CHAPTER 8

The pandemic, socioeconomic disadvantage and learning outcomes in Hungary

István Boza, Zoltán Hermann and Dániel Horn

Abstract

This chapter investigates the ramifications of the COVID-19 pandemic, marked by school closures and the transition to online education, for student performance in standardised tests. It also explores the interplay between the magnitude of learning loss and various student and school attributes. This chapter cannot examine education policies mitigating the learning gap, as education policy design was not organised at the national level and there are no data available for impact analyses of school-level policies. Specifically, this chapter scrutinises alterations in student test scores relative to family backgrounds during the COVID-19 era in Hungary, drawing on data from the national assessment of basic competences (NABC). The analytical framework employed in this chapter uses student-level data from the NABC, a comprehensive assessment database assessing mathematical and reading literacy among students in grades 6, 8 and 10. The focus is the period from 2010 to 2021. Our findings reveal an uneven distribution of learning loss among students. Contrary to expectations, students from higher social backgrounds or possessing stronger academic abilities were more severely affected by the pandemic, school closures and the transition to distance learning. Conversely, students hailing from disadvantaged backgrounds, particularly the most vulnerable, did not experience significant impacts from the pandemic.

Introduction

This chapter examines the impact of the COVID-19 period, including school closures and the transition to online education, on student test scores, as well as the relationship between the extent of learning loss and student and school characteristics. Specifically, the investigation delves into the changes in student test scores in relation to family background during the COVID-19 period in Hungary, utilising data from the national assessment of basic competences (NABC).

The negative impact of school closures during the COVID-19 pandemic on educational outcomes is apparent. Various analyses have brought attention to these negative effects, with attempts made to estimate the magnitude of the impact through historical data, such as the work of Burgess and Sievertsen (2020) and Varga (2020), the latter in relation to Hungary specifically. Since 2021, several studies have assessed the actual learning loss based on more recent student test scores. The overwhelming majority of these investigations have confirmed the decline in student performance, as evidenced by studies conducted by Betthäuser et al. (2023), König and Frey (2022) and Patrinos et al. (2022). Moreover, the extent of this decline has been found to be correlated with the duration of school closures, as highlighted by Patrinos (2023). Notably, the loss in learning has typically been more pronounced for mathematics than for reading skills, as indicated by Betthäuser et al. (2023).

In addition to evaluating the average rate of learning loss, an important aspect to consider is the differential impacts on distinct learner groups. The literature consistently demonstrates that the negative consequences of school closures have affected social groups disparately. Students from disadvantaged backgrounds and those from families with lower educational attainment have experienced greater than average learning losses, thereby exacerbating educational inequalities during the pandemic. A comprehensive study conducted by Betthäuser et al. (2023), and country studies by Engzell et al. (2021) (the Netherlands), Liao et al. (2022) (China), Maldonado and De Witte (2022) (Belgium) and Oikawa et al. (2022) (Japan) provide valuable insights into these disparities. However, the literature remains inconclusive regarding whether students who previously performed well or poorly have suffered greater learning losses. Notably, Oikawa et al. (2022), observed that primary school students in Japan who were struggling academically before the pandemic experienced the most substantial decline during the pandemic, and Contini et al. (2023) reported similar findings among secondary school students in Italy. Conversely, Borgonovi and Ferrara (2023) noted that primary school students in Italy with intermediate academic performance before the pandemic exhibited the greatest decline during the pandemic, and Arenas and Gortazar (2022) found that high-achieving students in the Basque Country experienced the largest learning loss during the pandemic. In the case of Hungary, using a non-representative sample of primary and lower secondary schools, Molnár and Hermann (2023) have shown that schools with low average socioeconomic status experienced the largest learning loss during the pandemic. They have also highlighted that these learning losses were far greater at the primary than the lower secondary level.

Overall, these research findings highlight the detrimental effects of COVID-19-related school closures on educational outcomes. The disproportionate impact on disadvantaged groups necessitates targeted interventions to mitigate learning losses and address the exacerbated educational disparities. Further investigation is warranted to fully comprehend the nuanced effects on different student subgroups and inform evidence-based policies aimed at educational recovery and equity.

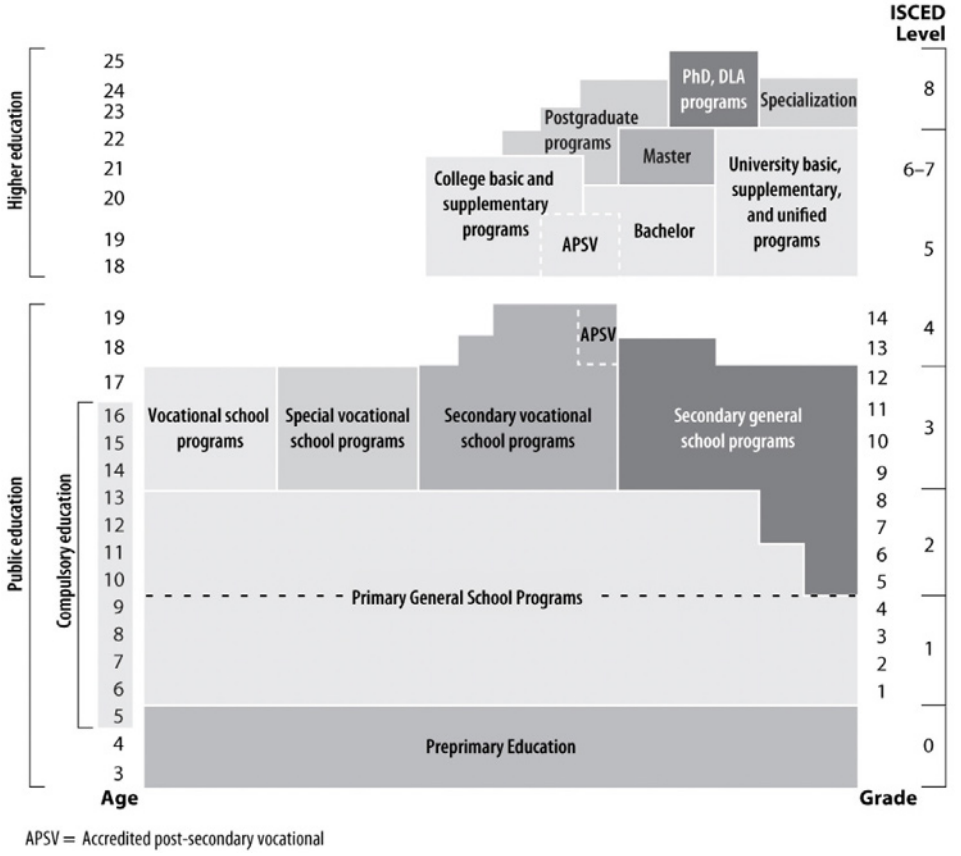
Similarly to previous research, our analysis in this chapter reveals a notable decline in test scores among grade 6 students, indicating a significant learning loss during this period. However, there was no clear decline in student performance among grade 10 or 8 students. Interestingly, the most substantial decline in test scores among grade 6 students occurred among those from higher social statuses and those who were high achievers. As a result, we surprisingly observed a reduction in learning inequalities during this period, which contrasts with what most other studies have found for other countries.

We must note that, strictly speaking, these results are not causal. That is, the significant drop detected in grade 6 student performance might not be due to COVID-19 or to the changes in learning practices during this period. However, we strongly believe that this is the case. The disruptions – notably the closing of the schools – were so large that it is unlikely that student learning was not affected by it. Unfortunately, however, we cannot identify specifically which changes in particular affected the drop in test scores.

The Hungarian education system (see an overview in Figure 8.1) consists of 3 years of compulsory pre-primary education (*óvoda*), 8 years of untracked primary general education (*általános iskola*) and 4 years of tracked secondary-level education programmes. Among the secondary-level programmes, the secondary vocational programmes (*szakgimnázium* or *technikum*) and the secondary general school programmes (*gimnázium*) offer the school-leaving certificate (*érettségi*) required for tertiary enrolment. The special vocational school programmes (*szakiskola*) cater to students with special education needs, while the vocational school programmes (*szakközépiskola*) offer vocational certificates but do not provide direct access to tertiary education. The secondary general programme (*gimnázium*) includes two special subprogrammes that select students after grade 4 or grade 6 and offer academic education for 8 or 6 years, respectively. These special early-selection programmes lead to the same school-leaving certificate as the normal 4-year secondary general school programmes.

Since 2013, the Hungarian education system has been highly centralised. The Ministry of Interior Affairs is responsible for general education (primary and secondary general), while the Ministry of Innovation and Technology oversees vocational education. The governance of general education is handled by the Klebensberg Centre, which is divided into 60 school districts throughout the country. These 60 districts act as school providers for state-run schools.

Figure 8.1: The Hungarian education system



NB: APSV, accredited post-secondary vocational; DLA, Doctor of Liberal Arts; ISCED, International Standard Classification of Education.

Source: TIMSS and PIRLS International Study Center (2015).

National administrative data

The analysis presented in this chapter utilises administrative student-level data from the NABC (see Sinka, 2010). The NABC assesses mathematics and reading literacy among the entire student population in grades 6, 8 and 10, with the exception of certain special education needs (SEN) student groups. To measure and quantify the social background of students, a family background questionnaire is incorporated in the NABC, which captures information such as parents' education level and the number of books in the household. The analysis focuses on the period from 2010 to 2021. Owing to school closures in 2020, the NABC was not conducted; therefore, a comparison with previous years can be made only using the 2021 results.

Two aspects of test scores were considered in the analysis: test score levels (averages) and 2-year learning progressions (test-score changes). The annual changes in average test scores (see Figure 8.6) encompass all students who participated in the test during a given year and were included in the average reported by the Educational Authority (excluding SEN students). For further analysis, a subsample of grade 6 students with valid test scores and completed background questionnaires was utilised. In 2021, the sample included 77.6 % of grade 6 students in the NABC, compared with 80 % in 2015–2019. The slightly lower response rate did not indicate a systematic change in the sample.

The analysis focuses on test scores in mathematics and reading literacy as the primary outcome variables. The scale of test scores has remained consistent since 2008, allowing meaningful comparisons to be made across years and cohorts. The fixed scale had a mean of 1 500 and a standard deviation of 200 points in 2008 for grade 6 students. Each grade and year can be directly compared with this fixed point, facilitating meaningful comparisons across different years and cohorts.

The heterogeneity of relative test scores in 2021 was examined across five dimensions: student gender, family socioeconomic status (SES) index ([31]), grade point average (GPA) at the end of the previous year, home learning environment and student composition. Students were classified into 10 deciles and 5 quintiles based on the SES index, reflecting their relative social positions. The student composition of schools was measured using the average SES index at the school level from 2010 to 2021, and schools were then categorised into quintiles based on the number of students in each school. The home learning environment was described using four variables: lack of internet access, absence of a personal computer, absence of a personal desk and a dummy variable indicating a household with two or more members per room. Students were also classified into quintiles based on the average GPA from the previous year.

The average GPA for grade 6 students in the 2021 survey represents the average teacher-assigned mark at the end of the 2020 school year, which coincided with the first wave of school closures. However, the data suggest that the GPA at the end of the fifth grade was not affected by the first wave of the pandemic. The distribution of the GPA and its correlation with family background remained consistent with previous years. It is important to note that the GPA has limitations in characterising past student performance. A significant proportion of respondents to the background questionnaire did not provide GPA information, primarily among lower-performing students. Furthermore, GPA is not comparable across schools because of potential variations in grading practices. Finally, the measurement error associated with the average GPA variable is likely to be larger than that of the family background variable. Nonetheless, the average GPA is considered suitable, albeit with some measurement error, for distinguishing between weak, average and high-achieving students.

The analysis employs descriptive graphs and simple regression estimates. The main explanatory variable in the estimates is the treatment variable indicating the year 2021, along with its interactions with gender, SES, GPA, student composition quintile

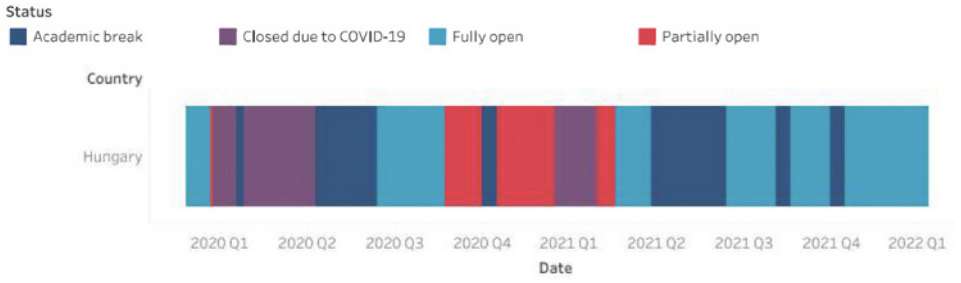
([31]) For the generation of the SES index, see Hermann et al. (2023).

and home learning environment variables in the heterogeneity analyses. Control variables encompass individual characteristics (gender and SEN status), family background (educational attainment of parents, number of books, student ownership of books and SES index deciles), class characteristics (class size, advanced mathematics / literature / art / other class type and type of education) and school fixed effects in all regression models.

Education policy

The overarching goal of the Hungarian education policy was to maximise in-person learning for primary school students. This approach aimed to minimise the potential learning gaps associated with the lack of school education. Additionally, complete closures would have required parents to supervise their children, potentially affecting their ability to work. We do not know of any other policies with the specific aim of reducing the potential learning losses of students in Hungary.

Figure 8.2: Timeline of school closures in Hungary



Source: UNESCO (2022).

Between February 2020 and March 2021, Hungarian schools experienced a total closure period of 20 weeks and an additional 19 weeks of partial closures, as reported by the United Nations Educational, Scientific and Cultural Organization (UNESCO; Figure 8.2). While 20 weeks was the average, the duration of full and partial closures varied at the school level. Primary general schools (grades 1–4) were closed for 17 weeks, lower secondary schools (grades 5–8) were closed for 20 weeks and secondary schools (with exceptions) were closed for 22 weeks on a compulsory basis (see Table A8.1 in the Appendix for details). The closures occurred between February 2020 and the 2021 summer break, affecting three school semesters during the three waves of the pandemic: the spring semester of the 2019/2020 school year (first wave), the autumn semester of the 2020/2021 school year (second wave) and the spring semester of the 2020/2021 school year (third wave). During the first wave, all levels of education and training were closed, with closures ending 1 week before the end of the academic year. Subsequently, only vocational institutions provided education, while others went on summer break.

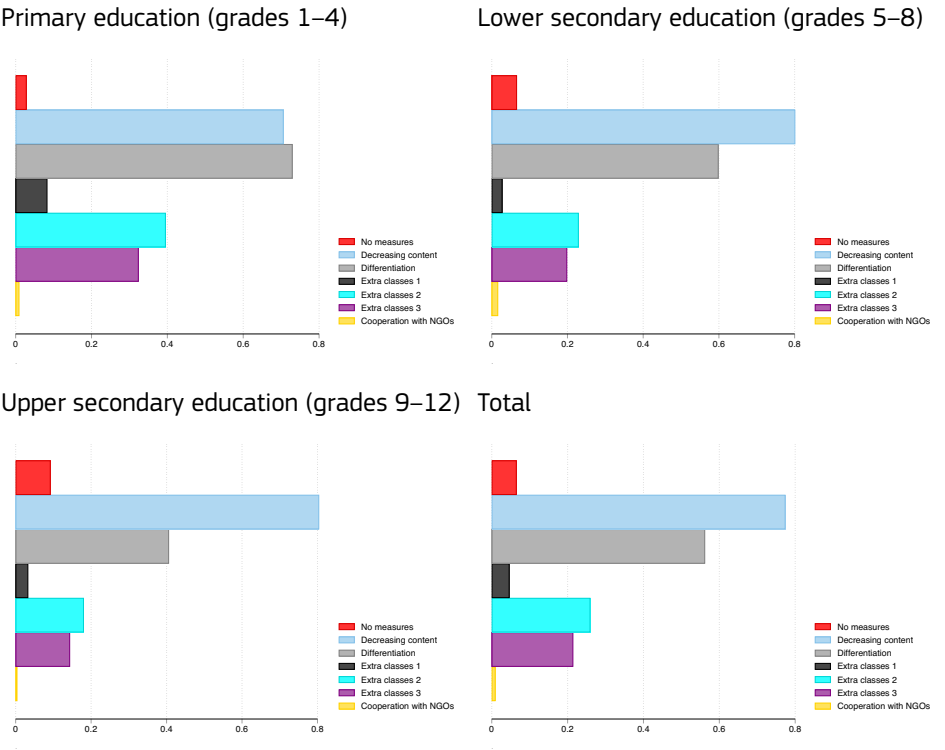
School-level responses to mitigate learning loss

During the compulsory closures, schools were allowed to organise on-site supervision and provide limited in-person teaching to separated classes a few times a week. These measures aimed to mitigate the impact of the reduced in-person attendance. While there is no official evidence on the extent of the utilisation of these measures or the specific school closures during partial closures, a survey conducted by Holb et al. (2022) collected responses from school principals and teachers regarding the effects of COVID-19-related interventions. The survey showed significant variation in the utilisation of these arrangements among schools. Vocational schools made the most extensive use of partial or occasional on-site instruction, probably because of the challenges of conducting practical training online. Non-teaching supervision was the most common form of support provided by primary general schools, particularly during the first and third waves of the pandemic.

During the closures, schools and teachers had to adopt distance learning methods, primarily online teaching. This sudden shift from in-person to online instruction had implications for the amount of class content that could be delivered. According to Holb et al. (2022), only a small proportion of teachers reported being able to teach all of their classes online, while a larger proportion reported being able to teach most of their classes online. Notably, however, almost half of primary school teachers reported being able to teach only a small proportion of their classes online during the first wave of closures. This proportion significantly improved by the third wave of the pandemic.

In examining the responses to the question regarding the strategies employed by teachers and schools to address learning loss, using the same teacher and principal survey as used by Holb et al. (2022), in this chapter we look at the extent to which teachers and principals implemented novel approaches to mitigate learning loss. Figure 8.3 presents the frequency distribution of various measures reported by teachers, categorised by educational level.

Figure 8.3: Measures to mitigate learning loss by level of education



NB: NGO, non-governmental organisation. Extra classes 1, 2 and 3 denote extra classes outside the teaching period, extra sessions for mentoring students individually in the teaching period and extra sessions for small groups in the teaching period.

Source: Authors' calculations based on the teacher–principal survey (see Holb et al., 2022).

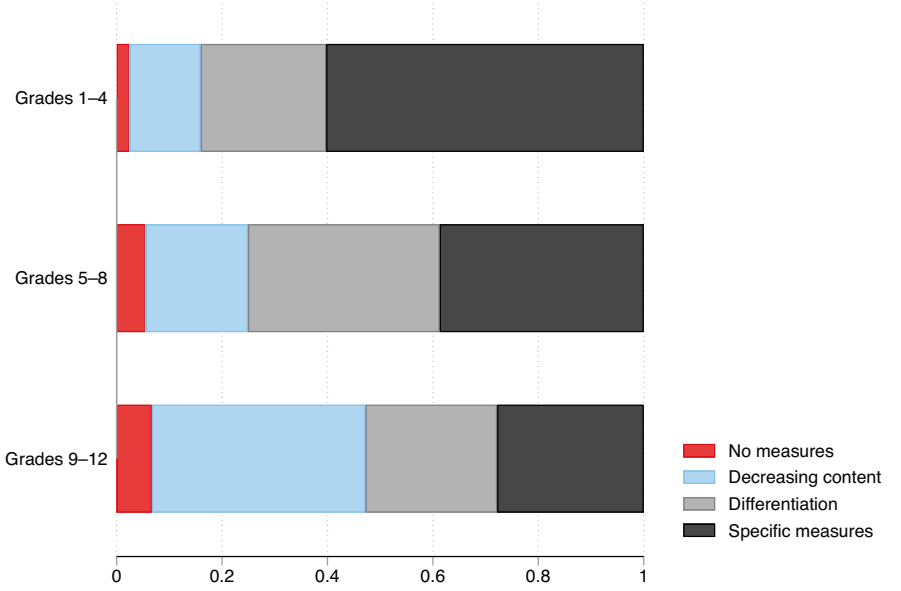
It is notable that a significant majority of teachers, regardless of the educational level, opted to reduce the curriculum content to some degree in their efforts to address learning loss. The second most frequently employed strategy involved differentiated teaching, with a particular emphasis on students facing difficulties. This approach was prominently adopted in grades 1–4 and grades 5–8, with lower utilisation in grades 9–12 (73 %, 60 % and 40 %, respectively). Supplementary measures such as extra classes or teaching sessions, individual student mentoring and collaboration with non-governmental organisations were also utilised to mitigate learning loss. These measures were most prevalent in grades 1–4.

The analysis of the responses reveals four distinct categories into which teachers can be classified based on their approach to addressing learning loss. First, some teachers reported no specific measures to address learning loss. Second, a substantial number of teachers focused on the core curriculum and content reduction, without implementing further measures. Third, certain teachers mentioned differentiation, especially for students experiencing above-average learning loss, but did not employ additional specific measures – importantly, a majority of teachers in this group (78 %)

also reported a reduction in content. Finally, a subset of teachers implemented well-defined, specific and direct measures to counteract learning loss, including the provision of extra classes, individual or small-group mentoring during the school year or in summer, and collaboration with civic organisations offering mentoring. Notably, most teachers in this final group also mentioned content reduction and/or differentiation, allowing for classification based on the depth of the measures undertaken. Figure 8.4 illustrates the distribution of teachers across these four categories, segmented by educational level.

In primary education, the majority of teachers (60 %) embraced at least some specific measures to address learning loss, whereas this pattern was less prevalent at higher educational levels. In upper secondary education, only a quarter of teachers belonged to this category. The reliance on differentiated teaching was more widespread in grades 5–8 and was less common in both lower and higher grade levels. Simultaneously, a significant portion of teachers in upper secondary education employed no specific measures and another significant portion relied solely on content reduction, with nearly half of teachers belonging to these two categories. These findings shed light on the diverse strategies employed by educators to tackle the critical issue of learning loss.

Figure 8.4: Types of compensatory practices implemented by teachers by level of education

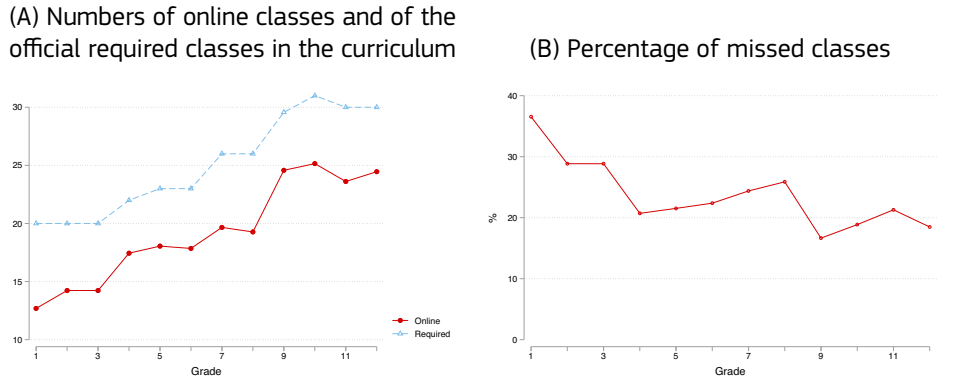


Source: Authors' calculations based on the teacher–principal survey (see Holb et al., 2022).

Parental views of distance learning

Analysing a phone survey conducted among the parents of school-aged children, Hermann et al. (2022) estimated the proportion of missed classes in each grade (Figure 8.5). Their results suggest that the percentage of classes that should have been offered but were not taught reached as high as 35 % in the first grade and gradually declined across higher grades, reaching around 20 % at the secondary school level (excluding physical education classes). This suggests that students in all grades missed at least one fifth of their classes, which could have significantly affected their learning.

Figure 8.5: Average total weekly numbers of online classes and of required classes and the percentage of missed classes per grade in Hungary



NB: Students in the preparatory language year are included in grade 9 and pupils in grade 13 are included in grade 12. 'Required classes' is defined as the number of weekly classes required in a given grade according to the Public Education Act, excluding physical education classes. The percentage of classes missed is defined as the difference between the average number of reported online classes and the number of required classes, as a percentage of the number of required classes (excluding physical education).

Source: Hermann et al. (2022, Figure 13).

Parents were also asked about their children's teachers' approaches to organising online education. Despite the centralised nature of the education system, there was no standardised practice for online teaching. Schools and teachers within schools adopted different online platforms. Approximately half of the schools used only one online teaching platform, while nearly one third used two platforms and an additional one fifth used three or more platforms. This meant that over half of the schools required students to adapt to at least two teaching platforms during online education. The choice of platforms also varied considerably. At the primary level, the official Hungarian KRÉTA platform was most used, followed by Google Classroom, Microsoft Teams, Zoom and other platforms such as Facebook, Skype, Google Meet and email. At the secondary level, Google Classroom was the most popular choice, followed by

KRÉTA, Microsoft Teams and Zoom. Overall, coordination in the use of online platforms between and within schools was poor (see Hermann et al., 2022).

In conclusion, while governmental efforts were made to minimise full school closures, particularly in primary general education, the partial closures and the inadequately organised online teaching – resulting in a significant number of missed classes and the use of various platforms – suggest that the COVID-19 pandemic could have had a substantial impact on learning by Hungarian students. This might have been mitigated somewhat by the individual responses from teachers – after in-person teaching returned – but these individual responses were also heterogeneous and were far from comprehensive.

Results

Average learning loss

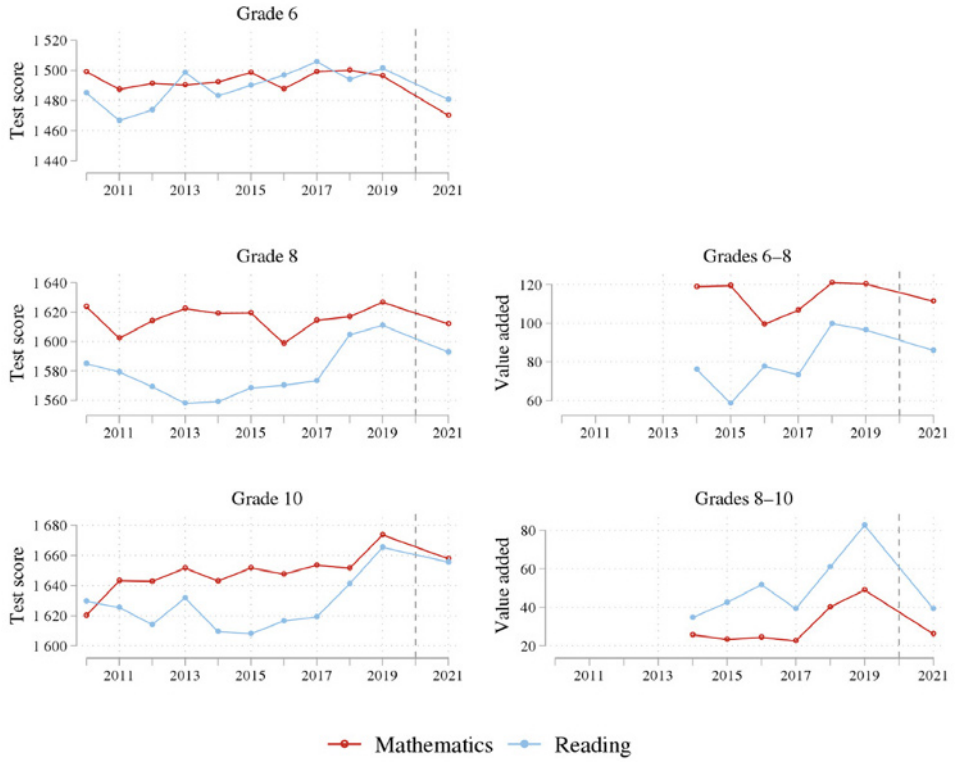
Initially, we examined the changes in raw test-score averages over the decade preceding the COVID-19 outbreak and in 2021. Figure 8.6 illustrates the trends in both mathematics and reading scores for all three grades surveyed. The second column of the figure displays the average individual score growth from grades 6 to 8 and from grades 8 to 10.

Based on the indicators presented, it is evident that the grade 6 test results demonstrate a notable decline. However, the patterns for the other grades are not as clear. For grades 8 and 10, it is challenging to interpret the declines in comparison with 2019. These declines could fit within an existing trend, showcase a decline in relation to the outlier 2019 results or indicate a break from an upward trend.

Likewise, the average individual test-score growth does not exhibit a distinct decline. While there is minimal difference observed for grade 8 compared with previous years, the grade 10 samples do not significantly differ from the numbers recorded a few years earlier (specifically 2017 or earlier).

In the preliminary analysis, regression estimates were employed for all three cohorts to determine whether, after accounting for the influence of individual characteristics, the 2021 average significantly differs from the 2011–2019 averages when comparing the years pairwise. When looking at both subject areas, scores and test-score growth levels, we find that, for grades 8 and 10, there is at least one earlier year with no significant difference from the 2021 results. However, in contrast, there is a statistically significant drop in grade 6 test scores in 2021 when compared with any previous year. Consequently, for the subsequent analysis, our focus is solely on grade 6 students.

Figure 8.6: Average NABC test scores and the 2-year value added, by year



NB: The three graphs in the left column show the average test scores, while the two graphs in the right column show the value added in average NABC scores over 2 years of schooling. Specifically, the first graph in the right column shows the difference between the eighth-grade average NABC score and the sixth-grade average NABC score for the same cohort. The second graph in that column shows the value added from 8th to 10th grade. All test scores are comparable to the 2008 sixth-grade cohort, for which the average was set to 1 500 with a standard deviation of 200.

Source: Authors' calculations based on the NABC dataset.

Table 8.1 presents the estimated learning losses for grade 6 across four different reference periods, while controlling for all individual characteristics and school fixed effects (as mentioned above). Part (B) of the table also incorporates linear trends, in which the estimated learning loss represents the average deviation of the results from what would have been expected in 2021 if the previous trend had been sustained. The results reveal a significant drop of 22–30 points (0.11–0.15 standard deviations) in mathematics and 10–30 points (0.05–0.15 standard deviations) in reading literacy. The effect of these trends is not statistically significant in all specifications and exhibits different signs across various reference periods.

Table 8.1: Average losses by 2021 over different time periods, without (A) and with (B) trends

	2017–2021	2015–2021	2013–2021	2011–2021
(A)		Mathematics		
2021	– 29.92***	– 27.94***	– 26.49***	– 25.51***
	(1.20)	(1.23)	(1.24)	(1.26)
N	296 317	443 595	595 233	744 718
R^2	0.382	0.373	0.361	0.355
		Reading comprehension		
2021	– 20.68***	– 18.13***	– 16.52***	– 12.09***
	(1.07)	(1.08)	(1.08)	(1.08)
N	296 317	443 595	595 233	744 718
R^2	0.392	0.392	0.388	0.385
(B)		Mathematics		
2021	– 22.43***	– 28.10***	– 29.58***	– 30.03***
	(2.32)	(1.59)	(1.50)	(1.45)
Trend	– 2.06***	0.04	0.65***	0.82***
	(0.72)	(0.35)	(0.25)	(0.20)
n	296 327	443 595	595 233	744 718
R^2	0.298	0.373	0.361	0.355
		Reading comprehension		
2021	– 10.33***	– 23.43***	– 21.15***	– 30.35***
	(2.04)	(1.41)	(1.33)	(1.26)
Trend	– 3.051***	1.364***	0.978***	3.328***
	(0.62)	(0.30)	(0.21)	(0.16)
n	296 327	443 595	595 233	744 718
R^2	0.339	0.392	0.388	0.387

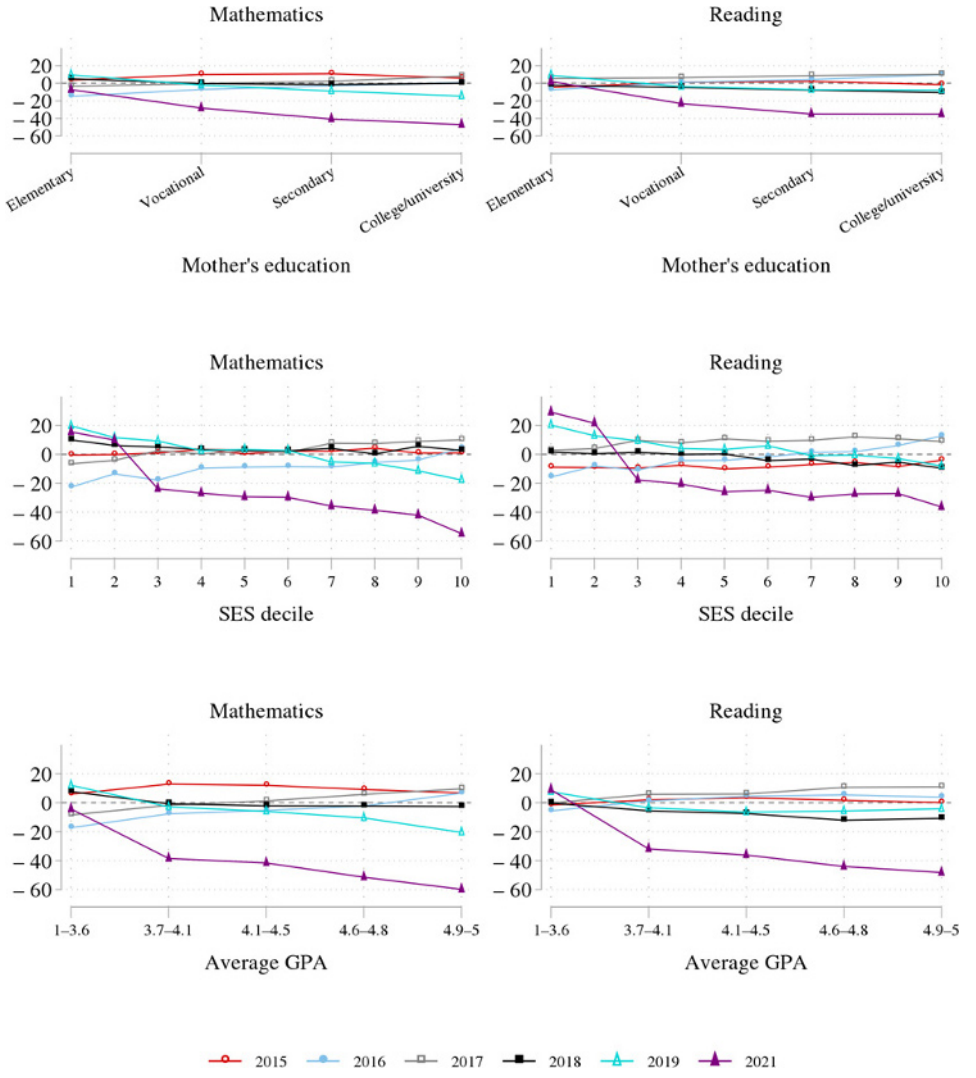
NB: The control variables included the following: gender, SEN status, mother's education, father's education, number of books in household, student-owned books, SES index decile, class size, GPA, type of education and school fixed effects. Standard errors clustered at the school level are in parentheses. Part (B) of the table also incorporates linear trends, in which the estimated learning loss represents the average deviation of the results from what would have been expected in 2021 if the previous trend had been sustained. ***$p < 0.01$.

Source: Authors' calculations based on the NABC dataset.

Learning losses among different groups of students

The heterogeneity of learning losses based on family background and GPA is depicted in Figure 8.7. In this analysis, family background is measured by the mother's educational attainment and the within-year decile of the SES index. Figure 8.7 illustrates scores that have already been adjusted for time averages. Each data point represents how much better a student from a specific background scored in a given year than the average of the 5 years prior to the pandemic. The graph reveals that, for students from low-status backgrounds (mothers with only a primary education or in the bottom two tenths of the SES index) and those with the lowest GPAs, test scores did not decrease in 2021. However, in other cases, it is evident that students from these groups scored lower in 2021 than in previous years. Furthermore, while there is detectable variation between all years, the downward swing in 2021 is much more pronounced. The most surprising aspect of this figure is that the extent of learning loss increases with social status or prior academic achievement, which is contrary to many international examples. In other words, high-status or high-performing students experienced the greatest learning losses during the pandemic.

Figure 8.7: Relative test scores between 2015–2019 and 2021 by family background and average grade



NB: Relative test score refers to the deviation from the average for the student group for 2015–2019.
Source: Authors' calculations based on the NABC dataset.

Individual heterogeneity in learning losses was also estimated using regression models to account for possible variations in the composition of learning losses based on individual characteristics. Table 8.2 presents the results of these estimates for the reference period 2015–2019 (without trends). In columns (1) and (4), heterogeneity is estimated by gender and quintiles of the SES index. Columns (2) and (5) include mean characteristics, while columns (3) and (6) incorporate characteristics of the home environment.

The results indicate that girls experienced significantly higher learning losses in reading literacy than boys. Overall, girls also experienced slightly higher losses in mathematics than boys, although the difference is small (around 0.02 standard deviations). Additionally, compared with boys with similar academic performance, girls experienced slightly lower losses.

The role of social background is particularly influential in mathematics. Compared with middle-quintile students, those from lower-status backgrounds experienced smaller losses, while higher-status students suffered significantly larger losses. For instance, middle-quintile students experienced a 30-point drop in mathematics (Table 8.2, column (1)), which is a considerable drop of around 0.15 standard deviations. For the students in the highest SES quintile, this drop was considerably higher (a drop of – 15.19 from – 30.44, resulting in – 45.63) than for the lowest quintile, for whom the change was much less (positive but insignificant) (– 30.44 + 39.94 = 9.5). In reading literacy, there was no significant difference between the middle quintile and the top two, but the losses for low-status students were significantly smaller (in fact, they were positive, if GPA is not controlled for). Because there is a strong correlation between family background and prior academic performance, if the average GPA is included, this somewhat mitigates the differences by family background, but does not eliminate them. On the other hand, differences based on prior academic achievement are also significant: poor learners experienced smaller losses, while good learners experienced larger losses, even after accounting for heterogeneity by family background.

Finally, we investigated how learning losses were influenced by certain characteristics of the physical home environment, such as the availability of adequate study space, the presence of two or more people per room and the availability of necessary infrastructure for distance learning, such as computers and internet access. Overall, observed deficiencies in the physical environment increased learning losses by 5–10 points, except for the absence of internet access, which had a non-significant positive impact. The estimated differences by social status do not change when these factors are included, most likely because deficiencies in the physical environment are predominantly found in the bottom quintile.

Table 8.2: Heterogeneity of estimated average losses by gender, family background and GPA for 2021

	Mathematics			Reading literacy		
	(1)	(2)	(3)	(4)	(5)	(6)
2021	– 30.44***	– 42.80***	– 30.11***	– 19.12***	– 34.26***	– 19.13***
	(1.75)	(1.92)	(1.76)	(1.76)	(1.90)	(1.78)
Interactions with 2021						
Gender: girl	– 2.86**	4.28***	– 2.89**	– 17.58***	– 10.23***	– 17.61***
	(1.26)	(1.16)	(1.26)	(1.35)	(1.24)	(1.35)
Family background (SES quintile, reference: quintile 3)						
Quintile 1 (low)	39.94***	27.46***	40.87***	47.39***	35.43***	47.19***
	(2.98)	(2.89)	(2.72)	(2.76)	(2.69)	(2.73)
Quintile 2	7.22***	3.79**	7.98***	10.31***	7.650***	10.84***
	(1.83)	(1.67)	(1.83)	(1.96)	(1.77)	(1.97)
Quintile 4	– 7.54***	– 6.16***	– 7.67***	– 2.44	– 2.07	– 2.47
	(1.82)	(1.65)	(1.82)	(2.01)	(1.80)	(2.01)
Quintile 5 (high)	– 15.19***	– 8.579***	– 15.37***	– 1.17	3.77*	– 1.17
	(2.04)	(1.96)	(2.04)	(2.12)	(1.99)	(2.12)
Average GPA at the end of the previous academic year (reference: quintile 3)						
GPA missing		38.05***			40.69***	
		(2.16)			(2.35)	
Quintile 1 (low)		25.54***			28.96***	
		(2.09)			(2.15)	
Quintile 2		4.80***			4.07**	
		(1.75)			(1.91)	
Quintile 4		– 7.70***			– 4.03**	
		(1.78)			(1.96)	
Quintile 5 (high)		– 17.13***			– 10.65***	
		(1.89)			(2.00)	
Physical environment at home						
No internet			5.04			9.381*
			(5.74)			(5.481)
No computer			– 2.30			– 5.042**
			(2.22)			(2.265)
Student does not have his/her own desk			– 1.71			0.0743
			(2.97)			(2.817)
Two or more people per room			– 4.80***			– 2.02
			(1.75)			(1.83)
n	443 595	443 595	443 595	443 595	443 595	443 595
R^2	0.374	0.485	0.375	0.394	0.505	0.394

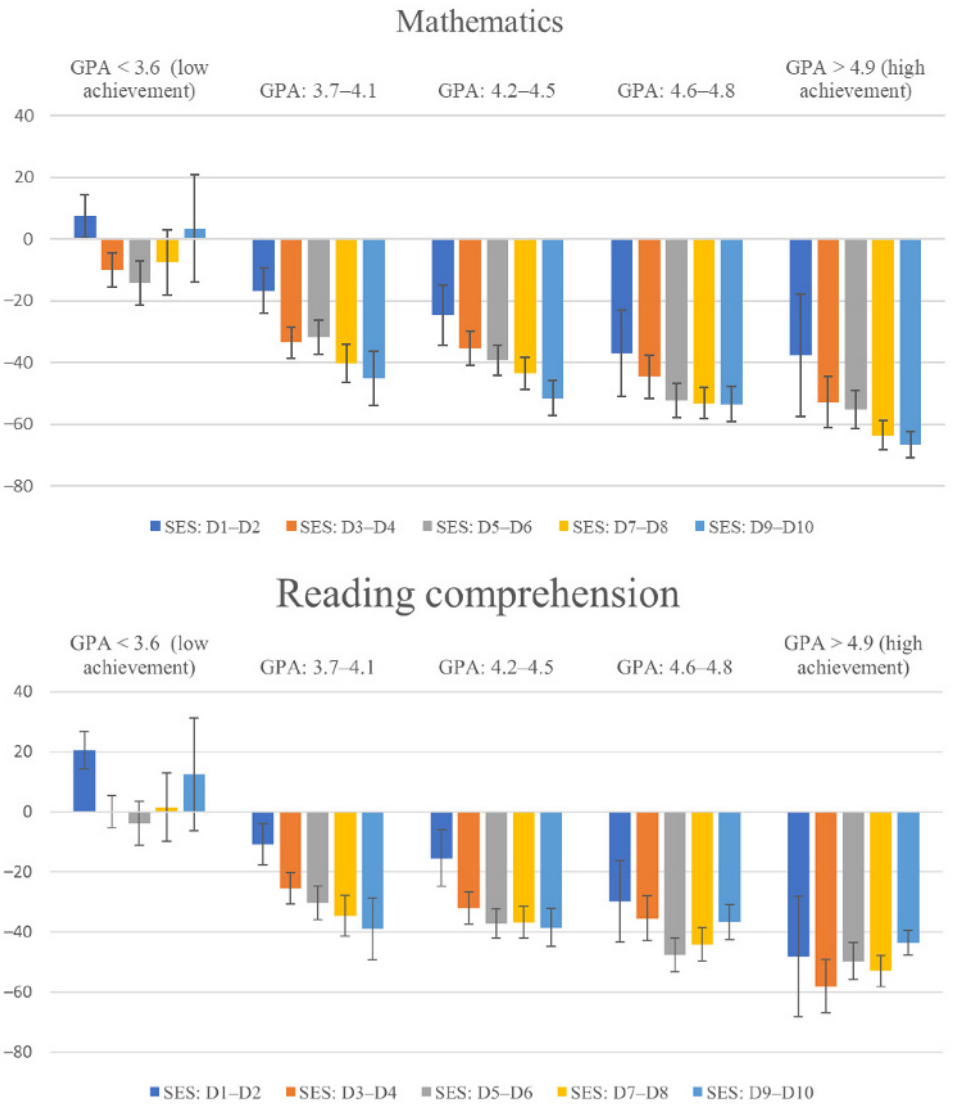
NB: The first line is the coefficient for the dummy for 2021. Below this are the coefficients for the interactions of individual characteristics and the 2021 dummy. The control variables in all models were as follows: gender, SEN status, mother's education, father's education, number of books in the household, student-owned books, SES index decile, class size, GPA, type of education and school fixed effects. Additional control variables included GPA quintiles (columns (2) and (5)) and physical environment characteristics (columns (3) and (6)). School-level clustered standard errors appear in parentheses. In columns (1) and (4), heterogeneity is estimated by gender and quintiles of the SES index. Columns (2) and (5) include mean characteristics, while columns (3) and (6) incorporate characteristics of the home environment. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Authors' calculations based on the NABC dataset.

The estimates in Table 8.2 assume that heterogeneity based on social status and educational attainment is independent. To relax this assumption, learning losses were estimated for all possible combinations of quintiles of the SES index and the mean GPA. The results are presented in Figure 8.8. It is important to note that the 'extreme' groups (high status and very low GPA, and low status and high GPA) have only a small number of students, resulting in wide confidence bands in the figure.

Overall, the results in Figure 8.8 depict a similar picture to those in Table 8.2. The groups of students with the lowest academic performance are notably different from the others, typically exhibiting no significant learning loss, except for students in the second and third SES quintiles in mathematics. In fact, in some groups, significantly higher test scores are observed. Test scores declined in all groups of students who were not very weak performers (except for the lowest-status weak and medium students in reading literacy). Differences by social status appear to be strongest for weak and medium students but are also significant among good and outstanding students in mathematics.

Figure 8.8: Estimated test-score changes in 2021 compared with 2015–2019, by family background and previous average GPA



NB: The bars show the size of the coefficients for the triple interactions of the family background and mean GPA groups and the treatment (dummy 2021). The graph shows test-score progression for all combinations of GPA and SES quintiles. The control variables were as follows: gender, SEN status, mother's education, father's education, number of books in the household, student-owned books, SES index decile (D), class size, grade, type of education, family background, average grade groups and school fixed effects. 95 % confidence intervals are shown.

Source: Authors' calculations based on the NABC dataset.

Learning losses in different groups of schools

In addition to individual characteristics, we also examined the relationship between the composition of students in schools (measured by the school mean SES index) and the rate of learning loss. Students were grouped into five quintiles based on the school's student composition, and heterogeneity in the variation of test scores was analysed using a regression framework similar to the one described earlier. The results are presented in Table 8.3.

When individual heterogeneity is not taken into account (columns (1) and (3) in Table 8.3), the learning loss is significantly smaller in schools with a poor student composition than in the middle category. However, when the effect of individual heterogeneity is removed (columns (2) and (4)), the differences between schools become smaller but remain statistically significant. An inverted U-shaped pattern is also observed for both testing areas, with the medium-composition schools showing the largest learning loss. These findings deviate from previous literature, highlighting different patterns in the relationship between student composition and learning loss.

Table 8.3: Heterogeneity of average estimated losses by 2021 by school student composition, gender and family background

	Mathematics		Reading literacy	
	(1)	(2)	(3)	(4)
2021	– 35.35***	– 36.09***	– 27.68***	– 25.46***
	(2.56)	(2.863)	(2.32)	(2.69)
Interactions with 2021				
School composition (reference: quintile 3)				
Quintile 1 (low)	30.23***	9.31*	32.07***	9.95**
	(4.82)	(4.80)	(4.02)	(4.01)
Quintile 2	11.11***	5.20	11.67***	5.88*
	(3.92)	(3.94)	(3.42)	(3.44)
Quintile 4	2.90	7.71**	3.54	7.40**
	(3.41)	(3.41)	(3.07)	(3.07)
Quintile 5 (high)	– 0.67	10.10***	6.31**	13.78***
	(3.25)	(3.28)	(3.05)	(3.15)
Family background (SES quintile, reference: quintile 3)				
Quintile 1 (low)		38.54***		46.07***
		(2.64)		(2.65)
Quintile 2		7.32***		10.57***
		(1.82)		(1.98)
Quintile 4		– 8.36***		– 3.66*
		(1.82)		(2.01)
Quintile 5 (high)		– 17.33***		– 4.50**
		(1.98)		(2.18)
Gender: girl		– 2.89**		– 17.63***
		(1.26)		(1.35)
n	443 595	443 595	443 595	443 595
R^2	0.373	0.374	0.393	0.394

NB: The first line is the coefficient for the dummy for 2021. Below this are the coefficients for the interactions of individual characteristics and the 2021 dummy. School student composition uses the school average SES index and the number of students weighted by quintiles. The control variables in all models were as follows: gender, SEN status, mother's education, father's education, number of books in the household, student-owned books, SES index deciles, class size, grade, type of education, student composition quintiles and school fixed effects. Standard errors clustered at the school level are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Authors' calculations based on the NABC dataset.

Conclusions

In this chapter, we aimed to examine the impact of school closures and the implementation of distance learning on students' academic performance. Given the data and pre-COVID trends, we specifically focused on grade 6 students, as analysing grade 8 or 10 would require strong assumptions. Our objective was twofold: to highlight the significant levels of learning loss and to investigate changes in educational inequalities during this period. Unfortunately, we could not examine the impact of education policies on the learning gap following the COVID-19 school closures, as education policy design was not organised at the national level and data are not available for an impact analysis of school-level policies.

Interestingly, our findings reveal that the distribution of learning loss was not equal across all students. Contrary to expectations, students from higher social backgrounds or with better academic abilities were more severely affected by the pandemic, school closures and the shift to distance learning. On the other hand, students from disadvantaged backgrounds, particularly the most vulnerable, did not experience significant impacts from the pandemic. This may be attributed to various factors, such as low attendance due to frequent illnesses, forced stay-at-home situations resulting from larger families, a lack of motivation and other related circumstances.

Overall, the COVID-19 pandemic has led to a more balanced distribution of test scores, but, unfortunately, this has not been achieved through catch-up efforts at the lower end of the performance spectrum. Instead, the overall equalisation is due to substantial learning losses among high-achieving students. These findings shed light on the unequal effects of the pandemic on different student groups and emphasise the need for targeted support and interventions to address the widening disparities in educational outcomes.

REFERENCES

Arenas, A. and Gortazar, L. (2022), 'Learning loss one year after school closures: Evidence from the Basque country', *EsadeEcPol Center for Economic Policy Working Paper*, No 1, Esade, Barcelona.

Borgonovi, F. and Ferrara, A. (2023), 'COVID-19 and inequalities in educational achievement in Italy', *Research in Social Stratification and Mobility*, Vol. 83, 100760 (https://doi.org/10.1016/j.rssm.2023.100760).

Betthäuser, B. A., Bach-Mortensen, A. M. and Engzell, P. (2023), 'A systematic review and meta-analysis of the evidence on learning during the COVID-19 pandemic', *Nature Human Behaviour*, Vol. 7, pp. 375–385 (https://doi.org/10.1038/s41562-022-01506-4).

Burgess, S. and Sievertsen, H. H. (2020), 'Schools, skills, and learning: The impact of COVID-19 on education', VoxEU (https://cepr.org/voxeu/columns/schools-skills-and-learning-impact-covid-19-education).

Contini, D., Di Tommaso, M. L., Muratori, C., Piazzalunga, D. and Schiavon, L. (2023), 'A lost generation? Impact of COVID-19 on high school students' achievements', *IZA Discussion Paper Series*, No 16008, IZA, Bonn.

Engzell, P., Frey, A. and D. M. Verhagen (2021), 'Learning loss due to school closures during the COVID-19 pandemic', *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 118, No 17, e2022376118 (https://doi.org/10.1073/pnas.2022376118).

Hermann, Z., Horn, D., Varga, J. and Varga, K. (2022), 'Távoktatási tapasztalatok a koronavírus járvány idején – Egy kérdőíves adatfelvétel eredményei', *KRTK-KTI Working Papers,* No 3, Institute of Economics, Centre for Economic and Regional Studies, Budapest (https://kti.krtk.hu/wp-content/uploads/2022/01/CERSIEWP202203.pdf).

Hermann, Z., Kertesi G. and Varga J. (2023), 'A teszteredménye társadalmi egyenlőtlensége és az általános iskolai szegregáció', in Szabó-Morvai, Ágnes and Pető, Rita (eds), *Munkaerőpiaci Tükör 2022*, KRTK Közgazdaságtudományi Intézet, Budapest, pp. 80–87 (https://kti.krtk.hu/wp-content/uploads/2023/11/A-teszteredmenyek-tarsadalmi-egyenlotlensege-es-az-altalanos-iskolai-szegregacio.pdf).

Holb, É., Khayouti, S., Kisfalusi, D., Messing, V., Varga, K. and Varga, J. (2022), 'A távolléti oktatás időtartama, az iskolák, pedagógusok és diákok felkészültsége, tanulási elmaradás a pedagógusok véleménye szerint', in Horn, D. and Bartal, A. M. (eds), *Fehér könyv a Covid-19-járvány társadalmi-gazdasági hatásairól,* ELKH Közgazdaság- és Regionális Tudományi Kutatóközpont, Közgazdaságtudományi Intézet, Budapest, pp. 108–130 (https://kti.krtk.hu/wp-content/uploads/2022/05/FeherKonyv.pdf).

König, C. and Frey, A, (2022), 'The impact of COVID-19-related school closures on student achievement. A meta-analysis', *Educational Measurement Issues and Practice*, Vol. 1, No 1, pp. 16–22.

Liao, H., Ma, S. and Xue, H. (2022), 'Does school shutdown increase inequality in academic performance? Evidence from COVID-19 pandemic in China', *China Economic Review*, Vol. 75, 101847 (https://doi.org/10.1016/j.chieco.2022.101847).

Maldonado, E. J. and De Witte. K. (2022), 'The effect of school closures on standardized student test outcomes', *British Educational Research Journal*, Vol. 48, No 1, pp. 49–94.

Molnár, G. and Hermann Z. (2023), 'Short- and long-term effects of COVID-related kindergarten and school closures on first- to eighth-grade students' school readiness skills and mathematics, reading and science learning', *Learning and Instruction*, Vol. 83, 101706 (https://doi.org/10.1016/j.learninstruc.2022.101706).

Oikawa, M., Tanaka, R., Bessho, S. I., Kawamura, A. and Noguchi, H. (2022), 'Do class closures affect students' achievements? Heterogeneous effects of students' socioeconomic backgrounds', *IZA Discussion Paper Series*, No 15751, IZA, Bonn.

Patrinos, H. A. (2023), 'The longer students were out of school, the less they learned', *Journal of School Choice*, Vol. 17, No 2, pp. 161–175.

Patrinos, H. A., Vegas, E. and Carter-Rau, R. (2022), 'An analysis of COVID-19 student learning loss', *Policy Research Working Papers*, No 10033, World Bank, Washington, DC (http://hdl.handle.net/10986/37400).

Sinka, E. (2010), *OECD review on evaluation and assessment frameworks for improving school outcomes – Hungary – Country background report*, OECD Publishing, Paris.

TIMSS and PIRLS International Study Center (2015), 'TIMSS 2015 Encyclopedia. Hungary' (https://timssandpirls.bc.edu/timss2015/encyclopedia/countries/hungary/).

UNESCO (2022), 'COVID-19 education response – Country dashboard' (https://covid19.uis.unesco.org/global-monitoring-school-closures-covid19/country-dashboard/).

Varga, J. (2020), 'Tanulási veszteség a covid következtében: Szimulációs eredmények', in Fazekas, K., Kónya, I. and Krekó, J. (eds), *Munkaerőpiaci Tükör 2020*, KRTK Közgazdaságtudományi Intézet, Budapest, pp. 202–223 (https://kti.krtk.hu/wp-content/uploads/2022/01/mt_2020_hun_220-223.pdf).

Appendix

Table A8.1: Duration of mandatory closures, by educational level and epidemic wave

	Compulsory school closures	Duration of distance teaching during this time
2019/2020 semester 2 – first wave of COVID-19		
Primary school (grades 1–4)	16 March–2 June 2020 (*)	12 weeks
Lower secondary (grades 5–8)	16 March–2 June 2020 (*)	12 weeks
Upper secondary general	16 March–2 June 2020 (*)	12 weeks
Vocational secondary	16 March–2 June 2020 (**)	10 weeks
2020/2021 semester 1 – second wave of COVID-19		
Primary school (grades 1–4)	None	
Lower secondary (grades 5–8)	None	
All upper secondary	11 November 2020–22 January 2021	4 weeks
2020/2021 semester 2 – third wave of COVID-19		
Primary school (grades 1–4)	8 March–18 April 2021	5 weeks
Lower secondary (grades 5–8)	8 March–9 May 2021	8 weeks
All upper secondary	25 January–9 May 2021 (***)	8 weeks
2021/2022 semester 1 – fourth wave of COVID-19		
Primary school (grades 1–4)	None	
Lower secondary (grades 5–8)	None	
All upper secondary	None	

NB: (*) Between 2 and 26 June 2020, all primary and secondary schools had to organise supervision of pupils. (**) From 2 June 2020, vocational schools could operate either as they did before the emergency or on a digital extracurricular basis. (***) This closure applied with an exception for grades preparing for the school-leaving examination.

Source: Holb et al. (2022, Table F5).