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The Effects of the COVID-19 Pandemic on Education Outcomes in Belize

Education Division

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ABSTRACT

The COVID-19 pandemic brought school systems to a halt across the globe. In Belize, remote learning was challenging owing to limited access to educational technologies and lack of familiarity with remote learning among teachers. This study draws on national standardized exams and specific achievement testing to assess pandemic-related learning losses at the primary education level. Based on administrative data, the study also analyzes changes in student enrollment, dropout rates, and grade repetition at the primary and secondary levels. We find that school closures resulted in significant learning losses in English language and mathematics at the end of primary education. Matching international trends, the largest losses occurred in mathematics. Among the strands of mathematics content, the one showing the most dramatic loss is *number sense* in primary schools and *geometry* in secondary schools; the achievement level in both dropped by around 55 percent. Also, in line with international trends, average student repetition and dropout rates surged at the secondary level after prolonged school closures. The largest increase in dropout and repetition levels were found in urban secondary schools: the average dropout rate increased by 51 percent in the 2020/21 school year, compared with the average rate in the year prior to the start of the pandemic, while the repetition rate increased from 6.7 percent in the 2019/20 school year to 11.6 percent in the 2021/22 school year.

JEL codes: C20; I24

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1 BACKGROUND

School closures in response to the COVID-19 pandemic disrupted the lives of students worldwide (Almeyda, et al. 2022). In Belize, schools closed on March 23, 2020 (United Nations Children's Fund 2021a). As a small, English-speaking developing country located in Central America, with limited internet connections in many areas and poor technology skills among its student and teacher populations, the school closures put a halt to the continuity of learning for children.[1]

When schools closed suddenly and unexpectedly, principals and teachers were tasked with the implementation of remote learning to allow students to continue their education. Selecting and implementing a remote education strategy was challenging in Belize since students' access to internet service and digital devices at home is very limited. This is especially true for migrant students, students of low socioeconomic status, and students in rural areas. Results from school readiness surveys conducted in June and July of 2020 revealed that 46 percent of primary school students had a home internet connection and 44 percent had access to either a tablet or computer. In secondary school, slightly more than half of students had a home internet connection and access to a tablet or computer at home (Belize Ministry of Education 2020). One schoolteacher pointed out that "*there is* a percentage of our students *who* don't have access to the internet... *there's* a larger portion of *them who will* have access *to the internet* but mainly on their smartphones; they don't have a computer, or they don't have a tablet to access, so it's only mobile data..." (Parker and Alfaro 2022). Also, even though eight in ten teachers have access to internet services and a computer at home, and most have access to internet services and computers at school (Belize Ministry of Education 2020), only a third indicated feeling comfortable using technology for basic tasks (Belize Ministry of Education 2021).

In view of these limitations, the Belize Ministry of Education focused on implementing a wide range of remote learning strategies in an effort to support all schools in the months following school closures. These included: (i) synchronous online classes, (ii) recorded video/audio lessons, (iii) online delivery of learning materials and assignments, (iv) direct delivery

1 Children in Belize start primary school at 5 years and are required to attend school until the age of 14 years.

of printed packets, and (v) TV or radio educational programs. The direct delivery of printed packets was the most effective way to reach a majority of students; 82 percent of preschools and 91 percent of primary schools chose this strategy. This was "especially true for students in the Toledo District where only 16 percent of preschools and 11 percent of primary schools engaged in some online instruction" (Belize Ministry of Education 2021). As for the other strategies, 65 percent of preschools and 77 percent of primary schools used radio educational programs, and 43 percent of preschools and 44 percent of primary schools incorporated online classes and digital resources (Belize Ministry of Education 2021).

The school year in Belize starts in August and ends in May of the following year. The gradual return of students to face-to-face learning was optional and began in two phases during the second semester of the 2020/21 school year. In April 2021, approximately 55 schools were approved by the District Education Centers to reopen. In May, 297 schools countrywide were authorized to begin in-person classes (United Nations Children's Fund 2021b). After being open for a few weeks, schools closed for summer break and did not reopen until October 4, 2021, which marked the start of the 2021/22 school year. However, not all schools were able to fully open for in-person classes and most were operating at limited capacity at all grade levels (United Nations Children's Fund 2022).

Despite the efforts made by the government of Belize, it is reasonable to suppose that students' limited access to technology and learning materials, paired with the total number of school days during which students were without in-person classes, led to a decrease in the rate of learning and education progress compared with that of previous years. This was indeed the case, as we shall see. Students in Belize were without face-to-face learning for approximately 170 school days in the two-year period following school closures. The loss of learning implies a decline in knowledge and skills required by students at each grade level.

School closures have also been found to affect other education outcomes, such as enrollment, dropout rates, and grade repetition. Prior to the pandemic, Belize reported a primary school enrollment rate of 98 percent and a secondary school enrollment rate of 57 percent, while the average student dropout rate in primary schools was 0.6 percent and that of secondary schools was 5 percent. Average grade repetition rates were

around 6 percent in both primary and secondary schools (Belize Ministry of Education 2022).

In an effort to better equip educators and policy makers in Belize in their process of identifying and closing learning gaps at the primary and secondary school levels, we measure the learning losses experienced by fifth- and eighth-grade students in primary schools as a result of the prolonged school closures, as well as changes observed in student enrollments, dropout rates, and grade repetition in primary and secondary schools. The data used in the analysis were sourced from national standardized tests administered over the five years preceding school closures and from post-COVID assessment tests administered in the years following complete school closures. In addition to the test data, the study uses administrative data at the school level provided by the Belize Ministry of Education.

2 METHODOLOGY AND DATA USED

The study uses school administrative data and data from national learning assessments to analyze the impact of the COVID-19 pandemic on education outcomes.

Learning Assessment Data

All eighth-grade students (known as standard 6 in Belize) are required to take the Primary School Examination (PSE) at the end of their final year in primary school. The exam assesses four subject areas: English language, mathematics, social studies, and science. Owing to the pandemic, the PSE was not administered in the 2019/20 school year. In the following academic years, 2020/21 and 2021/22, the government again suspended the examination.

In the years prior to the pandemic, the Ministry of Education administered national assessments in the fifth grade (standard 3); these were known as the Belize Junior Achievement Test (BJAT). As in the case of the PSE, the BJAT was not administered in the 2019/20 school year nor in the following academic years. The BJAT assesses mathematics and English language skills at the end of the school year.

To assess student knowledge and measure pandemic-related learning gaps, the Ministry of Education developed the Belize Diagnostic Assessment Test (BDAT), which evaluates English language and mathematics skills of students in grades one (known as “infant one”) through eight (known as “standard six”). The fifth- and eighth-grade BDAT evaluations were designed using the same topics and standards considered in the previous evaluations of these grades (BJAT and PSE, respectively), while new evaluations were developed for grades one, two, three, four, six, and seven, also using the topics and standards of the national curriculum pertaining to each grade level. As schools began to reopen for face-to-face instruction near the end of the 2020/21 school year, the BDAT was administered in June 2021 to eighth graders in these schools and in all grades during the period between January and March of 2022.

The data used in the analysis correspond to the results from the English language and mathematics sections of the PSE and the results from the BJAT in English language and mathematics during the five-year period before the start of the COVID-19 pandemic (2014/15 to 2018/19), as well as those from the fifth-grade BDAT for 2021/22 and the eighth-grade BDATs for 2020/21 and 2021/22 in English language and mathematics. In both the PSE and the eighth-grade BDAT, the English language and mathematics tests were developed to measure the knowledge and skills that eighth-grade students in Belize should be able to master, as stipulated in the national primary school curriculum. Similarly, the BJAT and the fifth-grade BDAT in English language and mathematics were created to measure the achievement level of fifth graders in Belize, based on the same curriculum.

The tests administered in both the fifth and eighth grades were very similar in structure and content. The English language tests combine a set of multiple-choice questions for each grade level covering skills in reading comprehension, grammar structure, inference, grammar mechanics, and vocabulary, in addition to a task that requires writing skills. The mathematics tests consist of a set of problem-solving questions and a set of multiple-choice questions that evaluate knowledge in data analysis and statistics, geometry, number sense, number operations, relations and equations, and measurement. As the same standards, approach, and methods were used in the design of the PSE and eighth-grade BDAT, as well as the BJAT and fifth-grade BDAT, the instruments are comparable by grade level. Also, to make the test results comparable, the raw test scores are converted to percentages by dividing each test score by the total score and then multiplying this quotient by 100.

The final samples for the study were limited to the student test results from the schools that administered the eighth-grade BDAT in the 2020/21 school year and the fifth-grade BDAT in the 2021/22 school year. In the 2018/19 school year, a total of 274 and 282 primary schools respectively administered the BJAT to their fifth-grade students and the PSE to their eighth-grade students. Almost 40 percent of the primary schools that administered the BJAT prior to the pandemic also participated in the 2021/22 fifth-grade BDAT (Table 1). In the eighth grade, slightly more than a third of the primary schools administered the BDAT in the 2020/21 school year, of which 51 also gave the BDAT to their eighth graders the following school year (Table 2). For the analysis of learning improvements

among eighth graders after school reopenings, the study uses data from the schools that administered the BDAT in both the 2020/21 and 2021/22 school years.

Table 1: Data on schools that participated in the fifth-grade evaluations

School characteristics	Schools that administered the BJAT in the 2018/19 school year	Schools that administered the BDAT in the 2021/22 school year	Schools that did not open in the 2021/22 school year	Difference
Geographical area				
Urban	80	25.5	31.5	-6.1
Rural	194	74.5	68.5	6.1
Performance level				
Bottom	108	43.4	36.9	6.5
Top	72	24.5	27.4	-2.9
All schools	274	106	168	

* p<0.010, ** p<0.005, *** p<0.001.

A majority of the schools in Belize are located in rural areas, and a large proportion are considered low-performing schools based on the 2018/19 PSE results (Tables 1 and 2). Of the schools that administered the 2018/19 BJAT and PSE, seven in ten are found in rural areas and four in ten are among the group of schools that showed low performance on the 2018/19 PSE. In the 2018/19 school year, top-performing schools accounted for 27 percent of the schools countrywide.

Table 2: Data on schools that participated in the eighth-grade evaluations

School characteristics	Schools that administered the PSE in the 2018/19 school year	2020/21 school year			2020/21 and 2021/22 school years		
		Schools that administered the BDAT	Schools that did not	Diff	Schools that administered the BDAT	Schools that did not	Diff
Geographical area							
Urban	82	28.6	29.3	-0.8	27.5	29.4	-2.0
Rural	200	71.4	70.7	0.8	72.5	70.6	2.0
Performance level							
Bottom	113	36.7	41.8	-5.1	37.3	40.7	-3.4
Top	76	20.4	30.4	-10.0*	19.6	28.6	-9.0
All Schools	282	98	184		51	231	

* p<0.10, ** p<0.05, *** p<0.01.

Table 1 shows that after reopening in the 2021/22 school year, 75 percent of the schools that administered the BDAT to their fifth graders were located

in rural areas. Similarly, 72 percent of the schools that administered the 2020/21 BDAT to their eighth graders were found in rural areas (Table 2). In terms of levels of school performance, 43 and 37 percent respectively of the schools that gave the 2021/22 BDAT to fifth-grade students and the 2020/21 BDAT to eighth-grade students, were among the bottom-performing schools. Top-performing schools that administered the fifth-grade BDAT represented one-fourth of the schools in the 2021/21 school year, while one-fifth of the schools that administered the eighth-grade BDAT in the 2020/21 school year were among the country's top-performing schools. These proportions were very similar to those of the schools that did not reopen for in-person classes; any differences observed were not statistically significant, with the exception of the proportion of top-performing schools that administered the 2020/21 BDAT to their eighth-grade students. This proportion is underrepresented compared to that of top-performing schools that did not reopen. Hence, these results in the analysis should be interpreted with caution.

The characteristics of the schools that administered both the 2020/21 BDAT and the 2021/22 BDAT to their eighth-grade students were similar to those of the schools that did not administer both evaluations, with no statistically significant differences observed (Table 2).

In the 2018/19 school year, 8,001 fifth-grade students took the BJAT and 6,959 eighth-grade students took the PSE. After prolonged school closures, the 2021/22 BDAT was completed by 1,756 fifth-grade students in 106 schools countrywide (Table 3). In the eighth grade, the 2020/21 BDAT was taken by 2,066 students in 98 schools across the country that reopened at the end of the 2020/21 school year (June 2021), while the 2021/22 BDAT was administered to 1,978 students in 110 schools that were open that year for face-to-face learning (Table 4). Lastly, a total of 941 eighth graders were in schools that administered the BDAT in both the 2020/21 and 2021/22 school years.

Table 3: Data on students who participated in the fifth-grade evaluations

School characteristics	All students who took the BJAT in the 2018/19 school year	Students in the sample of 2018/19 schools that administered the 2021/22 BDAT		Students who took the BDAT in the 2021/22 schoolyear		Difference
		Total	%	Total	%	
Geographical area						
Urban	3,619	1,163	38.3	578	32.9	5.4***
Rural	4,382	1,873	61.7	1,178	67.1	-5.4***
Performance level						
Bottom	2,617	1,004	33.1	679	38.7	-5.6***
Top	2,707	1,021	33.6	471	26.8	6.8***
Student gender						
Male	4,158	1,528	50.3	949	54.0	-3.7**
Female	3,843	1,508	49.7	807	46.0	3.7**
All students	8,001	3,036		1,756		

* p<0.010, ** p<0.005, *** p<0.001.

In the fifth grade, 62 percent of the students in the sample of 2018/19 schools that administered the 2021/22 BDAT were enrolled in rural schools, while a third of the students were in bottom-performing schools and another third were attending top-performing schools (Table 3). The gender distribution of the fifth-grade students in the sample of 2018/19 schools was even: 50 percent boys and 50 percent girls.

In the 2021/22 school year, 67 percent of the fifth-grade students who took the BDAT were enrolled in rural schools, a proportion that overrepresents that in the 2018/19 sample. There is also an overrepresentation in the 2021/22 school year of students in low-performing schools and an underrepresentation of students in high-performing schools, compared with the 2018/19 sample. The proportion of fifth-grade students who took the BDAT in bottom-performing schools reached 39 percent, while those who took the same BDAT in top-performing schools accounted for 27 percent. Additionally, boys taking the BDAT in the 2021/22 school year were overrepresented, at 54 percent. These differences observed in the groups of students are statistically significant; thus, the results in the analysis should be interpreted with caution.

In the case of the eighth-grade students, 57 percent of the students in the 2018/19 sample of schools that administered the 2020/21 BDAT were attending schools located in rural areas (Table 4). While 31 percent of the eighth graders in the 2018/19 sample were enrolled in bottom-performing schools, 25 percent were in top-performing schools. The gender ratio of the

students in the sample of 2018/19 schools that administered the 2021/22 BDAT was 49 percent boys to 51 percent girls.

Table 4: Data on students who participated in the eighth-grade evaluations

School characteristics	All students who took the PSE in the 2018/19 school year	Students in the sample of 2018/19 schools that administered the 2020/21 BDAT		Students who took the BDAT in the 2020/21 school year		Difference
		Total	%	Total	%	
Geographical area						
Urban	3,254	1,165	42.6	754	36.5	6.1***
Rural	3,705	1,569	57.4	1,312	63.5	-6.1***
Performance level						
Bottom	2,390	839	30.7	555	26.9	3.8***
Top	2,260	680	24.9	490	23.7	1.2
Student gender						
Male	3,478	1,346	49.2	1,103	53.4	-4.2***
Female	3,481	1,388	50.8	963	46.6	4.2***
All students	6,959	2,734		2,066		

* p<0.10, ** p<0.05, *** p<0.01.

Students in schools that administered the BDAT in the 2020/21 school year were overrepresented in rural schools (64 percent) compared with the 2018/19 sample. In terms of school performance, 27 percent of eighth graders enrolled in schools that administered the 2020/21 BDAT were in bottom-performing schools, and 24 percent were in top-performing schools. These proportions reveal an underrepresentation of students compared with those in the 2018/19 sample. In the 2020/21 school year, more boys than girls took the sixth-grade BDAT (53 percent vs 47 percent). These results should also be interpreted with caution, as the differences observed between years are statistically significant.

Administrative Data

The analysis of student dropout and grade repetition rates uses Ministry of Education data obtained from primary and secondary schools for the school years 2016/17 through 2021/22 (Table 5).

Table 5: Primary and secondary school dropout and grade repetition rates, 2016/17 to 2020/21

School year	Primary	Secondary
2016/17	303	59
2017/18	302	60
2018/19	306	61
2019/20	305	60
2020/21	304	61

3

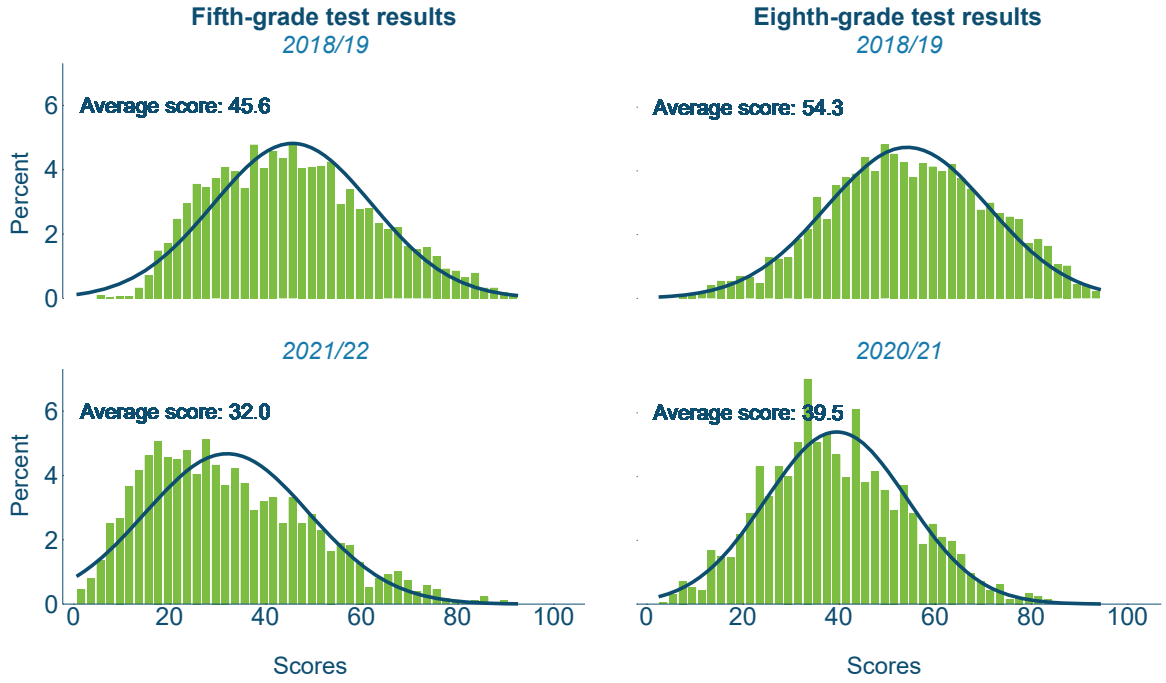
LEARNING LOSSES DURING THE COVID-19 PANDEMIC

When we contrast the distribution of the average composite scores of the sample of fifth and eighth graders who took the English language and mathematics evaluations before the COVID-19 pandemic with that of those who took the evaluations in the same subjects after prolonged school closures, it is evident that students learned less from remote learning than they would have in a normal year with face-to-face instruction (Figure 1).

The distribution of the combined total scores in the fifth grade follows a normal distribution before the pandemic. After months of school closures the distribution of the combined total scores shifts to the left and is slightly skewed to the right. This implies that in the 2021/22 school year a large proportion of the sample of students in the fifth grade obtained a very low combined total score. More specifically, after prolonged school closures, fifth-grade students obtained an average combined total score of 32 points, which represents a decrease of 14 points when compared with the average combined total score of 46 points obtained by fifth-grade students in the year prior to the pandemic. While the minimum average combined total score fell from 4.8 in the 2018/19 school year to 0.6 points in the 2021/22 school year, the maximum average combined total score decreased slightly from 91.5 to 90.0 points over the same period.

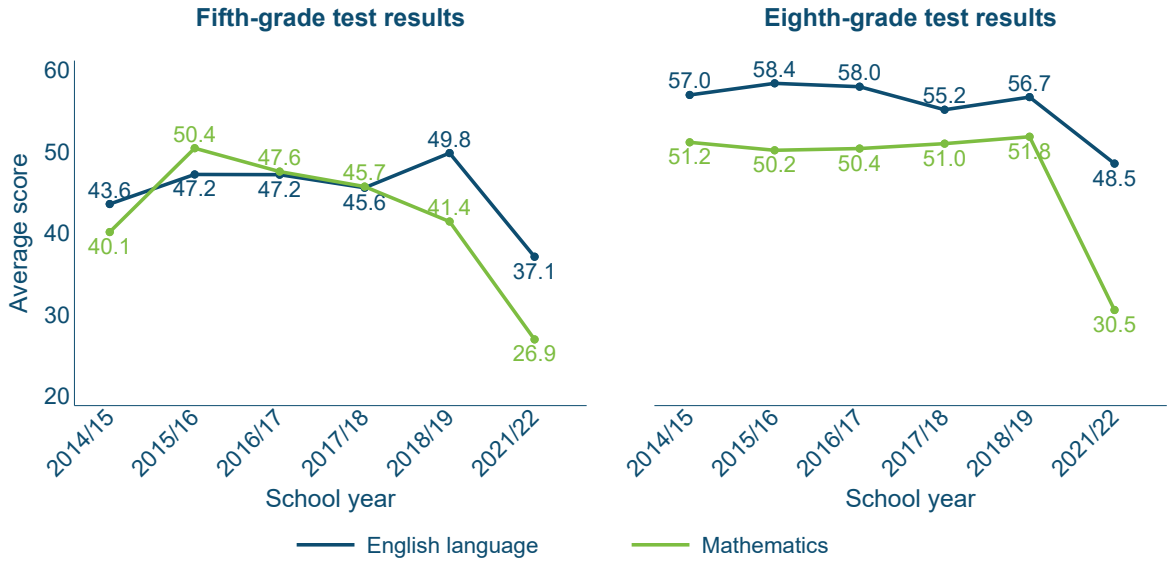
In the eighth grade, although the distributions of the combined total scores follow a normal distribution both before the pandemic and after remote learning, the entire distribution also shifted to the left after many months of school closures. Along with the shift in distribution, the average combined total score dropped 14 points after school closures: while students had an average combined total score of 54 points prior to the pandemic, their average combined total score was 40 points in the 2020/21 school year. Also, the maximum average combined total score dropped by 10 points (from 94.5 to 84.4 points), and the minimum average combined total score fell from 6.5 in the 2018/19 school year to 2.5 points in the 2020/21 school year.

Figure 1: Distributions of fifth- and eighth-grade standardized test scores



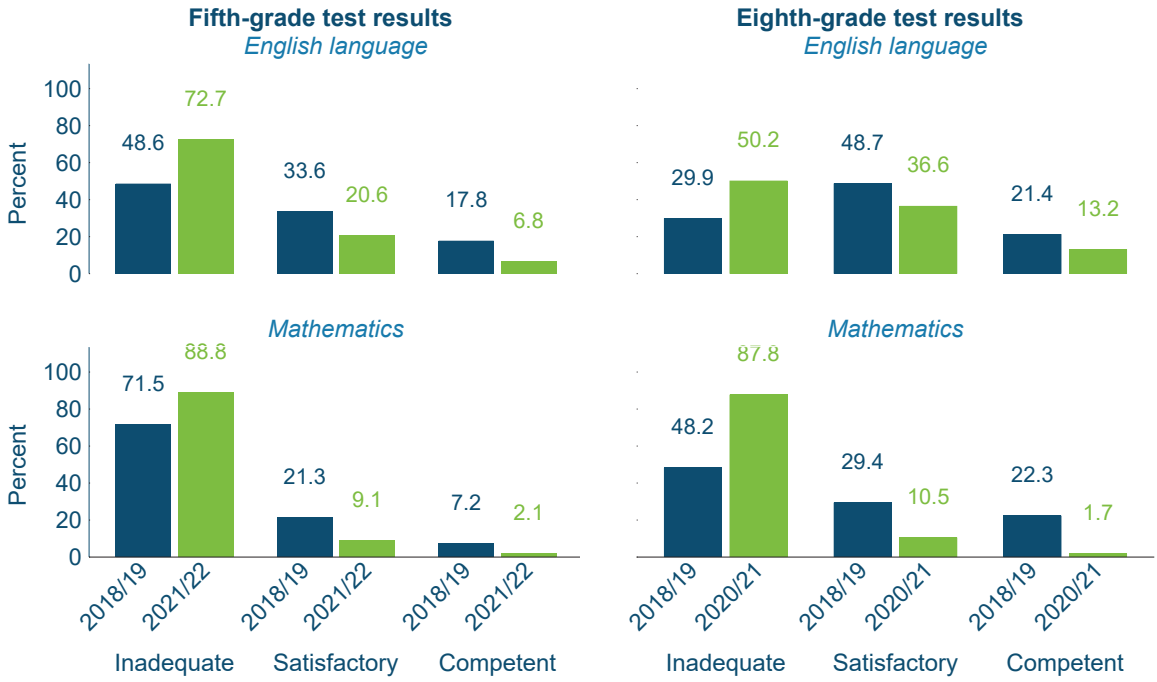
When analyzing the test scores separately by subject area, learning losses were significant among students in the fifth and eighth grades in both English language and mathematics (Figure 2). However, a larger effect of school closures was observed in mathematics than in English at both grade levels. Fifth-grade student performance in mathematics was already on a slight decline in the years before the pandemic. After prolonged school closures, the average mathematics score plunged from 41.4 to 26.9 points, meaning that fifth-grade students were approximately 15 points behind their peers who took the mathematics evaluations prior to the pandemic. In the eighth grade, after being relatively stable over the years prior to the pandemic, the average mathematics score suddenly fell by 41 percent in the 2020/21 school year (from 51.8 to 30.5 points). At this grade level, students were approximately 21 points behind their peers who took the mathematics evaluations before the pandemic. In English language, the average test score among fifth-grade students stood at 49.8 points in the year before the pandemic. However, after remote learning students average test score suddenly dropped by 13 points (26 percent). In the eighth grade, after hovering around 57 points in the years before the pandemic, the average English language score decreased by 15 percent, from 56.7 points in the 2018/19 school year to 48.5 points in the 2020/21 school year.

Figure 2: Average fifth- and eighth-grade standardized test scores by subject



These national test results were grouped and analyzed by achievement level: (i) competent-excellent, which encompasses test scores of 70 to 100 points; (ii) adequate-satisfactory, test scores of 50 to 69 points; and (iii) inadequate, test scores lower than 50 points. Consistent with the previous analysis, after remote learning a larger group of students fell into the inadequate performance level (Figure 3).

Figure 3: Percentage of fifth- and eighth-grade students by achievement level

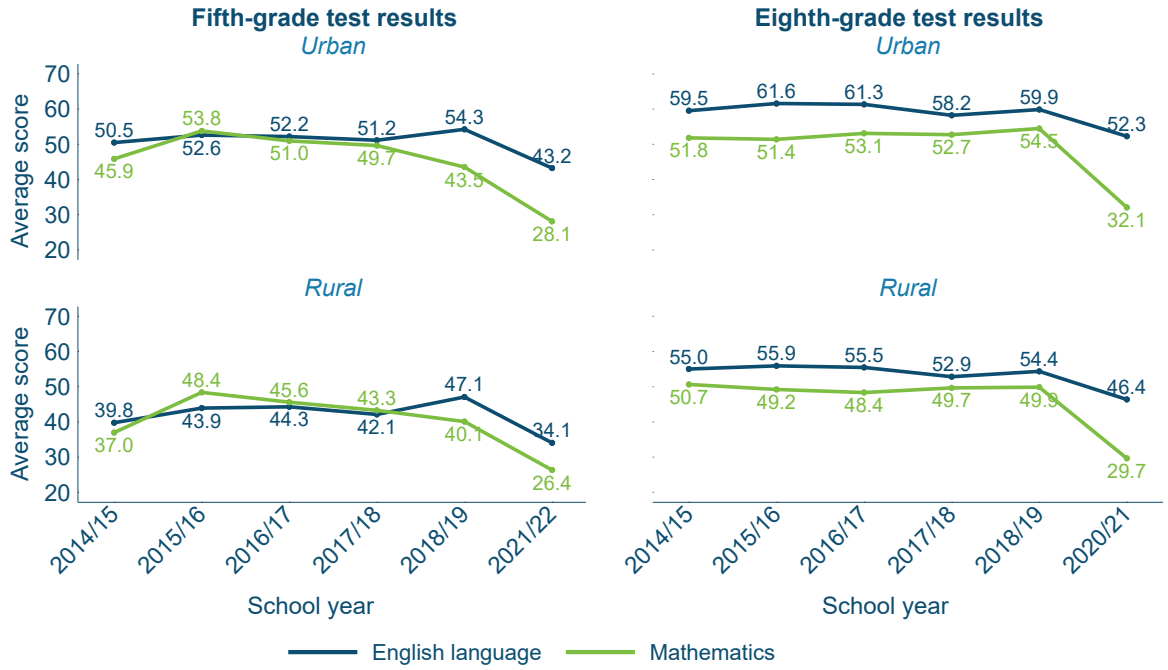


National testing shows that almost half of the fifth-grade students obtained an inadequate score in English language before the pandemic. This group of students increased to 73 percent after prolonged school closures. In mathematics, the achievement levels of fifth-grade students were worse: while seven in ten students were not able to reach an adequate-satisfactory achievement level prior to the pandemic, this ratio increased to almost nine in ten students after long periods of school closure.

In the eighth grade, half of the students obtained an inadequate score in English language after remote learning, representing an important increase with respect to the year before the pandemic, when 30 percent of the students fell into this category of achievement. In mathematics, the group of eighth-grade students who obtained an inadequate score was significantly larger in the 2020/21 school year than in the 2018/19 school year: 88 percent obtained an inadequate score after returning from distance learning, compared with 48 percent who had a similar score in the year before the pandemic.

Traditionally, students in urban areas outperform their rural peers in both mathematics and English language in the fifth and the eighth grades (Figure 4). After school closures, fifth- and eighth-grade students living in rural areas experienced a larger percentage drop in average test scores in English language than students in urban areas, thus deepening the learning divide. While average test scores of fifth-grade students living in urban areas decreased by 20 percent (11.1 points) in English language and by 35 percent (15.4 points) in mathematics, average test scores of students located in rural areas fell by approximately 13 points in both English language and mathematics, representing a 28 and 35 percent drop in test scores, respectively. After the implementation of remote learning, eighth-grade students living in both urban and rural areas experienced a similar decrease of approximately 8 points in English language. However, the percentage drop in average English language test scores was larger in rural areas: 15 percent compared with 13 percent in urban areas. In mathematics, the percentage drop in average test scores for rural areas after school closures was slightly more pronounced. It was not statistically significant in urban areas: 41 percent compared with 40 percent.

Figure 4: Average fifth- and eighth-grade standardized test scores by subject and geographical area

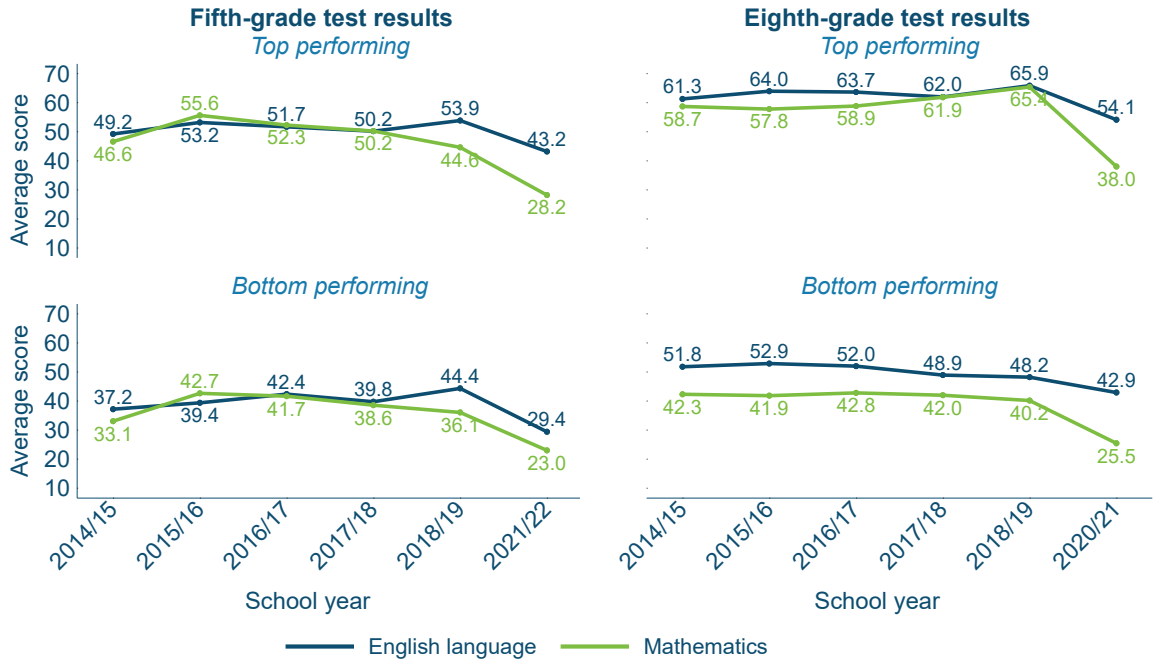


In an effort to analyze achievement in bottom- and top-performing schools, schools were assigned to one of three groups according to their 2018/19 school year results on the PSE: (i) bottom-performing schools, (ii) average schools, and (iii) top-performing schools (Figure 5). The test results of fifth-grade students showed that after school closures, the percentage drop in average English language scores was larger among students in bottom-performing schools: the average English language test score in bottom-performing schools decreased by 34 percent (15 points); in top-performing schools, the average English language test score fell by 20 percent (10.7 points). In mathematics, the drop in test scores was larger among fifth graders in top-performing schools after school closures: the average test score drop was the same in top-and bottom-performing schools (36 percent), which represented 16.4 points and 13.1 points, respectively.

Figure 5 also shows that the average test scores among eighth-grade students who took the English language and mathematics tests in bottom-performing schools was on a slight decline for the five years prior to the pandemic, whereas the average test scores among eighth-grade students in top-performing schools were increasing slightly. After school closures, greater learning losses were observed among students in the top-

performing schools in both mathematics and English language. In English language, the average test score among students in top-performing schools dropped 11.8 points (18 percent) compared with a decrease of 5.3 points (11 percent) in the average test score of students in bottom-performing schools. The average mathematics test score among eighth graders decreased significantly by 42 percent (27.4 points) in top-performing schools and by 37 percent (14.8 points) in bottom-performing schools.

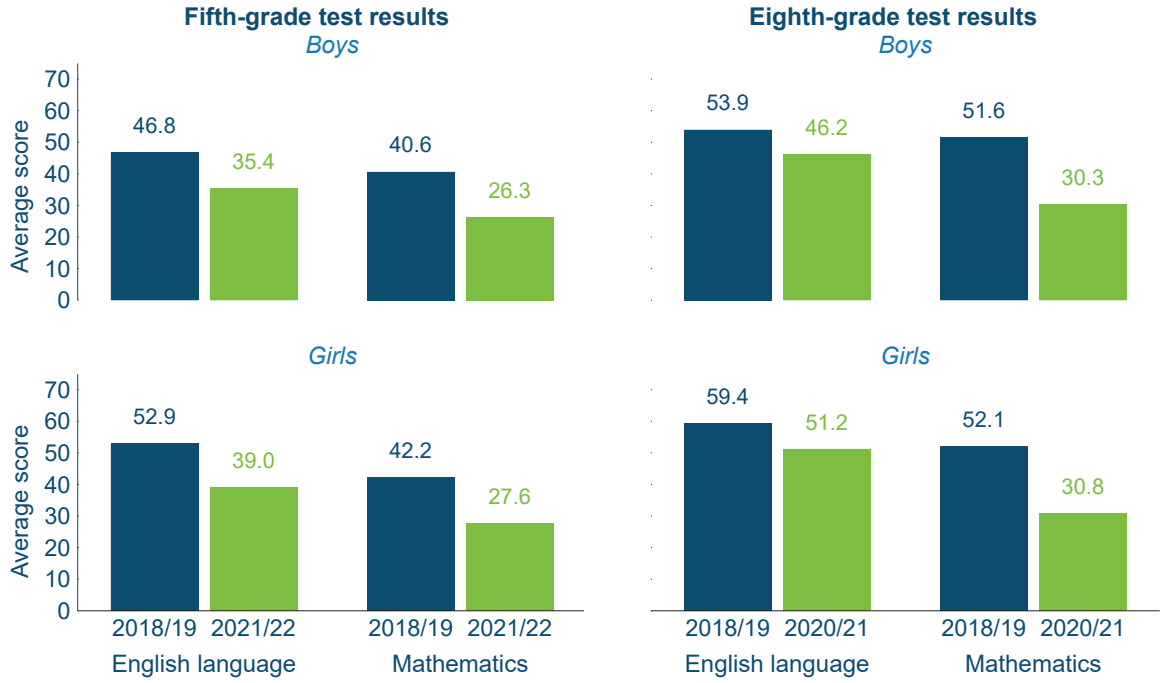
Figure 5: Average fifth- and eighth-grade standardized test scores by subject and school performance level



vWhen analyzing student performance by gender (Figure 6), we observe that fifth- and eighth-grade girls tend to perform better than boys in English and similarly to boys in mathematics. However, the learning losses in English language at both grade levels were greater among girls after school closures. In the fifth grade, girls' average English language test score decreased by 13.9 points (26 percent), and eighth-grade girls experienced a drop of 8.2 points (14 percent) in their average score. Boys in the fifth grade, on the other hand, experienced a drop of 11.4 points (24 percent) in their average English score, while eighth-grade boys' average score fell 7.7 points (14 percent). In mathematics, fifth- and eighth-grade girls and boys performed similarly, making the learning losses similar for both sexes. Fifth-

grade boys and girls scored around 41 points prior to the pandemic and approximately 27 points after school closures, while eighth-grade boys and girls earned approximately 52 points on the 2018/19 school year evaluation and close to 30 points on the 2020/21 evaluation.

Figure 6: Average fifth- and eighth-grade standardized test scores by gender

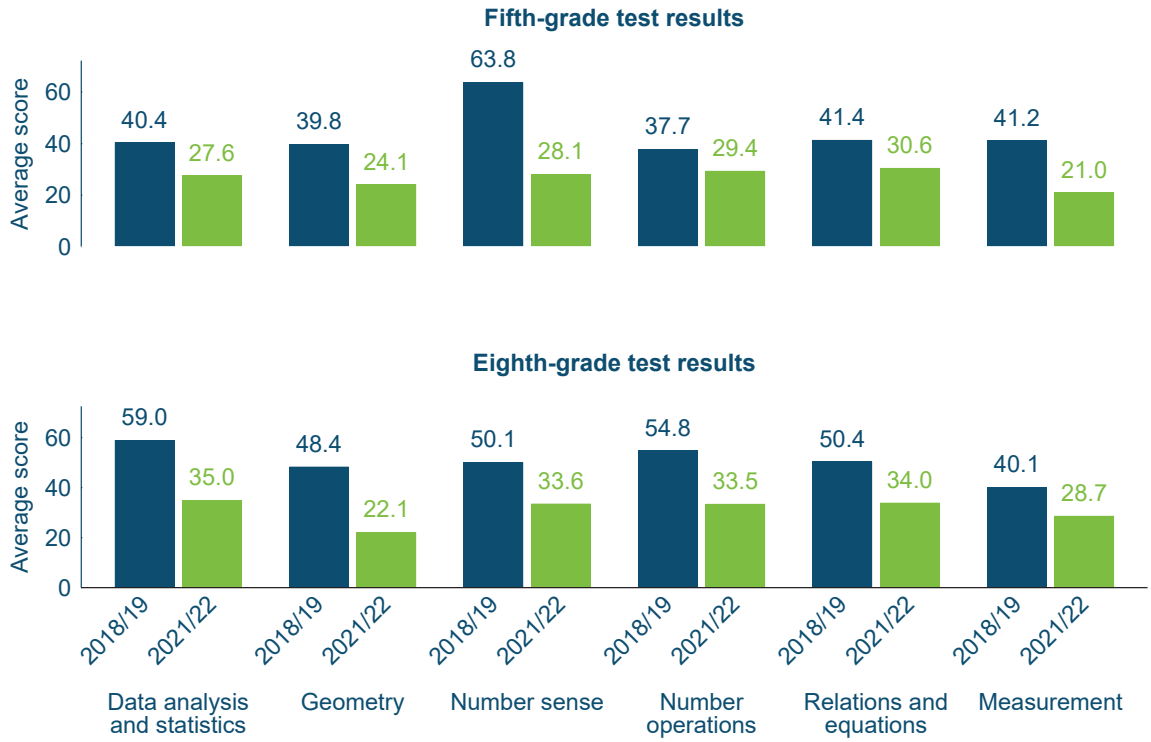


Learning Loss in Mathematics by Content Strand

We analyze mathematics achievement in the fifth and eighth grades by six content strands: (i) data analysis and statistics (interpretation of graphs and Venn diagrams, transformations, means, modes, probability, and Cartesian planes); (ii) geometry (calculating volume, circumference, perimeter, area, and angles of shapes); (iii) number sense (scientific notation, decimals, and Roman numerals); (iv) number operations (basic mathematical operations and properties of basic mathematical operations); (v) relations and equations (ratios and equations); and (vi) measurement (telling time and converting measurements). Although the average mathematics learning level was low prior to the pandemic, with 72 percent of fifth-grade students and 48 percent of eighth-grade students scoring at the inadequate level, there were differences in performance levels among content strands (Figure 7).

Prior to the pandemic, students in the fifth grade achieved their best performance in the *number sense* strand, while their worst performances came in the areas of *geometry* and *number operations*. Although learning decreased in all content stands after the closures, the greatest learning loss was observed in *number sense*, where the average score fell by 56 percent, from 63.8 points in the 2018/19 evaluation to 28.1 points in the 2021/22 evaluation. Fifth- grade students also experienced a large decline in *measurement*: the average score in the 2021/22 school year was 20.2 points below that of 2018/19, a 49 percent drop. The smallest, but still significant, learning losses occurred in *number operations* and *relations and equations*.

Figure 7: Average fifth- and eighth-grade standardized test scores by mathematics content strand



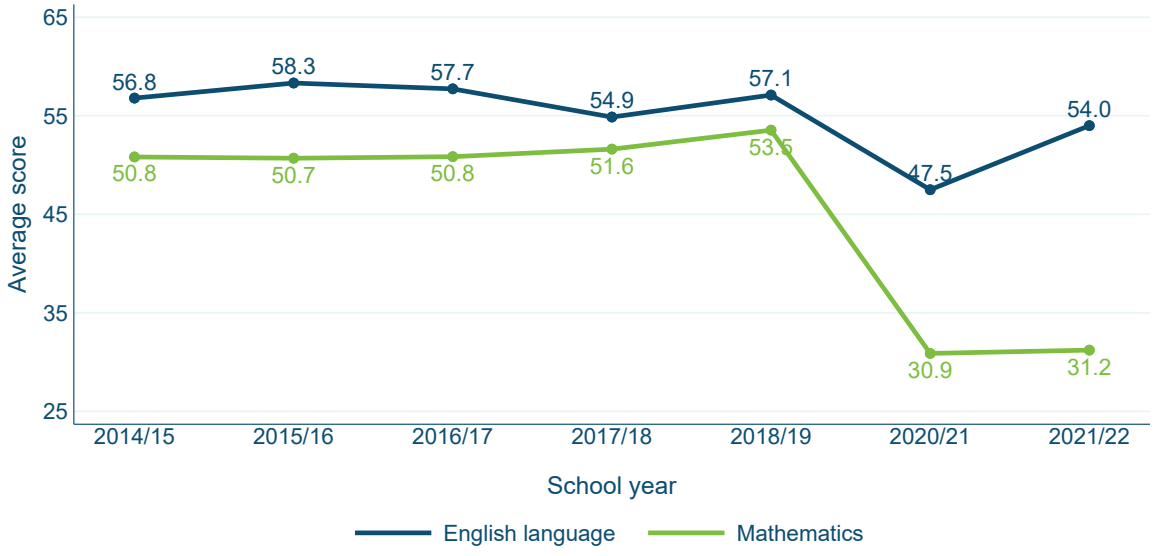
Eighth graders performed best in *data analysis and statistics* and worst in *geometry* and *measurement*, both before the pandemic and after school closures. The poor performance in *geometry* seems to be carried over from the primary school years, as both fifth and eighth graders perform poorly in this strand. At the eighth-grade level, learning also decreased in all content strands, with the greatest learning loss observed in *geometry*: the average score fell by 54 percent from 48.4 points in the 2018/19 evaluation

to 22.1 points in the 2021/22 evaluation. Large losses were also observed in *data and statistics*, as the average score recorded after school closures decreased by 24 points, a 41 percent drop from the average score in the year prior to the pandemic. The tasks with the smallest, but still significant, learning losses in the eighth grade are those related to *number sense, relations and equations, and measurement.*

Learning Outcomes after School Reopening

When analyzing achievement in schools that reopened in the 2020/21 school year, we observe that learning improved significantly in English language by the 2021/22 school year (Figure 8). The average score of eighth graders who took the English language evaluation rose from 47.5 points in the 2020/21 school year to 54 points in the 2021/22 school year. In mathematics, the improvement was not statistically significant. While the average score of the eighth-grade students who took the 2020/21 school year evaluation in mathematics was 30.9 points, eighth graders who took the 2021/22 school year evaluation earned a slightly higher average score of 31.2 points.

Figure 8: School reopening improves learning: eighth-grade average test scores

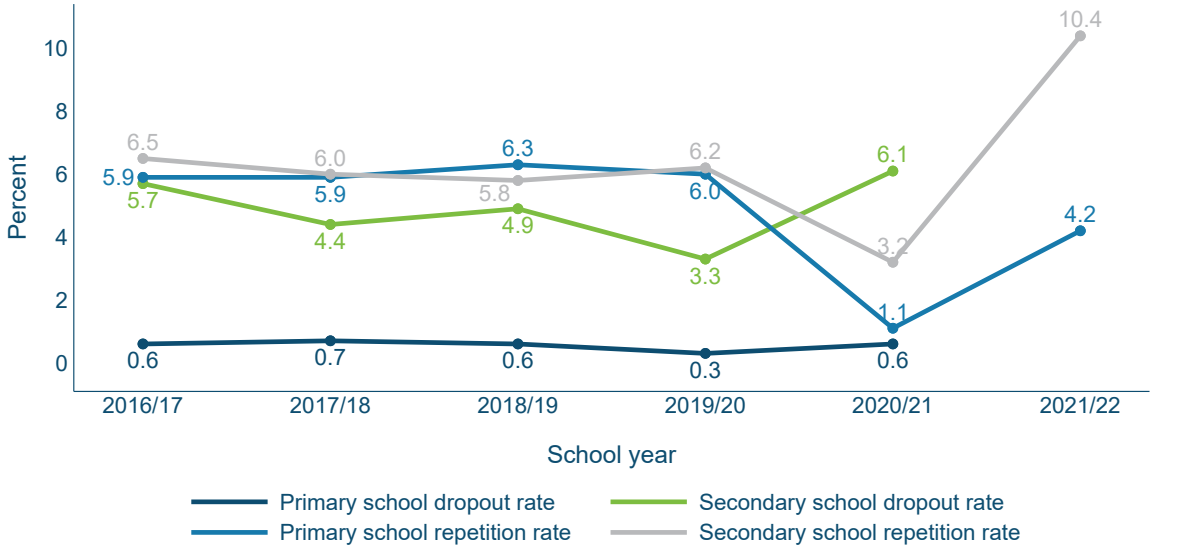


4 STUDENT ENROLLMENT, DROPOUT, AND GRADE REPETITION RATES

Not only did the COVID-19 pandemic cause learning losses for students at all levels, but it also increased the risk of students falling behind and repeating grades or dropping out of school. During the pandemic, students were allowed to automatically transition to the next grade level. While this policy prevented repetition in the 2020/21 academic year, repetition rates increased sharply in the following year (Figure 9). Meanwhile, net primary enrollment rates fell by 6.7 percentage points over a two-year period, from 96.3 percent in the 2019/20 school year to 89.6 percent in 2021/22 (Belize Ministry of Education 2022). At the secondary school level, net enrollment rates remained stable at approximately 56.5 percent.

In line with international trends, average repetition and dropout rates in Belize surged at the secondary level after prolonged school closures. The data show that in the three years preceding the pandemic, the average secondary school dropout rate ranged between 4.4 and 5.7 percent. In the 2019/20 school year, the average dropout rate fell by a third (from 4.9 to 3.3 percent). Given the mode of learning adapted during the second semester of the 2019/20 school year, it was difficult to identify the students who had dropped out of school that year, but with the return of students to in-class learning the following year, the dropout rate spiked to 6.1 percent. As for repetition in secondary schools, average rates fell by slightly less than half, from 6.2 percent in the 2019/20 school year to 3.2 percent in the 2020/21 school year. The drop could possibly be attributed to the automatic transition of students to the following academic year during the pandemic. As in the case of the dropout rate, the repetition rate increased sharply the following year (to 10.4 percent), almost doubled the pre-pandemic rate.

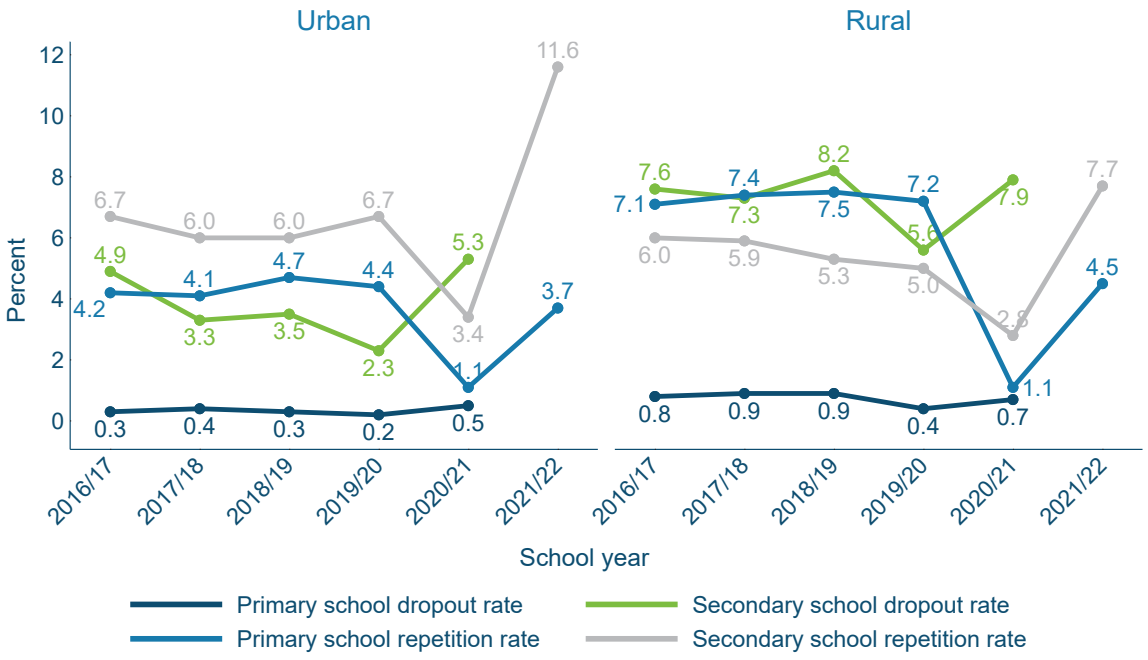
Figure 9: Student dropout rates and grade repetition by school year



At the primary school level, the average dropout rate was stable in the three years before the pandemic. In the 2019/20 school year, the average dropout rate decreased by half from the previous school year in primary schools (from 0.6 to 0.3 percent). This was followed by an increase to 0.6 percent in primary schools in the 2020/21 school year, basically returning to its pre-pandemic rate. Grade repetition among primary schoolers fell from 6 percent in the 2019/20 school year to 1.1 percent in the 2020/21 school year and then rose to 4.2 percent in the following school year (2021/22).

Analyzing the data by geographical area, we observe that primary and secondary students in urban areas were affected the most by the school closures in terms of dropout and repetition rates (Figure 10). In rural areas, dropout and repetition rates in primary schools and dropout rates in secondary schools increased in the 2021/22 school year but were still below the pre-pandemic rates. The situation of urban schools was different: the dropout rate in primary schools increased by 51 percent in the 2020/21 school year compared with the rate prior to the start of the pandemic. The average secondary school dropout rate in urban schools reached 5.3 percent in the 2020/21 school year, 1.8 percentage points more than the pre-pandemic rate. Equally worrisome is the average secondary school repetition rate in urban schools, which rose from 6.7 percent in the 2018/19 school year (prior to the pandemic) to 11.6 percent in the 2020/21 school year.

Figure 10: Student dropout and grade repetition rates by geographical area



5 DISCUSSION

Around the world, governments used school closures as a social-distancing tool during the pandemic. In Belize, school buildings were closed for approximately 170 days. Even though the government implemented various distance-learning strategies, limited access to educational technologies and shortages of pedagogical teaching skills made remote learning challenging.

Our analysis shows that the impact of the prolonged school closures on learning at the primary level of education was significant. While primary school students fell behind in both mathematics and English language, a larger learning loss was evident in mathematics. Given the nature of the analysis, it is important to consider that while the learning loss can be solely attributed to the loss of the quality of in-person classes, it may also be the result of the type of students who returned to schools while the pandemic was still ongoing. It is not possible to identify whether the students who returned were the more capable students who yearned to return to school or those whose parents had to return to work and had no choice but to send their children to school. But regardless of the type of students who returned to school the findings are worrisome since students did not learn what they would have learned in face-to-face classes; instead, moved on to the next grade less prepared and lacking necessary knowledge and skills for that level. The resulting learning gaps may affect their performance in higher grades and even put them at a higher risk of repeating grades or simply dropping out of schools because they are not able to catch up.

The analysis also reveals that high school students tend to be more at risk of repeating grades and dropping out of school than primary school students. Unfortunately, the data on characteristics of the students are insufficient to permit a more detailed analysis of the students who are more likely to repeat grades and drop out of school. Nevertheless the results are worrisome since students who repeat a grade are less likely to graduate from high school; even if they do finish secondary school, they are less likely to continue on to postsecondary education.

These shortfalls, if not dealt with at an early stage, may later translate to greater long-term challenges for students (Chetty, Friedman and Rockoff 2014, Psacharopoulos and Patrinos 2018, Currie and Thomas 2001). Hence

it is important that the government implement programs to close the learning gaps resulting from the school closures and to help students at risk of dropping out or repeating grades to stay in school and catch up on learning. It is unacceptable to have an entire generation of students held back.

The first step in trying to correct these shortfalls is to reintegrate all students in schools as soon as possible. Schools should implement health protocols to ensure the safe return of students to in-person classes. These include rearranging seating so that students are distanced from each other, wearing masks inside classrooms, washing hands regularly during the day, opening windows and doors to ventilate classrooms, implementing staggered school arrival and departure times, and adjusting recess times to differ by grade levels. COVID testing on a regular basis should also be readily available for teachers (Arias, et al. 2022).

The second step involves implementing initiatives to prevent students from dropping out of school or repeating grades. It is crucial to identify and locate children who were not able to connect to remote learning classes during school closures, students who are frequently absent from in-person classes, and students who seem to have difficulty grasping the concepts being taught. These students are most likely to drop out of school or fall behind; helping them will require different teaching and learning strategies in the classroom.

One such strategy is adaptive instruction, which uses alternative instructional strategies and materials to create a learning environment that targets the individual needs of all students. This type of instruction engages students differently depending on their learning level and can be useful in remediating learning losses among children who are most behind, while benefitting all students at the same time. “This approach differs from some models of remedial classes where students might always do below grade level work and thus never catch up, which could widen gaps between students being remedied and their grade-level peers. When done in targeted and adaptive fashion, remediation can enable attainment of foundational skills and in some cases full catch up to and beyond grade-level material” (Nälsund-Hadley and Angrist 2021).

Another strategy that can help students with greater learning losses is accelerated learning, a technique that allows students to learn grade-level

content in a shorter period of time with help when they need it ("just-in-time" support). Accelerated learning focuses on the basic grade-level skills that a student must learn; it can involve small-group instruction or one-on-one tutoring. It also allows students to control the speed and method in which they learn, which can sometimes mean going slower if the student so desires in order to reach the grade-level learning goals (Arias, et al. 2022; Näslund-Hadley and Angrist 2021).

These are only a few of the steps and strategies being implemented by governments in the region to close the learning gaps among students in primary and secondary schools in Belize. In the analysis presented here, we have sought to identify the characteristics of the schools with greater learning losses and higher student dropout and grade repetition rates, all in an effort to help Belize's government develop targeted programs for students most in need.

REFERENCES

Almeyda, Gonzalo, Ela Díaz, Gregory Elacqua, Raquel Fernández Coto, Jenny Carolina Hernández Cardozo, Ximena Dueñas Herrera, Juan Francisco Margitic, Agustina Thailinger, and Pablo Zoido Lobatón. 2022. "What We Have Lost during the Pandemic." In *How to reboot Education post pandemic? Delivering on the promise of a better future for youth*. Education Flagship Report, Inter-American Development Bank. Washington, DC.

Arias, Elena, Emma Näslund-Hadley, Verónica Frisancho, and Evelyn Vezza. 2022. "Taking Education Where It Needs to Be." In *How to reboot education post-pandemic? Delivering on the promise of a better future for youth*. Education Flagship Report, Inter-American Development Bank. Washington, DC.

Belize Ministry of Education. 2022. "Abstract of Education Statistics 2021-2022." Policy, Planning, Research, and Evaluation Unit, Ministry of Education, Culture, Science, and Technology, Belize.

Belize Ministry of Education. 2021. "Belize Education Sector Plan: 2021-2025." Policy, Planning, Research and Evaluation Unit, Ministry of Education, Culture, Science and Technology, Belize.

Belize Ministry of Education. 2020. "Estimate of Student and Teacher Access to Technology." School Readiness Study, Ministry of Education, Youth, Sports, and Culture.

Chetty, Raj, John Friedman, and Jonah E. Rockoff. 2014. "Measuring the Impacts of Teachers II: Teacher Value-Added and Student Outcomes in Adulthood." *American Economic Review* 104 (9): 2633–2679.

Currie, Janet, and Duncan Thomas. 2001. "Early test scores, school quality and SES: Longrun effects on wage and employment outcomes." *Research in Labor Economics* 20: 103–132.

Näslund-Hadley, Emma, and Noam Angrist. 2021. "Accelerate Learning for All-Education in Latin America and the Caribbean over the Next Several Years." *Enfoque Educación* (Blog). September 9, 2021. https://blogs.iadb.org/educacion/en/accelerate-learning-for-all-education-in-latin-america-and-the-caribbean-over-the-next-several-years/.

Parker, Malaka, and Pablo Alfaro. 2022. "Education during the COVID-19 pandemic: Access, inclusion and psychosocial support." *Studies and Perspectives* no. 104, ECLAC Subregional Headquarters for the Caribbean, Economic Commission for Latin America and the Caribbean (ECLAC), Santiago, Chile.

Psacharopoulos, George, and Harry Anthony Patrinos. 2018. "Returns to investment in education: A deccenial review of the global literature." *Education Economics* 26 (5): 445-458.

United Nations Children's Fund. 2021b. "LACRO COVID-19 Education Response: Update 25, Status of School's [sic] Reopening." Released on June 7, 2021.

United Nations Children's Fund. 2021a. "LACRO COVID-19 Education Response: Update 23, Status of School's [sic] Reopening." Released on April 5, 2021.

United Nations Children's Fund. 2022. "LACRO COVID-19 Education Response: Update 33, Status of School's [sic] Reopening." Released on March 31, 2022.

Database Sources

Belize Primary School Exam (PSE). National database 2016/2017 to 2019/2020. Ministry of Education, Culture, Science, and Technology, Belize.

Belize Junior Assessment Test (BJAT). National database 2014–2018. Ministry of Education, Culture, Science, and Technology, Belize.

Belize Diagnostic Assessment Test (BDAT). National database 2020/2021. Ministry of Education, Culture, Science, and Technology, Belize.

Belize Diagnostic Assessment Test (BDAT). National database 2021/2022. Ministry of Education, Culture, Science, and Technology, Belize.

Belize Total Dropout and Repetition. National database 2016/2017 to 2020/2021. Ministry of Education, Culture, Science, and Technology, Belize.

Belize Total Enrollment. National database 2016/2017 to 2020/2021. Ministry of Education, Culture, Science, and Technology, Belize.