities do have a technical dimension, but it must also be noted that the user's autonomy, the extent of the social support network available to them, as well as their previous digital experience can also vary immensely, which may also serve as the sources of such inequalities [29].

The literature sources have drawn some conclusions in regard to expectations towards distance learning systems operating equally well in a digital context. In addition to taking digital inequalities into consideration, the aspect that distance learning should also preserve the mental health of the participating parties and that it should strive to reduce negative inequality impacts through developing the necessary digital innovations must also be highlighted [28]. In terms of handling these inequalities, particular attention must be paid to the vulnerable groups of society [14], who often do not even have proper internet connection. Only after establishing these baselines can we examine which software, hardware, as well as organizational and work schedule corrections could bring about a sustainable solution in the educational system [17]. Odriozola et al. [16] call the attention of educational systems to students' stronger inclination towards anxiety and depression, as this problem must by all means be considered in the time of digital education. Another important aspect in the educational sphere is that they could only substitute a certain type of unidirectional, direct, classroom form of education properly with online courses [26], but they could not properly replace field work, laboratory work or processes requiring quick personal interaction in the new distance education framework.

Krishnamurthy [25] identifies the most important aspects to consider that a business school needs in the course of its transformation tailored specifically to business trainings. First, the points of organizational transformation of the given university must be identified, the changes taking place in business life need to be taken into consideration, and the changed attitude of students must also be incorporated into the system. The financial limits as well as the elements of the previously applied IT infrastructure must be considered.

Zhu and Liu's paper published in 2020 [19] does not only share the measures imposed by an individual country (China) and their experiences so far, but also formulates recommendations for the university sphere and governments for the future, which should be taken into consideration during the potential future waves of the epidemic or simply in the course of the further digitization of education.

Therefore, based on previous studies we can state that we must consider a complex set of criteria when examining the conceptual structure of good online education solutions and systems [55] [56].

## 3 Research Questions and Methodology

### 3.1 Goal of the Research and Research Questions

In this study we aim to examine how teachers overcame new challenges and what impacts online education had on the learning effectiveness of students compared to face-to-face teaching. In the framework of our research, we examine two subjects: one of the subjects (Macroeconomics) (751 students) encompassing weekly lectures and seminars, while the other subject (International Economics) with only 68 students included one lecture a week.

We aimed to achieve our research goal by answering the following research questions:

- What differences could be observed between the two subjects in the course of transitioning to online education?
- To what extent was the acquisition of the material and student performance influenced by the methodological change taking place during the spring semester of 2020?
- How did the teachers perceive the transition to online education and what experiences did they gain?
- How did the students perceive the transition to online education and what experiences did they gain?

### 3.2 Methodology

The aim of our study was to share with the reader how the education process of our institution was affected by the change of distance education system, caused by the pandemic. Our research includes a systematic description and academic reflection in a community process. In this regard, it is the presentation of a case study. The literature on case study methods is quite complex. According to the type of time dimension, as Starman [30] points to these types of classification our study is mostly a retrospective case study.

The ideal research subjects for the case study are new, emerging phenomena, in our case the transition to online education. Through this method, we wanted to examine the online educational process so that we could see from the outside the process we were involved in.

Case study analysis is a frequently used qualitative methodology tool in researches carried out in the field of education [33], yet it does not have a legitimate status due to the lack of well-defined and structured protocols [34]. From the 1970s, the case study was used in the field of education primarily to evaluate training plans

and materials. The aim was to be able to assess the user experience, opinion and socio-political impact of the trainings on the success of the output side [35].

The researchers who opted for case studies as their research methodology exceed the findings that can be concluded from quantitative research, as they get to see the events from the angle of participants, while the simultaneous examination of quantitative and qualitative data could help both the explanation of the process and the reconstruction of the events examined via complete monitoring and analysis [36].

If we only relied on quantitative methods when evaluating the effectiveness of educational programs and initiatives, some very important data would remain unexplored, and thus the survey would not be complete [36].

In a certain sense we could say that writing a case study is not simply a method, but also an approach at the same time. The essence of this is that in spite of all the apparent differences and distinctions, human behavior does have certain features that can be generalized. Thus, monitoring a given unit also offers a great insight to the specificities of a certain type of behavior or organizational operation [37].

In terms of research design, we have built up the methodological part of our work in a similar way as a study from 2020 on the subject of education (Jesionkowska et al [36]). We planned the steps for primary data collection; collected the data by the help of specific tools, described in the next section; analyzed the received data from the tools and from university databases; and finally, we presented the results of our work. We did not have a more sophisticated goal with the study, for example, we did not attempt to formulate a new theory by the help of our work. In this sense, our study does not strictly meet all the theoretical criteria, formulated in Andrade's [37] study.

Researchers primarily use exploratory and explanatory case studies [32, 33, 38, 39]. Our aim was also to describe the characteristics of the area under study (transition to online education) in a situation where there was no way to prepare students or teachers in advance.

### **3.2.1 Participants**

Four teachers and more than 300 students participated in the questionnaire. Table 1 shows the characteristics of the teachers involved in the study. All teachers have a degree in economics.

In our study, we compared the experiences and results of two full-time subjects in the field of theoretical economics: Macroeconomics and International Economics. A common feature of the two subjects is that both are disciplines of theoretical economics.

Table 1  
The characteristics of the teachers involved to the analysis

<b>Name</b>	<b>Sex</b>	<b>Age</b>	<b>Post</b>	<b>Educational experience expressed in years</b>
Éva	Woman	62	professor	30
Farkas	Man	56	associate professor	34
Tibor	Man	33	associate professor	10
Róbert	Man	32	assistant professor	3

Source: Author's source

However, an important difference between the two is that while Macroeconomics is taught to hundreds of students on a mandatory basis, with a lecture of 2 contact hours and a seminar of 2 contact hours each week, International Economics only has one lecture of 2 contact hours per week, and a maximum of 100 students are enrolled in this class, as an optional subject.

A total of 751 students attended the Macroeconomics course in the spring semester of 2020. The number of students involved in the questionnaire was 334 of which, 76% were female and 24% were male. In terms of age groups, the respondents aged 19 and 20 comprise 58.1%, those 20 to 22 years 35.3%, those 23 to 24 years 5.4%, while the rest of the students are 25 years old or older. More than 90% lives in the capital (45.5%) or in other cities (45.5%), the rest lives in smaller settlements.

68 students attended the International Economics course in the spring semester of 2020. 10 students participated in the study: 8 students are females and 2 are males. In this group distribution in terms of age: 22.2% is 19-20 years old, 66.7% is 21-22 years old, 11.1% is 23-24 years old, and no students are older than 25. The majority of respondents live in the capital (44.4%) or in other cities (33.3%), and 22.2% lives in villages.

91.3% of Macroeconomics students and 90% of International Economics students had unrestricted access to internet prior to online education. The internet did not work perfectly in many cases, only 47% reported no problems, the rest of the respondents experienced issues on a monthly, weekly or daily basis (Figure 1).

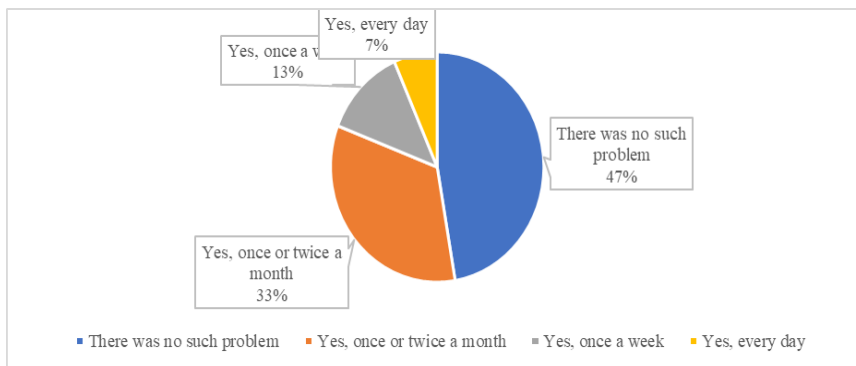


Figure 1

How often did students of Macroeconomics experience internet connection problems?

Source: own editing

### 3.2.2 Data Collection

We obtained important information at the online classes held each week. The meetings were held each week from mid-March until the end of May, over two and a half months, during which we logged the teachers' method of preparation for the classes each week. The log contained the following key information: the exact date of the lesson, the name of the teacher holding the given lesson, the place of the lesson (title of the online interface), the date of the consultation related to the lesson, the outline of the presented topic, listing the supporting materials in connection to the topic, determining the student's contact information, describing the information provided to the students, determining the author and subject of the control test.

We made semi-structured interviews with the concerned teachers, which we examined with the method of content analysis once recorded. To compare the responses of the teachers, first we constructed the main questions. Questions for teachers covered the following areas: comparison of the experiences of the online and offline education, the method of the preparation of online course materials, conclusion of the changes in the education methods, the processes of the control and assessment systems in the online period of the education, the most important best practices. We also sent an anonymous questionnaire with the total of 21 questions to the teachers. The questionnaire could be completed by the teachers over a given period which was between the 27th of August and 5th of September 2020.

We applied questionnaires in the case of students so that we could document and understand their experiences regarding distance learning. The structure of the questionnaire had several distinct parts. After the personal data we focused on the

technical conditions of the students in the online education framework. In the next part we explored the main experiences of our students in the online period. To make it easier to assess the changes, we asked a number of comparative questions between previous normal and online education. Finally, students were able to make suggestions for improving online education. A total of 22 questions had to be answered by the respondents. We sent the same anonymous questionnaire to the students of the two subjects separately, we worked with these two questionnaires in our study, concerning students. The questionnaires could be completed by the students over a specified time period between the 5th of August and 22nd of August 2020. A Google questionnaire link was sent to students through the Neptun and Coospace systems.

### **3.2.3 Data Analysis**

As we have collected data in various manners in our study, we opted for various analysis methods for processing them, as well.

Logging the meetings qualifies as a descriptive research method. This allowed us to collect and cumulate personal experiences and to understand the subject of the research, the underlying causal links, mechanisms and metacommunication aspects.

We processed the answers received in response to the structured questions in the course of the interviews as well as the casual conversations with content analysis.

We analyzed the data of the questionnaire with the help of Microsoft Excel spreadsheets. Except for demographics, the availability of technical devices to students and three open questions, we assessed the students' attitude and experience gained in the course of online education with Likert scale questions. We opted for an odd scale (1-5) in order to allow students to give neutral responses. This is more suitable for measuring attitude than odd scales [42] [43]. When examining data, we primarily assessed frequency and composition.

We exported the students' grades into Excel sheets, then calculated their means and standard deviation, as well as additional descriptive statistical indicators.

## **4 Results**

In this chapter of our study, we present the results and main implications of our research in specific subchapters. These subchapters are arranged according to the topic concerned by the subchapter and not according to the research questions.



#### **4.1 Main Changes in the Assessment Process of the Two Subjects in Question during the Distance Learning Period**

In terms of the formation of students' grades, differences are shown between the two subjects also during the offline, regular education period. Macroeconomics is a subject with a practical course mark, which means that the grade of the student reflects their performance during the given term. The two classroom tests give 70% of the final grade, while the student groupwork (essay and presentation in the case of traditional in-class education, only essay in the case of distance education) gives 30%. In contrast, International Economics is a lecture course, which means that the 100% of total points can be obtained at the written exam held during the exam period. In this sense, we can conclude that the effectiveness of the International Economics subject was completely influenced by the online education framework also in terms of conveying the course material to students (after the mandatory online education was announced), and students also had to obtain the credits necessary for their grade within a completely new framework. A new framework also prevailed in the case of Macroeconomics in terms of conveying the course material, and also in terms of the tests, however, there was no change whatsoever in the case of groupwork giving 30% of their final grade compared to previous periods. In our opinion, students had better chances at online tests, as before the announcement of mandatory online education and the severe spreading of the virus, they had to complete the test in a computer room, in the case of online education they had to pass the subject by completing the test at home, offering more ideal circumstances, and the use of aids also became possible in this case.

#### **4.2 Changes of Student Grades in the Case of Macroeconomics**

We examined the change of student performance by comparing the grades of the spring semester of the school year 2018/2019 with those of the spring semester of the school year 2019/2020 in the case of both subjects. It is true for both subjects that they are only held in the spring semesters, thus we had to go back an entire calendar year for correct comparison. We considered it sufficient to compare grades with those of the previous year, because we did not experience any significant differences in the course of the regular annual comparisons.

When comparing the final results, we examined the mean, standard deviation and mode of the grades achieved, as well as the ratio of students in the case of Macroeconomics that did not obtain a signature in the two periods. In Hungarian higher education, 1 is the worst grade: it means that the student does not pass the subject, while 5 is the highest possible grade. Thus, the range of the possible grades is 4, this did not change during the two periods. In the case of Macroeconomics, getting a signature also has a separate precondition, and those students who did not meet this precondition for any reason receive an entry stating

“signature denied” as an evaluation, and thus do not qualify for a grade at the end of the semester and do not pass the subject.

Table 2  
Descriptive statistics of Macroeconomics in the two periods analyzed

<b>Descriptive statistics of Macro economics in the two periods analysed</b>			
School year 2018/2019		School year 2019/2020	
Students with signature	618	Students with signature	698
Students without signature	10.17%	Students without signature	7.06%
Mean of the grades (618 students)	3.41	Mean of the grades (698 students)	3.56
Mode	3	Mode	4
Standard deviation	1.16	Standard deviation	1.1
Variance	1.33	Variance	1.21
Kurtosis	-0.92	Kurtosis	-0.94
Skewness	-0.16	Skewness	-0.25

Source: own editing

Table 2 contains the relevant descriptive statistical data pertaining to the Macroeconomics subject. The number of students in the two periods was not identical, more students attended the class in 2020. In terms of effectiveness, the performance of students was better in the latter school year, when they studied in an online education framework. This improved performance also manifests in the fact that the ratio of students failing to obtain a signature decreased from 10.17% to 7.06%. In addition, the arithmetical mean of students obtaining a grade increased from 3.41 to 3.56, resulting in a 0.15 rise. The mode of the grades was 3 in spring 2019 and rose to 4 by spring 2020. Standard deviation decreased from 1.16 to 1.1, the decrease also manifested in variance naturally, calculated as the square of the former value. The kurtosis of the basic sample of the two years takes almost the same value, and it is true for both years that the distribution of grades is flatter compared to normal distribution based on the negative indicator. There is a more significant difference in terms of skewness: in both years there are more outliers in the negative side of distribution, this changed from -0.16 to -0.25 by 2020. In our opinion, the students’ grades improved in the period of distance education owing to the effectiveness of the well-thought-out educational framework and as a result of completing tests at home.

### 4.3 Changes of the Grades of Students in International Economics

Table 3 contains the relevant descriptive statistical data pertaining to the International Economics subject. The number of students in the two separate periods was not identical in this case either because more students attended this

class in 2020. In terms of effectiveness, the performance of students improved in the latter school year, when they studied in a distance education framework. Signature does not have special preconditions in the case of this subject, as a result of which there is no difference in terms of students failing to obtain a signature, but there are differences in all other aspects. The arithmetical mean of grades increased from 3.85 to 4.15, resulting in a significant increase of 0.4. The mode took the highest possible value in both years. Standard deviation and variance decreased in the case of this subject, too, basically this value is lower in both years than in the case of Macroeconomics. Kurtosis allows us to conclude that the distribution of grades are flatter, compared to normal distribution based on the negative indicator, however, it deviates from normal distribution a lot less in the case of this subject, presumably due to the smaller number of students. The absolute value of skewness also increased in this case, from -0.62 to -1.07, which once again shows outliers on the negative side of distribution, most certainly stemming from the fact that the cumulative results are quite good, and thus the weaker performances qualify as outliers.

Table 3  
Descriptive statistics of International Economics in the two periods analyzed

<b>Descriptive statistics of International Economics in the two periods analysed</b>			
School year 2018/2019		School year 2019/2020	
Students with signature	48	Students with signature	66
Students without signature	0.00%	Students without signature	0.00%
Mean of the grades (48 students)	3.85	Mean of the grades (66 students)	4.15
Mode	5	Mode	5
Standard deviation	1.09	Standard deviation	1.04
Variance	1.19	Variance	1.08
Kurtosis	-0.46	Kurtosis	-0.31
Skewness	-0.62	Skewness	-1.07

Source: own editing

#### 4.4 The Most Important Implications regarding the Student' Questionnaire

The students' perception of online education could be an important criterion, due to its potential application in the future. 334 Macroeconomics students and 10 International Economics students shared their experiences in the course of our study.

The fear of Macroeconomics students from online education was distributed between all values almost evenly (between 'Strongly disagree' and 'Strongly agree'): 16% – 22% – 20% – 25% and 17%, while the majority of Macroeconomics students felt frustrated (70%). Thus, it is not surprising that the

latter were more pleasantly surprised: 60% of them felt this way completely, while 10% reported that they rather felt this way. In the case of the other subject, these values are 35% and 37% (Figure 2).

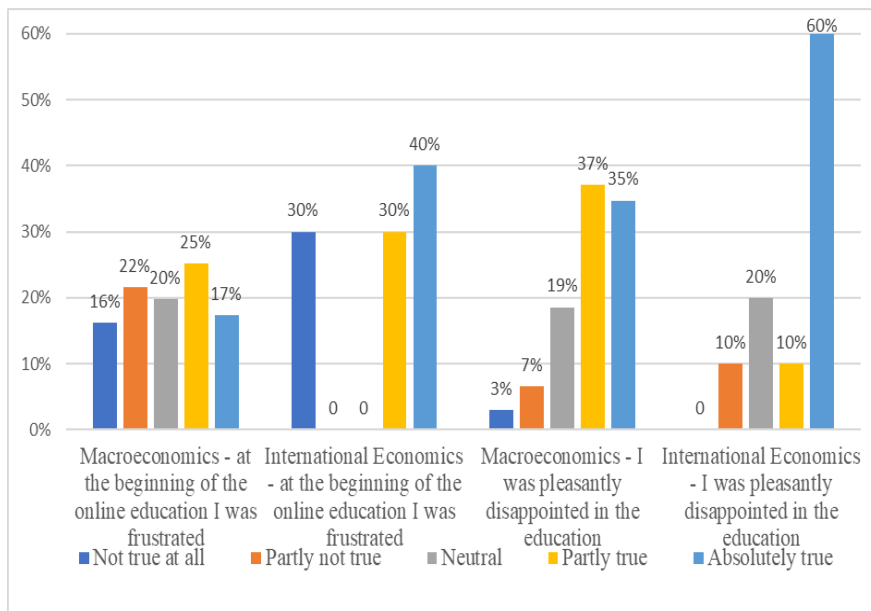


Figure 2  
The student’s opinion on the online education – at the beginning and at the final

Source: own editing

Online education did not only put a lot of pressure on teachers, but on students too. The majority (approx. 60%) felt in the case of both subjects that they had to dedicate more time to studying in the course of online education compared to regular education. In the case of International Economics, none of the students thought that this was “Not true at all”, and only 26 Macroeconomics students gave this answer.

How the work of students was facilitated by the materials uploaded during online education compared to regular education is demonstrated by Figure 3. The students thought that the course materials provided by their teachers facilitated their learning and preparation significantly in the case of both subjects. 154 Macroeconomics students (46.1%) and 6 International Economics students (60%) thought that they received maximum support from their teachers. If we add the ‘Partly true’ responses, the ratio of satisfied students is quite high in terms of both subjects: 82.6% and 80%, respectively.

In the case of Macroeconomics, 2 students were completely dissatisfied and 12 students were partly dissatisfied with the materials the teachers uploaded for them.

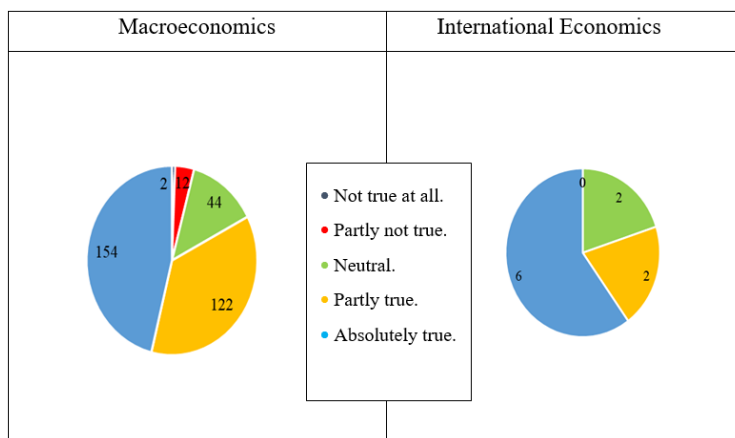


Figure 3

The course materials provided by the teachers greatly facilitated its acquisition (main)

Source: Author’s research

The students evaluated the information provided by teachers about the accessibility of course materials and the consultation dates quite positively. Approx. 60% of students considered the information provided to be completely adequate in both courses. By adding the ‘Partly true’ answers, the rate rises to 80% (Figure 4).

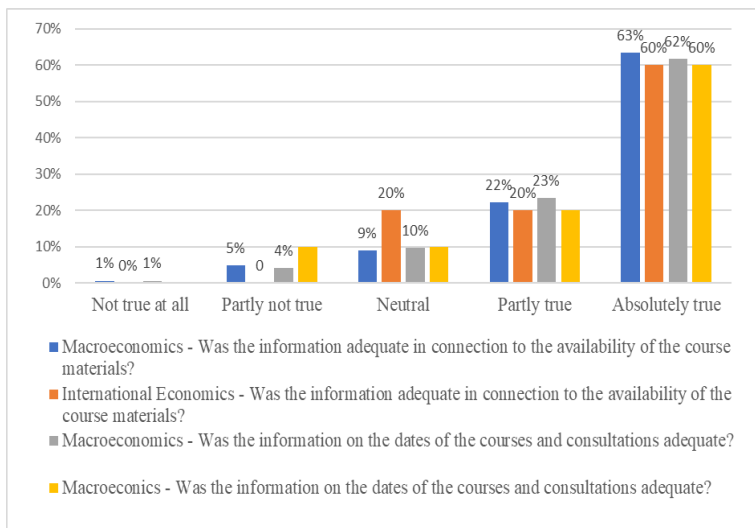


Figure 4

The information was adequate in connection to the accessibility of the course materials and the date of the consultations

Source: Author’s research

## 4.5 The Most Important Implications regarding the Experiences of the Teachers

Macroeconomics was taught by 4 teachers, one of whom also holds the International Economics lectures; thus, the teachers' experiences of online education were not separated based on the two subjects.

The 4-member teacher group had worked together effectively already before the measures were imposed due to the epidemic. They provided maximum support to each other, asked for the opinion of the other in professional matters and they made and implemented all decisions together. This way, their cooperation also remained unbroken in the course of online education. All members were present at all weekly Teams meetings held at a fixed date. They planned the key points of the events of the upcoming week at these meetings, including for instance the preparation of teaching aids in addition to the core material, the course of preparing the classroom tests and appointing the persons to execute them. Students were informed about the upcoming week by every Friday. They were informed, among others, about where to find the learning aids (videos, PPT files of presentations, glossaries and practice exercises), the dates of the Teams seminars of teachers, as well as about consultation options and the regular short tests for extra credit.

The fact that the seamless teamwork of teachers not all 4 of them shared the same opinion about the changes taking place due to online education (Figure 5).

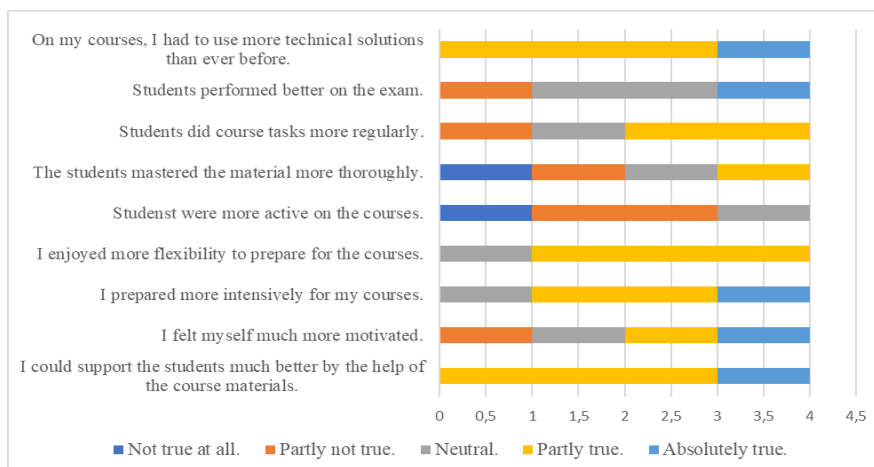


Figure 5

Comparison of the first, traditional in-class teaching to half of the school year in online education

Source: own editing

Their openness towards introducing several new technological solutions shows the flexibility of all 4 teachers, and they did all this to better facilitate students' learning with the course materials. However, their opinions regarding the performance of students varied to a great extent. Only one teacher thought that students achieved better results at tests in the framework of online education. Our findings regarding Research Question 2 support this opinion, as the students achieved a higher average in Macroeconomics and in particular in International Economics. Even though the teachers' levels of motivation were completely different, a more intense preparation can be observed in comparison with normal school semesters (Figure 5).

### **Conclusions, Summary**

In our study, we examined how the Covid-19 epidemic and the resulting social changes, influenced the education of theoretical economics, at the Faculty of Commerce, Hospitality and Tourism of Budapest Business School. Restrictive measures affecting the teachers and students of our institution, as well as the methods of teaching and examination were in place in the early phase of the epidemic. We collected and processed the grades, teaching and examination methods of two theoretical economics subjects (Macroeconomics and International Economics) as well as the experiences of the teachers teaching them, while also assessing student perceptions.

The most important conclusions of the study include the following. In the distance learning period, the revisions of the course materials and the routine use of online interfaces were the main challenges faced by the teachers. In the distance learning framework system, students also had to adopt a different approach towards learning and towards participation within the educational process. In the case of the subjects examined, the effectiveness of examinations significantly improved, which was influenced by the fact that students completed the tests at home, and they were able to learn by the help of newly developed online course materials. We should also stress in relation to students those certain aspects of digital inequality also influenced their approach to distance education and their performance, too. In spite of the relatively rapid and thorough transition process, in general, both students and teachers evaluated the experiences of the online education framework more positively than negatively. According to the teachers' experience, the most important task was the acquisition of coordinated online teamwork and smooth technical solutions. Students had to spend more time with learning in online education, rather than in a normal educational setting, but this was not experienced as a sacrifice. Approximately 60% of students considered the information provided to be completely adequate in both courses in the online education period, and only the lack of personal contacts and permanent internet problems served as negative experiences.

The main implications of our article are manifold. The Coronavirus changed the entire educational framework of our University, the performance of students

improved in both examined subjects; lesson preparation time for teachers increased, student learning time for exams also increased, consequently, online solutions used in distance learning period have changed the attitudes of the students and teachers, as well. In the absence of personal feedback, regular testing opportunities were positively received by students, however, digital inequalities and previously fewer common tasks, were more challenging for them. Although the work of the four teachers involved was more complex during the online education framework, they stated that they were happy to use some online solutions in subsequent classroom courses. This statement is also confirmed by the educational tools in the current school year.

### References

- [1] Williamson, B.; Eynon, R.; Potter, J.: Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency, Learning, *Media and Technology*, 2020, 45, 107-114.p.
- [2] Bedford, J.; Enria, D.; Giesecke, J.; Heymann, D.; Ihekweazu, C.; Kobinger, G.; Lane, H. C.; Memish, Z.; Oh, M.; Sall, A.A.; Schuchat, A.; Ungchusak, K.; Wieler, L.H.: COVID-19: towards controlling of a pandemic. *Lancet*, 2020, 395, 1015-1018.p.
- [3] WHO.: Coronavirus disease (COVID-19) pandemic. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> (12.10.2020.)
- [4] Xiang, Y. T.; Yang, Y.; Li, W.; Zhang, L.; Zhang, Q.; Cheung, T.; Ng, C.H.: Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*, 2020, 7, 28–29.p.
- [5] Weeden, K.; Cornwell, B.: The small world network of college classes: Implications for epidemic spread on an university campus. Manuscript under review. *Sociological Science*, 2020, 10.15195/v7.a9
- [6] UNESCO Education: From disruption to recovery. Available online: <https://en.unesco.org/covid19/educationresponse> (08.08.2020.)
- [7] Lim, M.: Educating despite the COVID-19 outbreak: lessons from Singapore. The World University Rankings [20. Mar; 2020]; Available online: <https://www.timeshighereducation.com/blog/educating-despite-covid-19-outbreak-lessons-singapore> (26.06.2020.)
- [8] Oranburg, S.: Distance Education in the Time of Coronavirus: Quick and Easy Strategies for Professors. *Duquesne University School of Law Research Paper* 2020, 02. Available at SSRN: <https://ssrn.com/abstract=3553911> (12.06.2020)



- [9] Sahu, P.: Closure of universities due to Coronavirus Disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus*. 2020, *12*, e7541.
- [10] Daniel, J.: Education and the COVID-19 pandemic. *Prospects* 2020. *4*, 1-6.p.
- [11] Cohen, A. K.; Hoyt, L. T.; Dull, B. A.: Descriptive Study of Coronavirus Disease 2019-Related Experiences and Perspectives of a National Sample of College Students in Spring 2020. *Journal of Adolescent Health* 2020, *67*, 369–375.p.
- [12] Toquero, C. M.: Challenges and Opportunities for Higher Education amid the COVID-19 Pandemic: The Philippine Context. *Pedagogical Research*, 2020, *5*, em0063
- [13] Trung, T.; Hoang, A. D.; Nguyen, T. T.; Dinh, V. H.; Nguyen, Y. C.; Pham, H.H.: Dataset of Vietnamese student's learning habits during COVID-19. *Data in Brief*, 2020, *30*, 1-7.p.
- [14] Drane, C.; Vernon, L.; O'Shea, S.: *The impact of 'learning at home' on the educational outcomes of vulnerable children in Australiaduring the COVID-19 pandemic*. National Centre for Student Equity in Higher Education: Perth. Australia, 2020.
- [15] Kapiasaa, N.; Paulb, P.; Royc, A.; Sahac, J.; Zaveric, A.; Mallickc, R.; Barmanc, B.; Dasc, P.; Chouhanc, P.: Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review* 2020, *116*, 1-5.p.
- [16] Odriozola-González, P.; Planchuelo-Gómez, Á.; Iruirtia, M. J.; de Luis-García, R.: Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, 2020, *290*, 113108
- [17] Basilaia, G.; Kvavadze, D.: Transition to Online Education in Schools during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic in Georgia. *Pedagogical Research*, 2020, *5*, em0060
- [18] Watermeyer, R.; Crick, T.; Knight, C.; Goodall, J.: COVID-19 and digital disruption in UK universities: afflictions and affordances of emergency online migration. *Higher Education*, 2020, *4*, 1-19.p.
- [19] Zhu, X.; Liu, J.: Education in and After Covid-19: Immediate Responses and Long-Term Visions. *Postdigital Science and Education*, 2020, *4*, 1-5.
- [20] Kaden, U.: COVID-19 School Closure-Related Changes to the Professional Life of a K-12 Teacher. *Education Sciences* 2020, *10*, 165
- [21] Lewis, C. T.; Zeineddine, H. A.; Esquenazi, Y.: Challenges of Neurosurgery Education During the Coronavirus Disease 2019 (COVID-

- 19) Pandemic: A U.S. Perspective. *World Neurosurgery* 2020, 138, 545-547.
- [22] Rajhans, V.; Memon, U.; Patil, V.; Goyal, A.: Impact of COVID-19 on academic activities and way forward in Indian Optometry. *Journal of Optometry* 2020, 12, 2016-226.p.
- [23] Hall, S.; Border, S.: Online Neuroanatomy Education and Its Role During the Coronavirus Disease 2019 (COVID-19) Lockdown. *World Neurosurgery*, 2020, 5, 628.p.
- [24] Zhang, Q.; He, Y.J.; Zhu, Y. H.; Dai, M. C.; Pan, M. M.; Wu, J. Q.; Zhang, X.; Gu, Y. E.; Wang, F. F.; Xu, X. R.; Qu, F.: The evaluation of online course of Traditional Chinese Medicine for MBBS international students during the COVID-19 epidemic period. *Integrative Medicine Research*, 2020, 9, 100449
- [25] Krishnamurthy, S.: The future of business education: A commentary in the shadow of the Covid-19 pandemic. *Journal of Business Research*, 2020, 117, 1-5.p.
- [26] Montacute, R.: *Social Mobility and Covid-19. Implications of the Covid-19 crisis for educational inequality*. The Sutton Trust: London. United Kingdom, 2020
- [27] Jégera, M. M.; Blaabéka, E. H.: Inequality in learning opportunities during Covid-19: Evidence from library takeout. *Research in Social Stratification and Mobility*, 2020, 68, 1-5.p.
- [28] Thomas, M. S. C.; Rogers, C.: Education, the science of learning, and the COVID-19 crisis. *Prospects*, Available online: <https://link.springer.com/article/10.1007/s11125-020-09468-z> (10.07.2020.)
- [29] Beaunoyer, E.; Dupéré, S.; Guitton, M. J.: COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior* 2020, 111, 1-9.p.
- [30] Starman, A. B.: The case study as a type of qualitative research. *Journal of Contemporary Educational Studies*, 2013, 1, 28-43.p.
- [31] Yazan, B.: Three Approaches to Case Study Methods in Education: Yin, Merriam, and Stake. *The Qualitative Report*, 2015, 20, 134-152. Available online: <https://nsuworks.nova.edu/tqr/vol20/iss2/12> (16.07.2020.)
- [32] Yin, R. K.: *Case study research: Design and methods*. Thousand Oaks, CA: SAGE Publications
- [33] Simons, H.: *Case study research in practice*. Los Angeles, CA: Sage. 2009
- [34] Zaidah, Z.: Case Study as a Research Method. *Jurnal Kemanusiaan*, 2007, 9, 1-6.p.

- [35] Mayer, P.: *Az esettanulmánykészítés módszertana. Methodology of Case study creation*. In: Turizmus kutatások módszertana. Methodology of tourism research. Kódósi, M. (ed.), Pécsi Tudományegyetem. University of Pécs. Pécs. Hungary. 2011
- [36] Jesionkowska, J.; Wild, F.; Deval, Y.: Active Learning Augmented Reality for STEAM Education – A Case Study. *Education Sciences*, 2020, 10, 198
- [37] Andrade, A. D.: Interpretative Research Aiming at Theory Building: Adopting and Adapting the Case Study Design. *The Qualitative Report*, 2009, 14, 42-60.p.
- [38] Merriam, S. B.: *Qualitative research: A guide to design and implementation* (2nd ed.). San Francisco, CA: Jossey-Bass. 2009
- [39] Stewart, A. *Case study*. In Jane Mills & Melanie Birks (Eds.), *Qualitative methodology: A practical guide* Thousand Oaks, CA: Sage. 2014, 145-159.p.
- [40] Boone, H. N.; Boone, D. A.: Analyzing Likert Data. *Journal of Extension*, 2012, 50, v50 n2
- [41] Joshi, A.; Kale, S.; Chandel, S.; Pal, D. K.: Likert Scale: Explored and Explained. *Current Journal of Applied Science and Technology*, 2015, 7, 396-403.p.
- [42] Lassoued, Z.; Alhendawi, M.; Bashithalshaer, R.: An Exploratory Study of the Obstacles for Achieving Quality in Distance Learning during the COVID-19 Pandemic. *Education Sciences*, 2020, 10, 232
- [43] Chaka, Ch.: Higher education institutions and the use of online instruction and online tools and resources during the COVID-19 outbreak - An online review of selected U.S. and SA's universities. 2020. Available online: <https://assets.researchsquare.com/files/rs-61482/v1/ea822947-e8f3-4708-81e5-a2b24dafb6f8.pdf> (03. 01..2021.)
- [44] Angelova, M.: Students' attitudes to the online university course of management in the context of COVID-19. *International Journal of Technology in Education and Science (IJTES)*, 2020, 4(4), 283-292.p.
- [45] Bylieva, D.; Bekirogullari, Z.; Lobatyuk, V.; Nam, T.: Analysis of the Consequences of the Transition to Online Learning on the Example of MOOC Philosophy during the COVID-19 Pandemic. *Humanities and Social Sciences Reviews*, 2020, 4, 1083-1093
- [46] Gonzalez, T; de la Rubia, M. A.; Hincz, K. P; Comas-Lopez, M.; Subirats, L.; Fort, S.; Sacha, G. M.: Influence of COVID-19 confinement on students' performance in higher education. *PLoS ONE*, 2020, 15(10): e0239490

- [47] Eurbuonyanun C.; Wittayapairoch J.; Aphinives P.; et al.: Adaptation to Open-Book Online Examination During the COVID-19 Pandemic. *Journal of Surgical Education*, 2020, September
- [48] Coghlan, S.; Miller, T.; Paterson, J.: Good proctor or "Big Brother"? AI Ethics and Online Exam Supervision Technologies. ArXiv, 2020, abs/2011.07647
- [49] Shuck, R. K.; Lambert, R.: "Am I Doing Enough?" Special Educators' Experiences with Emergency Remote Teaching in Spring. *Education Sciences*, 2020, 10, 320
- [50] Giovannella, C.; Passarelli, M.; Persico, D.: Measuring the effect of the Covid-19 pandemic on the Italian Learning Ecosystems at the steady state: a school teachers' perspective. *Interact. Des. Arch. J*, 2020, 45, 1-9.p.
- [51] Elhaty, I. A.; Elhadary, T.; El Gamil, R.; Kilic, K.: Teaching University Practical Courses Online during COVID-19 Crisis: A Challenge for ELearning. *Journal of Critical Reviews*, 2020, 8, 2865-2873.p.
- [52] Arifiatib, F.; Nurkhyatic, E.; Nurdiawatid, E.; et al.: University Students Online Learning System During Covid-19 Pandemic: Advantages, Constraints and Solutions. *Systematic Reviews in Pharmacy*, 2020, 7, 570-576.p.
- [53] Rizun, M.; Strzelecki, A.: Students' Acceptance of the COVID-19 Impact on Shifting Higher Education to Distance Learning in Poland. *International Journal of Environmental Research and Public Health*. 2020, 17, 6468
- [54] Elhadary, T.; Elhaty, I A.; Mohamed, A. A.; Alawna, M.: Evaluation of Academic Performance of Science and Social Science students in Turkish Universities during COVID-19 Crisis. *Journal of Critical Reviews*, 2020, 11, 1740-1751.p.
- [55] Nagy B.; Váraljai, M; Kollár, A. M.: Enhancing Higher Education Student Class Attendance through Gamification *Acta Polytechnica Hungarica*, 2020, 17, 2. 97-114.p.
- [56] Pinter R.; Čisar, S. M.; Balogh, Z.; Manojlović, H.: E-learning Spaces to Empower Students Collaborative Work Serving Individual Goals. *Acta Polytechnica Hungarica*, 2020, 17, 2. 13-33.p.
- [57] Gavurova, B; Belas, J.; Cepel, M.; Kmecova, I.: Perception of the Quality of Educational System for Entrepreneurship – Comparative Analysis. *Acta Polytechnica Hungarica*, 2021, 18, 3. 65-86.p.