Evaluating Education:
Normative Systems and Institutional Practices

Nuno Crato
Harry Anthony Patrinos *Editors*

Improving National Education Systems After COVID-19

Moving Forward After PIRLS 2021 and PISA 2022

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Evaluating Education: Normative Systems and Institutional Practices

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Editors

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Preface

This book is one of the few, or even the first, to be published after the release of the results of the two latest international student assessments (Progress in International Reading Literacy Study, or PIRLS, 2021, and Programme for International Student Assessment, or PISA, 2022). As so, it is the first one to provide a global assessment of the devastating impact of the COVID-19 pandemic on student learning as measured by independent international comparative surveys.

One reason only made it possible for us to present this work to the reader with such a short delay after the release of the PISA results in December 2023: we were truly fortunate to be able to gather an exceptionally knowledgeable and generous group of international experts.

The 12 countries discussed in this volume represent a wide variety of educational systems—including Chile, Ecuador, England, Estonia, Italy, the Netherlands, Poland, Portugal, South Africa, Spain, and the USA. We have high performers; countries that perform at the OECD mean; and countries that are struggling to attain the OECD average. Each country has its history that reflects efforts to cope with pandemic school closures and improve educational achievement.

After the introduction, each chapter of this book concentrates on one country. Countries are presented in alphabetical order. Each one is discussed by one of its foremost national experts, some of them with experience in government or in advising governments, many of them with experience in international organizations, and quite a few served as national representatives for international assessments. If the reader peruses the biographic notes of each contributor, they will be as pleased, as we were honoured, when all of them accepted our invitation to contribute.

The idea for this book came about when we had the privilege of convening a roundtable on PIRLS and PISA results at the Lisbon Economics and Statistics of Education (LESE) meeting in 2024. It took place at the Lisbon Economics and Business School of the University of Lisbon, ISEG. It was the seventh meeting of this biennial conference, and five authors of this book were present. We immediately felt that the diversity of experiences and the independence of spirit of the participants enriched tremendously the analyses presented for individual countries. We had the

idea of preparing a contribution that could discuss the learning losses and what to do to counteract them. The outcome is this collective work.

The book is organized as follows. Each chapter is a data-based essay about the evolution of a specific country, discussed and supported by PISA and/or PIRLS results and other data, and represents the personal stance of the authors. Thus, each author represents his or her own views and not those from his or her institution or government. Each author draws on published data, as well as on a vast set of information, and supports his or her view with data and reliable information.

The introductory chapter gathers our synthetic reading of the 12 chapters. It follows the same principles: we express our views freely but support them with the best information available. We do not claim to voice the opinion of the authors and we are solely responsible for what we wrote.

We are honoured to edit this book and feel sure that it will be useful to all those interested in understanding what it takes to improve a country's education system.

Lisbon, Portugal — Nuno Crato
Washington, D.C., USA — Harry Anthony Patrinos
June 2024

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We are all grateful to the Springer editor Claudia Acuna and the reviewers below, who helped improve this collective work. Needless to say, they are not accountable for any insufficiencies or views expressed in this book.

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Chapter 1
PIRLS 2021 and PISA 2022 Statistics Show How Serious the Pandemic Losses Are

Nuno Crato and Harry Anthony Patrinos

Abstract PIRLS 2021 and PISA 2022 are the first international large-scale surveys that assessed students worldwide after the COVID-19 pandemic school closures. As expected, they reveal devastating learning losses for students of most countries and regions although in a few of them average results were able to progress despite the pandemic. For many countries and regions, the recent student learning losses add to previous losses. This chapter discusses these setbacks and highlights the main conclusions from different countries' experiences. Unsurprisingly, the key factors are the curriculum, which needs to be streamlined and made more rigorous and better structured; the assessment, which needs to be regular, frequent, and to combine national standardized testing with formative tools; and the targeted support for struggling students.

1.1 Seventy Years of International Large-Scale Assessments

Modern international surveys of student knowledge and skills stem from the First International Mathematics Study (FIMS), held in 1964, involving 12 countries and organized by the International Association for the Evaluation of Educational Achievement (IEA). Following these first efforts, the IEA launched an additional series of international studies, of which the two most successful are the Trends in International Mathematics and Science Study (TIMSS) and the Progress in

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International Reading Literacy Study (PIRLS). TIMSS has been held every four years, starting in 1995, and PIRLS every five years, starting in 2001.[1]

In 2000, the Organization for Economic Co-operation and Development (OECD) promoted the Program for International Student Assessment (PISA), which became the better known of all these so-called International Large-Scale Assessment (ILSA). PISA is held every three years, but it was not held during the pandemic, so PISA 2022 is the latest. Every wave or cycle of PISA encompasses three core domains, reading, mathematics, and science, but focuses on one of these three.

PIRLS and PISA studies have a set of common characteristics. Country participation is voluntary, and each country pays the costs of its participation and organizes the application of the surveys following common rules supervised by the promoting organization. Students are selected using a multi-stage random sampling method. Most test questions are confidential to allow it to be reused across different survey rounds for longitudinal calibration purposes.

Although each survey focuses on specific cognitive skills, each yields data on a large variety of issues, such as teaching methods, students' perception of their abilities, and students' social and economic background.

PISA, on one hand, and TIMSS and PIRLS, on the other, differ regarding the selection of students and the intended measurements. PISA is age-based, surveying 15-year-old students regardless of their grade and the type of study program that they are taking, whereas TIMMS and PIRLS are grade-based, with TIMSS testing 4th and 8th grade students and PIRLS testing 4th grade students. While PISA tries to assess applied knowledge and skills, or literacy, in a generic sense, TIMSS aims to be curriculum-sensitive and so tries to measure achievement based on an internationally agreed set of basic knowledge.

Many countries have been participating in some of these international tests for decades, thus accumulating a series of results that make it possible to assess their progress over time and estimate the impact of their implemented educational policy measures. Given the complexity of intervening factors, causality is always difficult to establish, but the time series are now longer than political cycles (usually four or five years) and longer than a student's compulsory schooling (usually nine to 12 years), which make it possible to help analyze the impact of educational policies.

One excellent example is a study performed by one of the contributors to this volume and his co-authors (Bergbauer et al., 2021), which shows the impact of standardized testing on students' cognitive skills. Taking advantage of the panel data structure of the survey results and using countries' performance in PISA waves, the authors showed that "standardized testing with external comparison, both school-based and student-based, is associated with improvements in student achievement." They also revealed that this effect is stronger in low-performing countries and that relying on internal testing without a standardized external comparison does not necessarily lead to any improvement in student achievement.

[1] This introduction first paragraphs draw from a previous work by one of the authors (Crato, 2021) and from IEA (2018).

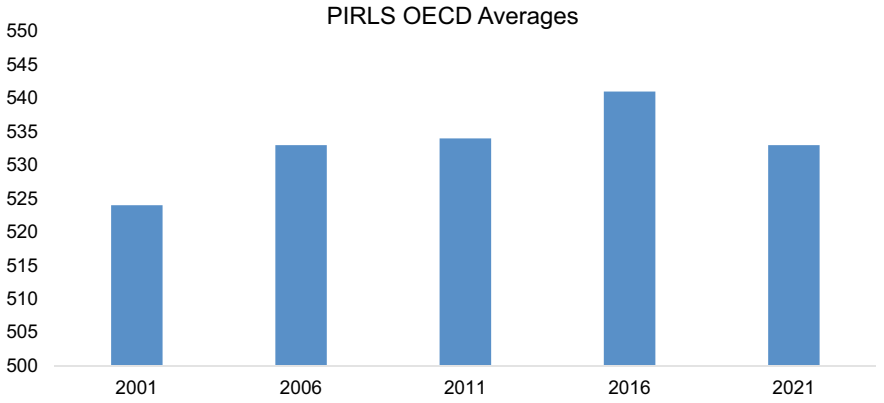

Fig. 1.1 Evolution of PIRLS Results for OECD countries. Evolution of PIRLS Results for OECD Countries that have participated in all PIRLS waves. Raw data retrieved from Mullis et al. (2023) and IDE database. https://nces.ed.gov/surveys/pirls

1.2 PIRLS 2021 and PISA 2022

PIRLS 2021 report was the first international large-scale survey done after the pandemic. It included 57 countries and eight benchmark participants. PIRLS 2021 differs from previous PIRLS waves as it started the transition to digital assessment. This time, PIRLS data collection occurred over two years, providing only one to date internationally comparative fourth grade results after the pandemic. In Fig. 1.1, we show the averages for the OECD countries. As the countries that participate in PIRLS have changed significantly from wave to wave, we have chosen OECD countries for comparability.

As usual in these types of assessment studies, data are normalized from the initial scores of students in the first wave (2001) by adjusting a Gaussian distribution with a mean of 500 and a standard deviation of 100 points. It is difficult to translate the scores in terms of years of study, but making a parallel with PISA assessments, one can fathom that 20–30 points may be equivalent to one school year of students' progress (Avvisati & Givord, 2023; OECD, 2009, 2019). Data shows a modest but steady increase along the various study waves, and a drop of 8 points in 2021.

One year later, we witnessed the release of PISA 2022 data. About 700,000 students from 81 participating countries and economies representing about 29 million 15-year-old students performed the test. This time, most of the students answered the questions on computer. The core domain was mathematics, although the survey also covered the other two main domains, reading and science.[2]

Using as a reference the first cycle in which each subject (reading, mathematics, and science) was the main one to be studied, PISA normalized the initial scores of students from the then participating OECD countries by adjusting a Gaussian

[2] For a quick overview, essential data are reported in OECD (2023a).

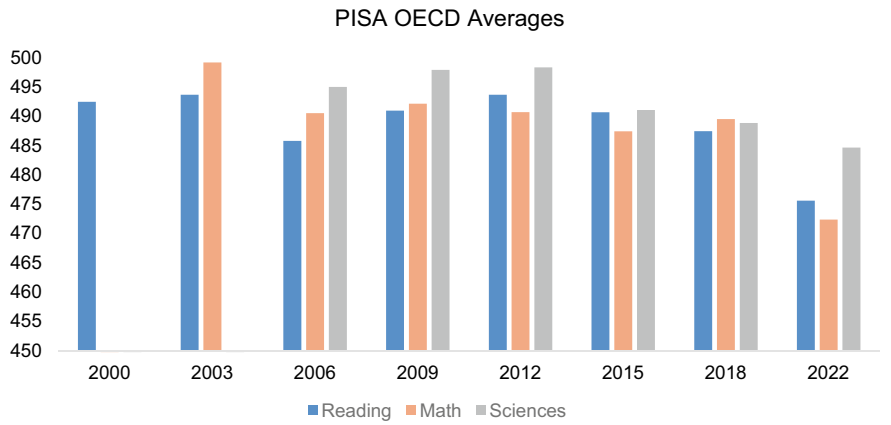

Fig. 1.2 Evolution of PISA Results for OECD countries. Evolution of PISA Results for OECD Countries. PISA OECD countries averages include countries that have participated in all PISA waves. Raw data retrieved from OECD IDE database. https://nces.ed.gov/surveys/pisa/idepisa/report.aspx

distribution with a mean of 500 and a standard deviation of 100 points for each subject. OECD countries' results have been declining slightly but steadily since 2009 as can be seen in Fig. 1.2. Decreases in the scores for mathematics are noticeable since 2003.

In 2022, we notice more pronounced decreases, especially in reading and math. But all this means that there are two factors to take into consideration. The first is that education in OECD countries is finding lower and lower results as reported by PISA scores. This is no minor fact, which indicates for most developed economies serious problems in the preparation and training of the young generations. The second factor to take into consideration is that after the pandemic the situation became much worse.

These two factors are both very important. The worsening situation after the pandemic should not make us forget about the previous regressive trend. There are factors, namely policy measures, that need to be thought over and this discussion should not be forgotten by blaming all problems on the pandemic.[3] By the same token, the negative trend should not lead us to forget the seriousness of the new situation we are facing. In many regions, the situation is much worse than before, and we cannot forget the need to take appropriate measures. The difference between the average scores in mathematics in 2003 and 2012 amounts to a loss of about half of a school year.

To simplify the interpretation of results, the PISA scale is categorized into six ordinal proficiency levels. The minimum level is 1, although students can still score below the lower threshold of level 1. The maximum level is 6, with no ceiling. Mean

[3] A similar point is made by Schnepf and Granato (2023) regarding decline in reading achievement in European countries.

scores are included in level 3. Students scoring below level 2 are considered low-performers, while those scoring above level 4 are considered high-performers. In 2015, recognizing the worrying number of low performers and the need to differentiate those students, PISA subdivided level 1 into 1a and 1b. In 2018, PISA introduced an additional third level, 1c.

In 2009, the European Union's strategic framework for co-operation in education and training set as goal for 2020 that "the share of low-achieving 15-year-olds in reading, mathematics, and science [as measured by PISA] should be less than 15%" (European Council, 2009, pp. C 119/2-10). This goal is far from achieved and is not even in sight. The share of low performers in the European Union has been slightly increasing and, in 2018, the last PISA wave before 2020, it reached the average of 22% in reading, mathematics, and sciences. Not only was this target not attained by 2018, but the European Union has since moved further away from this target. Then, in 2021, the European Council adopted a new resolution (2021/C 66/01) setting the same 15% target for 2030 and in the exact same terms as the previous 2009 resolution.

In 2015, the United Nations defined in their Sustainable Development Goals for 2030 a minimum proficiency level that all children should acquire in reading and mathematics by the end of secondary education (United Nations, 2015, goal 4.1.1.). This minimum level is assumed to correspond again to proficiency level 2 (OECD, 2019, p. 105). The goal is not even in sight, and it is difficult to understand the realism in its formulation. In 2022 and just for the OECD countries, which in general should perform not worse than the remaining countries, the average fraction of low performers for reading, mathematics, and science were, respectively, 26, 31, and 25%.

1.3 COVID-19, School Closures, and the Devastating Aftermath in Terms of Student Learning

Learning loss refers to the decline in student academic achievement during the COVID-19 pandemic. By 2022, student achievement was significantly below pre-pandemic levels. Data from PIRLS and PISA revealed one-half to one year of learning has been wiped out in just two years (Jakubowski et al., 2023, 2024).

The causal estimates of learning loss relied on national studies that followed up students or a cohort or a grade over time using standardized assessments. Thus, they were quasi-experimental with a valid counterfactual and an exogenous shock—the unanticipated school closures due to the COVID-19 pandemic—and were measured carefully. Most reviews put the losses between 0.14 and 0.20 standard deviations, or likely one-half to full year of learning loss (Table 1.1). A typical specification of learning loss would be:

$$Y = \alpha + \beta \text{COVID} + \gamma X + \varepsilon,$$

as in the case of Italy, where Y is the learning loss expressed typically in standard deviations (in PISA, about a 0.25 SD is considered equivalent to a year's worth of schooling), COVID represents the exogenous shock measured by the advent or duration of school closures, X are control variables, and α is the constant, β is the coefficient of learning loss, and ε is an error term.

While declines were seen in most countries, not all students were affected equally. Students who remained at home for remote learning suffered more learning loss than students who returned to the classroom for in-person learning. Students from very poor backgrounds had steeper declines than students from middle-class and affluent backgrounds. Minority students fared worse than others. Students who were already struggling academically had significantly more learning loss than students at or above grade level. Learning loss seems to have the strongest association with the amount of time spent in remote learning. The longer students were out of school, the greater their learning loss (Patrinos et al., 2023; Székely et al., 2024).

These learning losses were largely the result of poor policy planning during the pandemic. Most students were not at high risk from COVID, meaning they could have returned to school with some precautions (Munro et al, 2023). Children were among the groups who were least affected in terms of negative health outcomes, yet they suffered the most significant disruptions, including the closure of schools.

Table 1.1 Reviews of reviews of learning loss in national and international studies

	No. of countries		Learning loss in SD
	Total	Developing countries	
Donnelly and Patrinos (2021)	7		0.13
Hammerstein et al (2021)	11	1	0.10
Storey and Zhang (2021)	5		0.15
Konig and Frey (2022)	18	2	0.18
Zierer (2021)	5		0.14
Betthauser et al. (2023)	15	4	0.17
Sabarwal et al. (2023)	22	9	0.17
Patrinos et al. (2023)	41	19	0.17
Di Pietro (2023)	41	5	0.19
Dela Cruz et al (2024)	36	21	0.16
Average			0.16
PIRLS			
Kennedy and Strietholt (2023)	29	4	0.17
Jakubowski et al. (2023)	55		0.33
PISA			
Jakubowski et al. (2024)	71	29	0.14
Global average			0.20

Students could have returned to the classroom much sooner, but resistance from some groups stalled this return.

Addressing learning loss is the education policy challenge of our time. High dosage tutoring must be available for students who are behind (Fryer & Howard-Noveck, 2020). Online tutoring and other low-cost technological solutions worked well during the pandemic (Angrist et al, 2023a, 2023b; Carlana & La Ferrara, 2021; Gortazar et al, 2024; Zoido et al., 2024).

Countries will need to use their resources to fund these initiatives. Without serious and intensive intervention, it will take years for students to recover from pandemic-era learning loss. We have seen this happen before, whether due to past pandemics, natural disasters, or wars (Psacharopoulos et al., 2021). The negative effects of pandemics include disability, morbidity, and mortality as well as reduced educational attainment, earnings losses, and reductions in economic output. The 1918 influenza generated impacts that arguably lasted into the 1980s (Almond, 2006). Other crises that result in school closures have also provided insights into the impacts on the labor market outcomes of affected cohorts. A few cases of long-term, nationwide school closures have been found to result in learning losses in the form of increased grade repetition and lower educational attainment (Baker, 2013; Belot & Webbink, 2010). School disruptions due to war and teacher strikes have been associated with projected annual earnings losses of between 2 and 3% over the course of the affected students' lifetimes (Ichino & Winter-Ebner, 2004; Jaume & Willén, 2019). Exposure to civil conflicts and wars also reduces schooling and depresses earnings (Galdo, 2013; Islam et al, 2016; Patrinos, 2022).

1.4 A Different Type of Problem

Many people still look at the Covid-19 school closures and the consequent learning losses as something in the past and tend to think in the following way: *Students did not progress as usual for some social skills, they did not get some types of knowledge and some types of skills, but they will recover; it may take some time, but recovery will naturally happen as schooling progresses.* Many mature adults who suffered during the pandemic but got back to their normal lives project their own experiences onto students' life. Some policymakers also think like this.

The situation is much more serious, and time is running out, as Bradley and Hanushek explain in their chapter on the United States in this book. There is a substantial risk that the losses will become permanent. We are not resuming normal life in the same way in which a movie resumes after a theatre interval. School closures and the interruption of normal school life left many profound scars that will linger. As Oates explains in his chapter on England, problems may persist until 2030 or even later.

There are cognitive losses that are hard to regain quickly as there are no speedy ways to make up for basic unacquired knowledge. A student who did not learn the basis for geography and cannot recognize the oceans and continents will take a long

time to overcome these deficiencies as the curriculum progresses. Without being explicitly taught these basic facts, this student will eventually absorb them as the class is studying countries and rivers, but this will take longer, and many gaps are likely to remain.

As the great American education psychologist David Ausubel explained, "The most important single factor influencing learning is what the learner already knows." He continued by recommending teachers to first ascertain what the student already knows and then "teach accordingly" (Ausubel, 1968). This means that what the learner does not already know is an impediment to acquiring additional knowledge.

Students' cognitive losses are uneven. Consequently, it is more difficult for teachers to keep students learning in tandem at approximately the same pace. Interacting with students, questioning, and formative assessments are intrinsic parts of good teaching. However, these student assessment activities are incomplete when not supported by external standardized testing.

As van der Berg and Böhmer stress in their chapter on South Africa, different student cohorts have different deficiencies, mostly related to which curriculum topics they were taught during the pandemic years. This means that a teacher who one year teaches a certain grade will face certain challenges and will try to adapt to them, but the following year will teach the same grade with different students and will face different challenges. This is creating extreme difficulties for teachers.

Internal assessments unsupported by external standardized valid assessments tend to be biased towards local conditions and tend not to reflect global learning goals, as Hofflinger and coauthors explain in the chapter on Chile and as Marôco reinforces in the chapter on Portugal. This means that as students progress from one grade to the next, new teachers will likely have an incomplete assessment of their levels of learning.

During the pandemic, student wellbeing deteriorated, socio-psychological problems increased, and students' ability to adapt to collective classwork suffered as various authors in this volume describe. In their chapter on Poland, Jakubowski and Gajderowicz show that schools are now facing many different types of student wellbeing problems. As Oates points, teachers are now trying to teach students with underdeveloped study habits and a higher propensity to be affected by stressful conditions. Up to a certain point, some stress, and some difficulties in adapting to schoolwork are normal for youngsters, but these problems appear to have increased abnormally, which compounds the difficulties involved in overcoming learning losses.

A few exogenous negative trends have become apparent after the pandemic. Both teacher shortages and strikes are becoming increasingly frequent as is discussed throughout this book. Both student and teacher absenteeism has increased, particularly in Chile, England, and the US. Leniency and complacency about student performance has also tended to increase as discussed in the chapters on Chile, Estonia, Portugal, and Spain. During the pandemic, as is described in the chapter on Chile, teachers and schools became more lenient towards students' efforts, which meant that, while grades increased, actual attained learning—as measured by standardized assessments such as PISA—decreased. When students work is assessed only by their

teachers, it is likely that those learning measurements are biased upwards, as reported in the chapter on Spain.

1.5 We Cannot Act on What We Ignore

Not surprisingly, the international experience during and after the pandemic has highlighted the importance of valid student assessment. Some countries, such as the Netherlands, maintained regular standardized national testing during the pandemic period, and this has enabled them to understand the problems that they face.

Other countries decided to suspend national exams and other standardized tests but soon resumed the assessment procedures; they should not be surprised by the negative PISA results. The US maintained their National Assessment of Educational Progress (NAEP) tests and witnessed parallel downward movements of NAEP and PISA scores.

A third group of countries, namely Spain and Portugal, as reported in the relevant chapters, already had changed to poor systems of assessment, and suspended some of the standardized tests during the pandemic. It is not yet clear whether they are going to resume regular testing or are seeing this break as an opportunity to avoid assessment.

This issue is profoundly serious, as these and other countries are experiencing a double blow. The decline in learning due to the pandemic losses is being compounded by a decline in learning due to curriculum or other education policy issues or more general social problems. As Marôco warns in his chapter, in the absence of clear assessments that can disentangle the complicated causes of learning losses, there is an increased risk that faulty education policies will not be corrected, leading to further deterioration of the education system. If countries do not reinstate serious national student assessments, this is likely to have terrible consequences for student learning. The experiences of various countries highlight the importance of reinstating assessment as a priority. Also, in some countries, the assessment procedures have been undermined, which complicates matters. Regular, frequent, and standardized student assessments are needed now more than ever. We cannot act on what we do not know.

Even in countries where national exams have continued, the results can be biased, as reported in the chapter on Ecuador. This bias can reach serious proportions, as reported in the chapter on Portugal. Internal assessments organized by Portugal's Ministry of Education were systematically biased upwards, in such a way that they seemed to show that students' knowledge and skills had improved with school closures. For Portugal and other countries, the disclosure of their PIRLS and PISA results was a shock.

Although Estonia' education has also suffered from the pandemic, the country maintained a policy of high expectations and rigorous external assessments. As Tire explains in her chapter, Estonia considers their national exams to improve student results. Even so, as the national tests were temporarily changed from high to low stakes during the pandemic, it was observed that students reduced their efforts.

The assessment system is a comprehensive structure with many interconnected and mutually reinforcing components. Formative assessments by teachers during normal classes prepare students for summative assessments done by teachers and schools and for national exams. These national exams set the level of rigor and the tone for tests in schools and for daily activity in classes. This top-down effect calibrates the degree of difficulty at all levels of schooling and all types of assessment (Koretz, 2008, p. 23). As has been well documented, tests can be geared towards long-term retention and deep learning or towards short-term retrieval and shallow memorization (Carpenter et al., 2022). National exam makers have an immensely important responsibility to ensure that their tests evaluate deep learning. Assessment has always had a vital part to play in maximizing learning, but it is now more important than ever to counteract the cumulative learning losses that are afflicting countries around the world.

Policy impact evaluation should also be part of countries' collective efforts. Substantial financial efforts should be accompanied by evaluation of their results. In the US, for instance, massive amounts of funding have gone to schools through the Elementary and Secondary School Emergency Relief (ESSER) Fund in 2020; the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) in 2020; the Coronavirus Response and Relief Supplemental Appropriations Act of 2021; and the American Rescue Plan Elementary and Secondary School Emergency Relief ion 2021 (Jack & Oster, 2023). The first two funding allocations to the ESSER Fund from CARES and CRRSAA (ESSER I and ESSER II) totaled $13 billion and $54 billion. The third federal relief package, however, allocated over $122 billion dollars to the ESSER Fund as part of the American Rescue Plan (ARP ESSER). The results of these ESSER investments, and the extent of the hoped-for recovery of test scores in general, remains unclear. Overall, the literature on recovery of test scores is still underdeveloped. Unfortunately, this is another example where limited data infrastructure may affect our ability to learn from the data. Despite these very large U.S. federal expenditures, little effort has been made to document how these funds are being spent. As a result, it may be difficult (in the short or even the long term) to point to any approach to recovery that has worked better.

1.6 Conclusion: Improve Education Quality

There is only one general way of counteracting students' learning losses and recovering lost time. This way forward is to improve the quality of the education system. Not surprisingly, the first crucial element of this effort is to improve the curriculum. As described in the chapter on the Netherlands and referred to in others, the national curriculum can be simultaneously streamlined, by centering on the basic subjects that are crucial for students' continued progress, and made more demanding, by increasing the level of knowledge taught and the rigor of each subject. Fluency in reading and arithmetic are foundational, and the more thoroughly they are established, the more likely students will be to absorb more advanced knowledge. This is

also the case for more advanced subjects and topics. At this crucial time, we cannot lose our focus on basic knowledge and skills.

In many countries, the curriculum does not follow a clear progression as subjects have been added at different times and sometimes in a haphazard way. Therefore, the first recommendation stemming from the research discussed in this book is that the shakeup of education because of the pandemic is an opportunity for *revising the curriculum* to re-center it on the basic subjects, to clarify the learning goals, and to improve its sequencing.

The second recommendation that stems from the numerous studies in this volume is to *improve the assessment system.* Assessments are not only a way of knowing where countries stand after the learning losses but also a way to monitor and improve education. The moment calls for increased monitoring of both face-to-face and supplementary online teaching, as various authors of this volume have stressed, particularly in the chapters of Italy and the Netherlands. The chapter on Ecuador and others add that, while assessments help to improve the education of all students, this is particularly the case for low-performing students.

The third recommendation that comes from our reading of the various chapters is the need to *not fall to the temptation of lowering standards*, as Tire eloquently explains. The solution to tackling the problems of low-performing areas and low-performing students is to provide clearly targeted interventions, as Oates explains and as the experiences of other countries such as Ecuador and Poland also show.

A very efficient way of supporting students that has recently been the subject of much discussion is *tutoring*. This is especially helpful for low-performing students as a way of helping them to reach class levels. Volunteer tutoring by college students has proven to be highly effective, as the authors of the chapters on Italy and the US stress and other authors of this volume confirm. The chapter on Portugal raises an alert about a tendency to replace cognitive tutoring by just emotional mentoring. Although the latter may be needed, the former is essential to address the students' cognitive deficiencies directly, while also having the potential to support their social and emotional needs. Experience also indicates that incentives to teachers to tutor low-performing students has proven to be remarkably effective.

Other ways of supplementing teaching have been tried in different countries, including extending teaching hours, and reducing summer breaks. These alternatives have often been met with opposition from unions and parents alike, but they can be very effective, as described in the chapter on Italy.

Finally, another way of improving education would be to educate and hire more efficient teachers. Bradley and Hanushek make this point in their chapter. However, this may be even more difficult today than it has been in the past due to the current lack of teachers in both developed and developing countries.

To sum up, this book provides further evidence of the learning losses resulting from the pandemic and grounds them in data from recent international studies (PIRLS and PISA). Unfortunately, it seems today that few countries have answered this challenge with evidenced-based policy measures to stimulate learning recovery, while many have simply continued to operate as they did before the pandemic.

Previously published reports, such as the World Bank's *Learning Recovery to Acceleration* (Sánchez et al., 2023), have already alerted the education world to these problems and pointed out solutions that are largely aligned with our findings. We hope that this book's additional evidence constitutes a further alert and a call to better study recent ILSA data and to put in place the emergency policies needed to revive learning around the world.

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Chapter 2
Chile: From Closure to Recovery: Tracing the Educational Impact of COVID-19

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Abstract This chapter analyzes the effects of school closures in Chile, the nation with the longest period of school closures among OECD countries. Using data from PISA (national level) and SIMCE (student level) in 2022, we examine the association between school closures and students' GPA, attendance rates, and math and reading scores. Our findings show that, on average, students' attendance rates and math and reading scores experienced a decline, while their annual GPA increased after 2020. The results also show that school closures affect students differently depending on their demographic and socioeconomic backgrounds.

2.1 Introduction

Between 2020 and 2022, Chile maintained its schools fully closed for 259 days as a measure to slow the spread of COVID-19. During the school shutdown, some students had access to remote learning, while other students, for example those in rural areas, had no class at all but were expected to independently complete tasks at home. This chapter aims to provide a comprehensive analysis of the COVID-19-related school closures, examining the multifaceted aspects of how the pandemic affected student learning and overall educational outcomes in Chile. The disruption led to a critical

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juncture in education and calls for an in-depth evaluation of the strategies employed during this period and their effectiveness.

School closures required a redistribution of students' time at home to accommodate learning-related activities. Research indicates significant differences in time use and engagement in study-related activities among students and families of different socio-economic levels, further exacerbating existing disparities. Students from lower socio-economic backgrounds spent far less time learning at home compared to their middle and high-income peers, whose time spent learning at home was two to three times that of their peers from poorer households. Due to the socioeconomic conditions of their families or schools, these students faced greater difficulty accessing active support and adequate educational resources and tools, such as consistent teacher support, computers, online classes, or digital learning materials (Andrew et al., 2020; Dietrich et al., 2020; Jæger & Blaabæk, 2020).

The assessment of learning losses and student outcomes, including grades, attendance, and dropout rates, during the COVID-19 pandemic is crucial for understanding the full impact of prolonged school closures and remote learning (Patrinos et al., 2022; Singh et al., 2022). Moreover, these consequences will be worse for non-white students, ethnic minorities, rural dwellers (due to connectivity issues), and students with disabilities (Azevedo et al., 2021; Lichand et al., 2022; Monge, Hernández, & Arenas, 2020; Pérez-Mora & Moreno, 2021). The pervasive learning losses reflect a significant educational setback, especially in core subjects like reading and mathematics (Hammerstein et al., 2021; Kaffenberger, 2021; Kogan & Lavertu, 2021; Kuhfeld et al., 2020, 2022). This is not just a short-term academic crisis but a long-term challenge with potential lifelong implications for the affected students. For example, research indicates substantial deficits globally, with an average learning loss representing 35% of a normal school year's learning (Betthäuser et al., 2023). These educational setbacks are not just numerical figures; they translate into diminished capabilities in literacy and numeracy, which are foundational skills essential for future learning and success in the job market.[1] Therefore, assessing these losses is vital to quantify the extent of the impact and to tailor recovery strategies that address these specific areas of deficit.

Additionally, the pandemic has underscored disparities in educational access, with a marked increase in absenteeism and dropout rates among students from lower socio-economic statuses, rural areas, and indigenous communities. These trends

[1] Attendance and dropout rates are equally critical indicators of the pandemic's impact on education. The shift to remote learning, while necessary, exacerbated existing inequalities, particularly affecting students from lower socio-economic backgrounds, rural areas, and indigenous communities. These groups often lacked access to essential learning resources, including internet connectivity and support materials, leading to higher absenteeism and increased risk of dropping out. The alarming rise in dropout rates, as reported in various countries, not only disrupts the educational trajectory of individual students but also poses a broader societal concern. Increased dropout rates have been linked to a range of negative outcomes, including lower future earning potential, poor physical and mental health, and higher likelihood of engagement in risky behaviors. Therefore, monitoring these rates is imperative to identify at-risk populations and implement targeted interventions, such as re-engagement programs and infrastructure improvements, to bring these students back into the educational fold and mitigate the long-term effects of educational disruption (OECD, 2023).

threaten not only individual educational progress but also have wider societal implications, including reduced future earning potential and increased health and behavioral risks. The broader socio-economic implications of these educational disruptions are profound, potentially leading to decreased future income and heightened poverty levels, especially among vulnerable groups. Studies predict a reduction in relative income for students affected by the pandemic, with a more pronounced effect on vulnerable groups (Azevedo et al., 2021; Hanushek & Woessman, 2020; Bracco et al., 2022).

Policymakers and educators must use assessments of learning losses and attendance rates to inform a comprehensive response, ensuring educational recovery and socio-economic stability in the post-pandemic era. This information is essential because, as researchers have shown, the most consequential effects of the pandemic will be experienced in the long run, during the student's lifetime. Consequently, academics and policymakers must better understand these effects.

Our exploration starts with a brief review of the global repercussions on student learning resulting from the COVID-19-related school closures. Then, we focus on the post-pandemic educational landscape in Chile. First, we investigate the immediate effects of school closures on student academic achievement, attendance records, and overall grade point averages. Second, we delve into the factors that fueled educational disparities, highlighting the intensified inequities faced by diverse student populations. Finally, we draw broader policy implications and propose viable strategies for the recovery and advancement of Chile's education system in the wake of the pandemic's enduring legacy.

2.2 The Chilean Case

2.2.1 Efforts and Policy Decisions During the Pandemic

In an effort to curb the spread of COVID-19, educational institutions worldwide were closed. Latin America and the Caribbean was among the regions with the longest duration of school closures, averaging a total of 146 days (UNICEF, 2021). For instance, from March 2020 to February 2021, schools in Panama were closed for 211 days, El Salvador for 205 days, Bolivia for 192 days, Brazil for 191 days, Costa Rica for 189 days, Mexico for 180 days, Venezuela for 170 days, Ecuador for 169 days, Guatemala for 165 days, Paraguay for 158 days, and Honduras for 147 days (UNICEF, 2021). In contrast, Uruguay experienced school closures for only five weeks during 2020 (Gottlieb, 2022).

In Chile, the Ministry of Education (Mineduc) launched various initiatives to support teachers and families during the pandemic. Notable among these was the "Aprendo en Línea" digital platform, which provided content and materials for students, teachers, and guardians across different educational levels and modalities.

Other initiatives included the creation of the "TV Educa Chile" educational television channel, the distribution of printed educational materials to students, assistance to institutions for the effective use of digital tools, and the provision of technological devices to students and educational establishments (Centro de Estudios, Ministerio de Educación, 2020a, 2020b; Ministerio de Educación, 2020).

In response to concerns raised by international organizations such as the United Nations, UNESCO, and UNICEF about the negative consequences of prolonged school closures, the Mineduc encouraged the return to in-person schooling at the start of the 2021 academic year. This included prioritizing the vaccination of education workers, providing students with COVID-19 school insurance which covered medical care for the Coronavirus, distributing health care kits, setting a budget of 186 billion for infrastructure, and creating funds such as the "Yo Confío en mi Escuela Fund" for public schools needing infrastructure improvements and the "Apoyo para el Retorno Seguro" Fund for public and private subsidized institutions requiring sanitary protection resources. From the second semester of the 2021 academic year, educational establishments gradually returned to in-person teaching (Ministerio de Educación, 2022a).

Following the 2021 reopening, the government developed plans and programs focused on addressing the negative impacts of school closures. During 2022, the Mineduc initiated the Comprehensive Educational Reactivation Policy "Seamos Comunidad," comprising a series of measures aimed at addressing issues like school coexistence and mental health, learning recovery, improvement of educational infrastructure, connectivity, and student retention. Various programs were implemented, including the, "Territorial de Convivencia Escolar, el Plan Nacional de Tutorías, la Estrategia de Fortalecimiento de Lectura, Escritura y Comunicación Creativa," and workshops on coexistence and well-being for teachers. To tackle the issues of dropout and absenteeism caused by the pandemic, attendance reports were sent to public and private subsidized private schools, along with guidelines for re-engaging students (Ministerio de Educación, 2022b, 2022c). In 2023, the Ministry of Education announced an expansion of the educational reactivation plan, allocating additional resources. The plans included setting up re-entry classrooms, extending the tutoring program, and increasing coverage of the Connectivity 2030 program (Ministerio de Educación, 2022c, 2022d).

Particularly in the first phase of the pandemic (2020–2021), several of the measures developed by the Mineduc required, for their proper implementation, that students had access to the internet or that schools reopened. However, neither option was viable in rural areas. Rural zones typically have low levels of connectivity; for example, while an average of 45% of urban non-indigenous families have broadband internet access, only 3% of indigenous households in rural areas have this service (Ministerio de Desarrollo Social y Familia, 2017). Additionally, despite lower levels of contagion, rural areas kept their schools closed (Hofflinger, 2020). For instance, by March 2021, nearly 80% of rural schools remained closed (Centro de Estudios, Ministerio de Educación, 2023).

Furthermore, adapting to the virtual learning environment was more complex in rural areas due to the low digital literacy of parents in these sectors, complicating

educational support for their children (Cáceres-Muñoz et al., 2020; Kuzmanic et al., 2023; Monge et al., 2020). In summary, low connectivity and school closures placed vulnerable students at greater risk of the negative consequences arising from remote education.

2.2.2 PISA Assessments in Chile

The 2022 PISA report highlights significant challenges in Chile's education system, particularly in mathematics. Chilean 15-year-olds scored an average of 412 points in mathematics, substantially lower than the Organization for Economic Co-operation and Development (OECD) average of 472 points. Figure 2.1 depicts the score in mathematics, reading, and science for all the Latin American and the Caribbean countries that were part of 2022 PISA. Compared to 2018, Chile scored 5 points lower in 2022 in mathematics, 4 points lower in reading, and scored the same in science. However, this decline in performance is notable, as the 2022 scores are among the lowest ever observed in Chile since the PISA assessments began. The proportion of students achieving at least Level 2 proficiency in mathematics was only 44%, compared to the OECD average of 69%. Moreover, only 1% of Chilean students were top performers in mathematics, significantly below the OECD average of 9%. This decline in mathematics performance is coupled with a performance gap based on socio-economic status, where advantaged students outperformed their disadvantaged peers by 69 score points, slightly less than the OECD average gap of 93 points (OECD, 2023). Despite this, there has been a narrowing of the performance gap between the top and bottom socio-economic quartiles in Chile from 2012 to 2022, contrary to the stable average gap observed across OECD countries (OECD, 2023).

Additionally, the PISA 2022 report reveals gender disparities and the impact of immigration and the COVID-19 pandemic on student learning outcomes in Chile. Boys outperformed girls in mathematics by 16 points, aligning with a global trend where boys outperformed girls in 40 countries in mathematics. In contrast, girls scored higher than boys in reading in almost all participating countries. The proportion of immigrant students in Chilean schools increased to 7% in 2022, in comparison to 2018, with a substantial performance gap of 29 points in mathematics favoring non-immigrant students (OECD, 2023). The COVID-19 pandemic had a significant impact, with 53% of Chilean students experiencing school closures for more than three months, and nearly half reported difficulties in understanding assignments during remote learning. These challenges underscore the need for targeted interventions to address educational disparities and support vulnerable student groups in Chile (OECD, 2023).

Figure 2.2 panel A plots the PISA math scores against the duration of full and partial school closures across various countries using the UNESCO school closure dataset for all the countries that took part in PISA 2022. We use duration of full and partial school closures (in weeks). The figure shows a downward trend, suggesting a negative correlation between the length of school closures and math scores. The

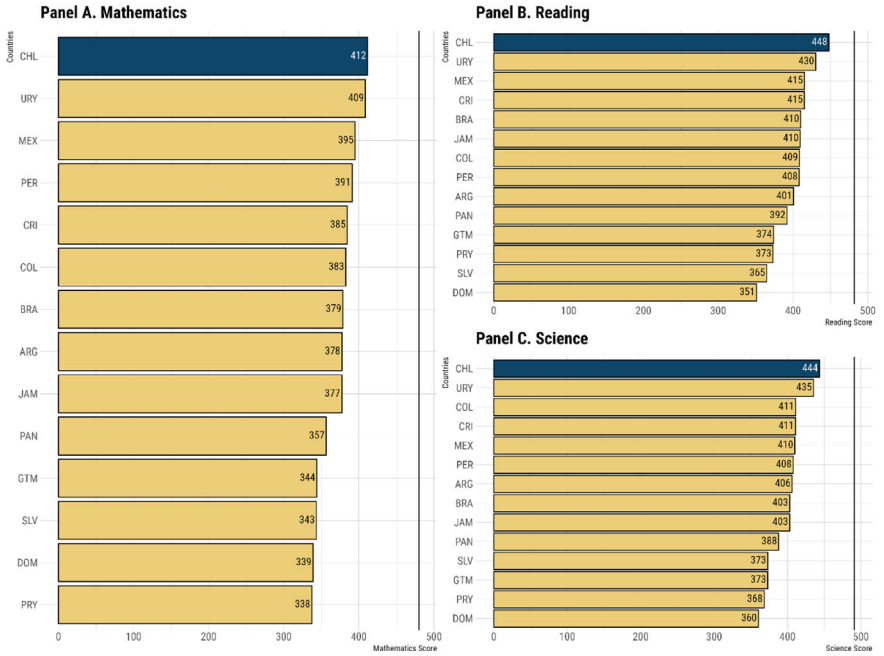

Fig. 2.1 PISA 2022 scores in Latin American and the Caribbean. *Source* OECD (2023). *Notes* Vertical line represents OECD average for mathematics (480), reading (482), and science (491)

longer the duration of school disruptions, the lower the PISA math scores. The implication is clear: extended periods away from traditional classroom environments and face-to-face instruction have hindered students' ability to learn and perform in mathematics.

Panel B focuses specifically on Chile and uses the national assessment, SIMCE, math scores plotted against the percentage of days schools were closed in 2022 for schools. Like the PISA data, there is a visible negative trend line, showing that as the percentage of school closure days increased, the average SIMCE math scores in Chile decreased. This localized insight complements the global data provided by PISA, underscoring the challenges faced by Chilean students. The SIMCE scores are essential for understanding the country-specific impact of the pandemic on education which reveals the extent to which school closures have affected Chilean students' learning outcomes in mathematics. Reading scores also follow the same trend.

Both figures allow us to understand the scale and specifics of the educational challenges posed by the pandemic. Globally, as the PISA data shows, student mathematics learning suffered due to school closures. In Chile, the SIMCE data provides a more detailed picture of these challenges, showing how local students' math performance was affected by the number of days schools were closed. This consistent pattern across both international and national assessments indicates a broad and serious impact of the pandemic on educational outcomes.

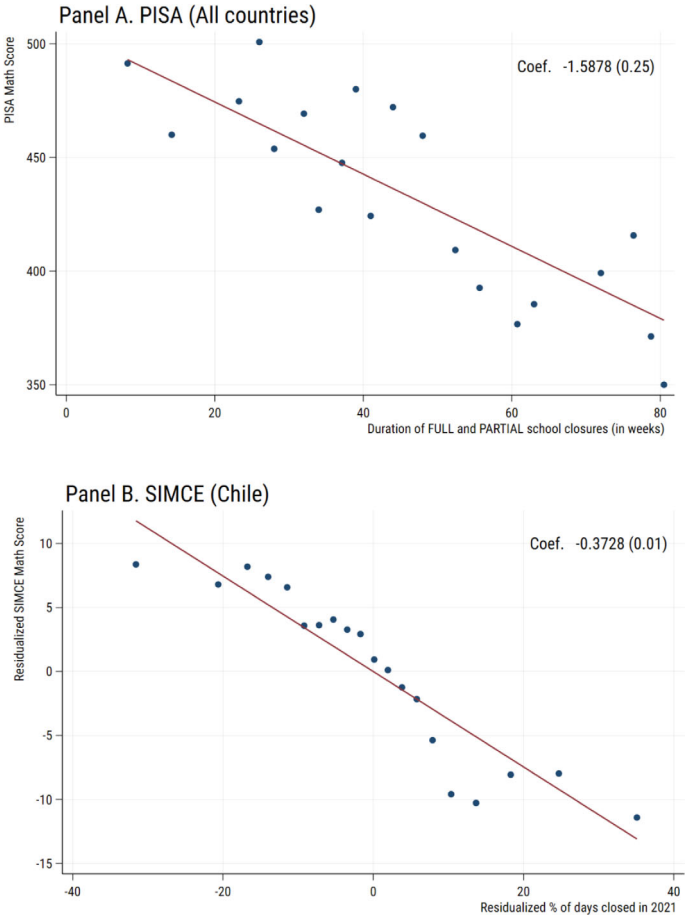

Fig. 2.2 Relationship between school closures and mathematics score for PISA and SIMCE. *Source* OECD (2023) for Panel A, and SIMCE 2022 for Chile. *Notes* In Panel B, we plot residualized SIMCE math scores and residualized % of days closed in 2021 on the following controls: Mother's and father's education, family income deciles, and whether the mother and father are indigenous or not. Standard errors are shown in parenthesis

2.3 Data and Methods

We assembled data on students' test scores and socio-demographic characteristics from Chile's national assessment, SIMCE. Our analysis specifically focused on secondary school students so that we could compare the results with PISA. In Chile, it is mandatory for all students to take SIMCE; however, the scores of students with developmental disabilities ("estudiantes con necesidades educativas especiales permanente") are not reported (Agencia de Calidad de la Educación, 2023).

We obtained data on student attendance and grade point average (GPA) from "Rendimiento del Estudiante" (Centro de Estudios, *Mineduc*) in 2022. In Chile, GPA ranges from 1 to 7, with 5 corresponding roughly to a B in the United States. We gathered data on school closures from "Estado apertura de establecimientos" (Centro de Estudios, *Mineduc*). Each school self-reported this data during the pandemic and provided daily information about whether schools were opened or closed in 2021. We created the variable "% of days closed 2021" by dividing the number of days that each school was closed by the total number of days during the school year (from March to December 2021). Finally, we merged these records (school closures) with the student -level data using a unique school ID number in both datasets.

To examine the impact between the duration of school closures and secondary school student scores in Chile, we analyze SIMCE 2022, and follow a similar strategy to Kennedy and Striethold (2023) and Patrinos (2023). We standardized reading and mathematics scores and estimate the following specification:

$$Y_{is} = \alpha + \beta_1 \text{Duration}_s + X_i'\delta_1 + \mu_d + \varepsilon_{isr} \tag{2.1}$$

where Y_{is} is the standardized score for reading or mathematics for student i in school s; Duration is a variable that equal to the percent of days closed for school s in year 2021; X_i' is a vector of characteristics of student i such as whether the mother/father has a secondary education, college education, family income,[2] and whether the mother/father is indigenous; μ_d are district fixed effects, and ε_{isr} is the error term.

To understand the differential impact of the pandemic, we use SIMCE scores from 2018 and 2022, and evaluate the impact on pre-pandemic and post-pandemic cohorts.[3] We estimate the following model which interact baseline characteristics with our pandemic indicator as follows:

$$\begin{aligned} Y_{is} = \alpha + \beta_1 \text{Group}_i + \beta_2 \text{Pandemic}_{ic} + \beta_3 (\text{Group}_i \times \text{Pandemic}_{ic}) \\ + X_i'\delta_1 + \mu_s + \varepsilon_{is}, \end{aligned} \tag{2.2}$$

where Group_i denotes one of the baseline variable for heterogeneity analysis (e.g., girl, ethnicity, rural residency, and whether student's family falls within the lowest income quartile of the distribution); Pandemic_{ic} is an indicator variable that equals 1 if student i was in 10th grade post-pandemic and 0, otherwise; c denotes cohort; $X_{i'}$ is a vector of characteristics of student i such as whether the mother/father has a secondary education, college education, family income, and whether the mother/father is indigenous; μ_s are school fixed effects; and ε_{is} represents the error term.

[2] We converted family income to the midpoint of each category using the robust Pareto midpoint estimator (von Hippel et al., 2017).

[3] We standardized math and reading tests scores to the year 2018 as our baseline to have a mean of 0 and a standard deviation of 1.

2.4 Results

We begin by presenting in Table 2.1 the relationship between percent of days closed in 2021 with SIMCE 2022 scores. Columns (1)–(3) present the results for mathematics, and columns (4)–(6) the results for reading. In all cases, the relationship between days closed and test scores is negative, and the point estimates range between 0.007 and 0.012 standard deviations (SD). This means that a 1% point increase in the days that a school remained during 2021 is associated with a reduction of 0.007 SD in math scores and 0.003 SD in reading scores.

Given that the mean percent of days closed in 2021 is 43%, we can use the coefficients to estimate the impact on test scores. For instance, a 50% closure would be associated with a decrease of approximately 0.36–0.58 SD in mathematics test scores and 0.15–0.35 in reading test scores.

Table 2.2 presents the same identification strategy as the one presented in Table 2.1 but for student attendance and GPA scores. For attendance, all three models show a negative relationship with the percentage of days closed, indicating that more days of school closure are associated with lower attendance rates, as expected. The coefficients range from − 0.003 to − 0.005 SD, and all are statistically significant. When examining GPA, columns (4) and (5) indicate a significant negative impact of school closures on GPA, with coefficients of − 0.003 and − 0.004 SD, respectively. However,

Table 2.1 Relationship between percent days closed in 2021 with SIMCE scores

	Dependent variable					
	Math scores			Reading scores		
	(1)	(2)	(3)	(4)	(5)	(6)
% days closed in 2021	−0.0116***	−0.0123***	−0.0072***	−0.0070***	−0.0080***	−0.0034***
	(0.0008)	(0.0009)	(0.0007)	(0.0007)	(0.0008)	(0.0006)
Observations	186,805	186,805	127,355	184,622	184,622	125,907
Mean % days closed	43.414	43.414	43.061	43.382	43.382	43.052
R^2	0.036	0.099	0.186	0.013	0.046	0.109
District fixed effects	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Extrapolated estimates from half a year of school closure	− 0.578	− 0.614	− 0.360	− 0.352	− 0.400	− 0.169

Notes Standard errors clustered at the school level are shown in parenthesis. Controls include dummies for mother education and father education (high-school and/or college attainment), family income deciles, and whether the mother (father) is indigenous or not. *, ** and *** denote significance at the 10, 5 and 1% levels

when we include district fixed effects and student characteristics in column (6), the relationship between school closures and GPA becomes statistically insignificant, with a coefficient very close to zero. This suggests that once students are compared with their peers within the same district, the percentage of days schools closed in 2021 did not affect students' annual GPA. However, other variables such as mother's and father 's educational attainment, family income, and student's ethnicity are associated with a student's GPA. The change in statistical significance from models (4) and (5) to model (6) for GPA suggests that factors controlled for in model (6)—like family background and socio-economic status—may play a critical role in mediating the impact of school closures on GPA. In other words, these factors could be more influential in determining GPA outcomes than the mere fact of school closure.

Overall, the analysis underscores the importance of considering a variety of factors when assessing the impact of school closures on educational outcomes. The findings indicate a clear negative association between school closures and attendance, which holds even after controlling for other factors. For GPA, the initial negative association disappears once student characteristics are included, suggesting that students' academic performance as measured by GPA may have been buffered by other factors during the pandemic. These results highlight the complexity of the educational disruptions caused by COVID-19.

We analyze the impact of school closure in our sample across different baseline characteristics using Eq. (2.2). In Table 2.3, we present our comparative analysis

Table 2.2 Relationship between percent days closed in 2021 with attendance and GPA

	Dependent variable					
	Attendance			GPA		
	(1)	(2)	(3)	(4)	(5)	(6)
% days closed in 2021	−0.0034***	−0.0057***	−0.0038***	−0.0036***	−0.0038***	−0.0002
	(0.0007)	(0.0008)	(0.0008)	(0.0006)	(0.0007)	(0.0006)
Observations	155,410	155,410	128,036	155,410	155,410	128,036
Mean % days closed	43.487	43.487	43.067	43.487	43.487	43.067
R^2	0.003	0.043	0.057	0.003	0.036	0.083
District fixed effects	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Extrapolated estimates from half a year of school closure	−0.171	−0.286	−0.188	−0.180	−0.191	−0.012

Notes Standard errors clustered at the school level are shown in parenthesis. Controls include dummies for mother education and father education (high-school and/or college attainment), family income deciles, and whether the mother (father) is indigenous or not. *, ** and *** denote significance at the 10, 5 and 1% levels

of academic outcomes and attendance rates across various demographic segments. We examine the following characteristics: the student's gender (girl), indigenous background, rural residency, and belonging to the lowest income quartile. For each panel, the group indicator variable is substituted by the characteristic denoted in the respective column number. We focus on the main specification that uses school fixed effects and demographics controls.

Panel A shows that, overall, the gap in math scores between the pandemic and non-pandemic cohorts was marked, with the pandemic cohort registering a significant decline in scores, ranging from 0.22 to 0.25 SD (about 14–16 points across all demographics). Notably, the most adversely impacted group during the pandemic were girls, facing the largest differential at nearly 0.02 SD decrease. This represents an increase in the gap between boys and girls after the pandemic of about 11%. Despite variations in the magnitude of decrease, none of the groups succeeded in bridging the pandemic-induced performance gap in the year 2022.

Panel B presents the results for the reading. The reading proficiency gap, when comparing pandemic and non-pandemic cohorts, was slightly narrower to the math gap, with a decrease of 6–7 points from pre-pandemic levels or 0.12–0.16 SD decrease. Nonetheless, students within the lower income quartile witnessed a more pronounced decline in reading scores, with a reduction of up to 0.06 SD compared to their counterparts in higher income quartiles in the post-pandemic period. Similarly to the results presented in Panel A, none of the sub-groups was able to close the gap after two years into the pandemic.

Panel C and Panel D present the results for GPA and attendance. There is an overall positive trend in GPA across all groups post-pandemic, with the interaction effect showing a significant positive impact exclusively for girls. However, it's important to note that the method for calculating GPA may have been adjusted during the school closures; for example, schools may have revised the GPA calculation criteria post-pandemic, incorporated new assessment methods or adjusted grading scales to reflect the unique challenges and learning environments during the post-period (Al-Jarf, 2022; Bulman & Fairlie, 2022; Karadag, 2021). These changes could influence the interpretation of GPA trends. Similar trends have been observed in other countries, where researchers have found an increase in the GPA in higher education and high school after 2020.

Finally, in our analysis, we observe a significant decline in attendance post-pandemic across all subgroups. Notably, students in the lowest income quartile experienced a disproportionately negative impact, exacerbating the attendance disparity relative to their peers in higher income brackets. This trend is evident when examining the combined effects of the pandemic and its interaction with income levels, indicating a widening gap in attendance rates among different socioeconomic groups.

Overall, school closures adversely affected math and reading scores across diverse subgroups, as shown in Tables 2.2 and 2.3. When analysis within school variations, the impact, particularly on pandemic cohorts, reveals a significant increase in the disparities between groups, affecting not only test scores but also attendance rates. While there was a general decline in test scores for math and reading, GPAs did not uniformly suffer, suggesting that there may have been compensatory strategies or

Table 2.3 Gaps in test scores and academic performance

	Group indicator			
	Girl	Indigenous rural	Quartile	Lowest
	(1)	(2)	(3)	quartile
Panel A. Math scores				
Group indicator	− 0.111***	0.042***	− 0.103***	− 0.030***
	(0.007)	(0.015)	(0.011)	(0.007)
Pandemic cohort	− 0.217***	− 0.234***	− 0.240***	− 0.247***
	(0.011)	(0.008)	(0.009)	(0.009)
Group indicator × Pandemic cohort	− 0.024**	0.032***	0.095***	0.058***
	(0.010)	(0.012)	(0.017)	(0.009)
Observations	251,586	251,632	245,442	251,632
Mean Dep. Variable in 2018	0.057	0.057	0.069	0.057
Panel B. Reading scores				
Group indicator	0.271***	0.070***	− 0.049***	0,023***
	(0.006)	(0.017)	(0.012)	(0.007)
Pandemic cohort	− 0.158***	− 0.141***	− 0.141***	− 0.122***
	(0.010)	(0.007)	(0.007)	(0.008)
Group indicator × Pandemic cohort	0.030***	− 0.009	− 0.014	− 0.063***
	(0.010)	(0.012)	(0.018)	(0.010)
Observations	249,153	249,198	243,084	249,198
Mean Dep. Variable in 2018	0.044	0.044	0.052	0.044
Panel C. GPA				
Group indicator	0.171***	0.010	− 0.033***	0.001
	(0.004)	(0.010)	(0.009)	(0.005)
Pandemic cohort	0.229***	0.236***	0.233***	0,234***
	(0.006)	(0.005)	(0.005)	(0.005)
Group indicator × Pandemic cohort	0.018***	0.008	0.010	0.008
	(0.006)	(0.008)	(0.013)	(0.006)
Observations	255,299	255,363	248,991	255,363
Mean Dep. Variable in 2018	5.716	5.716	5.721	5.716
Panel D. Attendance				
Group indicator	− 0.897***	− 0.394***	0.374***	− 0.270***
	(0.057)	(0.142)	(0.106)	(0.060)
Pandemic cohort	− 2.709***	− 2.551***	− 2.588***	− 2.419***
	(0.102)	(0.083)	(0.084)	(0.085)
Group indicator × Pandemic cohort	0.402***	0.093	0.109	− 0.248***
	(0.094)	(0.111)	(0.164)	(0.088)
Observations	255,299	255,363	248,991	255,363

(continued)

Table 2.3 (continued)

	Group indicator			
	Girl	Indigenous rural	Quartile	Lowest
	(1)	(2)	(3)	quartile
Mean Dep. Variable in 2018	92.952	92.952	93.004	92.952
School fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Notes Standard errors clustered at the school level are shown in parenthesis. All regressions control for mother education and father education (high-school and/or college attainment), family income deciles, whether the mother (father) is indigenous or not, and school fixed effects. Each column is a separate regression of the given outcome where we use as the group indicator variable the respective column label. *, ** and * " denote significance at the 10, 5 and 1% levels

alterations in assessment methodologies during the pandemic period. This indicates a nuanced landscape of academic impacts, where different evaluation metrics reflected varying levels of resilience or vulnerability.

2.5 Discussion

The objective of this chapter has been to analyze the impact of school closures in Chile, the nation with the longest period of school closures among OECD countries (OECD, 2022). Using data from PISA and SIMCE (2022), we found that, on average, high school students experienced a decrease in their academic achievement and attendance records, but an increase in GPA after the pandemic. The results also show that the impact of school closures varied by student gender, ethnicity, family income, and whether they come from a rural area.

Several factors contributed to the disparities in educational outcomes observed in Chile during the COVID-19 pandemic. Students' socio-economic background was as a primary factor, with students from lower-income families facing more significant challenges in accessing remote learning (OECD, 2023). This group often lacked the necessary technological resources, such as reliable internet access and devices, which are essential for participating in online education. Additionally, these students were more likely to experience a lack of suitable learning environments at home, further hindering their ability to engage effectively in their studies (Díaz et al., 2022).

Educational disparities are notably influenced by gender and income level, particularly in the context of math performance. Students from the lower quartile of the income distribution and girls experienced more pronounced declines in math scores. This discrepancy could be attributed to factors such as differential access to educational resources or variations in home learning environments (Belay, 2020; Bellei & Contreras, 2023; Díaz et al., 2022). For instance, students from lower-income households might have encountered more significant challenges in accessing

digital learning tools or receiving adequate academic support at home. Another possible reason is that, according to España (2022), students in the highest income quintile were able to lose fewer classes during the pandemic, which could also have contributed to the gap in learning assessments as shown in this chapter. Similarly, the differential by gender on educational outcomes post pandemic might reflect underlying disparities in expectations, resources, or support, with these factors collectively contributing to the observed gaps in tests performance.

Bellei and Contreras (2023) found that the return to in-person classes was slow, and based on official data, the national average school attendance was 83% in 2022. Students in the lowest income quartile were particularly affected, and the gap in attendance has yet to see an improvement. Despite various efforts to boost school attendance, a substantial portion of students remained absent, with the most pronounced effects in publicly funded schools and among students from poorer regions (Centro de Estudios, Ministerio de Educación, 2022). This reflects a global trend where the most vulnerable student populations, similar to the lowest income quartile in our analysis, face heightened challenges in educational participation and achievement.

The effectiveness of remote teaching methods and the preparedness of schools and teachers to transition to online education could also have influenced educational outcomes (Bellei & Contreras, 2023). While we do not have ways of testing these hypotheses, schools with better resources and more technologically adept staff may be more able to provide effective remote learning experiences. In contrast, schools with limited resources and teachers who lacked training in digital tools struggled to maintain educational continuity. Additionally, the psychological impact of the pandemic, including stress and anxiety among students, could have further compounded learning challenges, particularly for those without access to adequate mental health support.

In contrast, our results show that students' annual GPA increased significantly after the pandemic. This finding is consistent with previous studies that show an upward trend in student grades after 2020 (Alishev et al., 2022; Cavanaugh et al., 2023; Clark et al., 2021; Doz, 2021; Rodríguez-Planas, 2021; Supriya et al., 2021; Tillinghast et al., 2023). Some research indicates that the increase in grades can be explained by a more flexible attitude adopted by schools and teachers, which may represent a compensatory measure in reaction to adverse circumstances faced by students during remote learning (Al-Jarf, 2022; Bulman & Fairlie, 2022; Karadag, 2021).

The wider implications of these educational disruptions in Chile extend beyond the immediate learning outcomes. The decline in learning due to the pandemic is likely to have long-lasting effects on the future prospects of the affected students. Azevedo et al., (2022) estimate that the decrease in learning and school engagement could potentially lead to a reduction of 7–10% in future earnings for students impacted by the school closures. This economic impact, coupled with the increase in dropout rates, is a cause for serious concern. It highlights the need for comprehensive strategies that not only address the immediate educational challenges but also mitigate the long-term socio-economic consequences of the COVID-19 pandemic on Chile's younger generation.

The experiences and challenges brought forth by the COVID-19 pandemic have significant implications for educational policy in Chile and present opportunities for reform and improvement. First, addressing the digital divide must be a top priority. The pandemic has highlighted the urgent need for equitable access to technology and internet connectivity as essential to modern education. Policies should focus on providing consistent and reliable digital access to all students, regardless of their socio-economic status or geographical location. This includes not only the distribution of devices but also the improvement of internet infrastructure in remote and rural areas. Alongside technological access, there is a need for comprehensive digital literacy programs for both students and teachers to ensure the effective use of these resources.

Second, teacher training and support systems must be strengthened. The transition to online education during the pandemic revealed gaps in digital competencies among educators. Future policies should include ongoing professional development opportunities for teachers, focusing on digital skills and innovative teaching methods suited for both online and blended learning environments. Additionally, there should be an emphasis on emotional and psychological support for teachers, who have faced significant stress and adaptation challenges during the pandemic. Providing educators with the necessary tools and support is crucial for improving the overall quality of education.

Third, the mental health and well-being of students must be integrated into educational policies. The isolation and stress caused by the pandemic have had a profound impact on students' mental health, affecting their ability to engage and succeed in their studies (Blanchflower & Bryson, 2022). Implementing mental health programs, counseling services, and social-emotional learning curricula in schools can provide students with the necessary support to navigate these challenges. Such initiatives should be designed to be inclusive, addressing the needs of students from diverse backgrounds and with varying levels of need.

Last, there is a need for flexible and resilient educational frameworks that can adapt to unforeseen challenges like those presented by the pandemic. This includes developing and implementing policies that allow for a seamless transition between in-person, remote, and hybrid learning models as circumstances require. Creating contingency plans and resources for emergency education situations will ensure that learning can continue uninterrupted in any future crises. In conclusion, the lessons learned from the pandemic provide a roadmap for strengthening Chile's educational system, making it more inclusive, adaptive, and resilient to future challenges.

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Chapter 3
Ecuador: Inserting the Country into the PISA Experience

Miguel Ángel Herrera-Pavo, Christian Jaramillo-Baquerizo, and Victor H. Valencia

Abstract Ecuador debuted in the PISA-D evaluation in 2018, emerging as the top performer among seven nations, yet still trailing behind OECD averages. This analysis explores Ecuador's unique challenges within its diverse and politically complex context. Highlighting the impacts of COVID-19, which exacerbated existing educational issues, the study discusses curriculum reforms and the essential role of universities in professionalizing teachers and improving student outcomes. As Ecuador prepares for its next PISA in 2025, this chapter critically examines the nation's educational strategies and the need for continuous improvement in response to global standards and internal demands.

3.1 Ecuador's Culture of Evaluation

Ecuador's culture of evaluation stems from a constitutional mandate to create an entity that promotes assessment in the national education system. Accordingly, following Article 346 of the Political Constitution of the Republic, The National Institute of Educational Evaluation (INEVAL) was established on November 26, 2012, as a public entity with administrative, financial, and technical autonomy. INEVAL is responsible for conducting the comprehensive evaluation of the National Education System, i.e., students, teachers, and principals. Its purpose is to promote educational quality (Instituto Nacional de Evaluación Educativa, s. f.-a).

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Since its creation, INEVAL has successfully designed and implemented evaluation processes at a national level, a recent example being the standardized test 'Ser Estudiante.' Additionally, it managed the implementation of international tests, e.g., PISA, in 2017. The national standardized test, 'Ser Estudiante,' began in 2013–2014 and has been implemented since, except for the academic year 2019–2020, due to the pandemic. INEVAL has also managed the implementation of international tests, such as those of the Latin American Laboratory for the Assessment of the Quality of Education (LLECE) in 2006, 2013, 2016, and 2019, or those of the Program for International Student Assessment (PISA) in its edition for developing countries, with the results published in 2018. INEVAL is preparing Ecuador's LLECE and PISA tests for 2025 (Instituto Nacional de Evaluación Educativa, s. f.-b).

3.1.1 The Evolution of National Learning Assessment Tests

In 2012, INEVAL designed the 'Ser Estudiante' test based on the learning standards developed by the Ministry of Education (Ministry of Education of Ecuador, 2012). Ecuador's Ministry of Education defines learning standards as "descriptions of the learning achievements that students must achieve throughout their school career" in each academic level (Ministerio de Educación, 2012, 7). Each year, at the end of the school period, INEVAL applies this test to a sample of students nationwide to evaluate the knowledge, skills, and abilities in the areas of Mathematics, Language and Literature, Natural Sciences, and Social Sciences, also developing an evaluation on factors associated with these areas. In the 2022–2023 academic year, INEVAL applied a new test for early childhood education called 'Ser Estudiante' en la Infancia (SEIN). SEIN evaluated 5800 boys and girls aged five from 283 institutions among the public, partially public-funded, private, and municipal schools from the Coast-Galápagos Islands and Sierra-Amazonian regions using virtual and physical gamification techniques. It was applied to evaluate children's logical-mathematical relationships, language development, and oral expression (Instituto Nacional de Evaluación Educativa, s. f.-c).

The learning standards were updated in 2017 (Ministerio de Educación, 2017) to align with the new curricular proposal implemented in 2016. Since then, INEVAL has focused its efforts on articulating its Ser Tests with the new standards and the 2016 curriculum, which has structured all current curricular proposals to date, as some studies revealed a lack of alignment between the tests and the curriculum (Figueroa Chávez & Herrera Pavo, 2019; Herrera Pavo et al., 2019). This alignment allows INEVAL to ensure the relevance of its assessment processes, providing educational institutions with relevant feedback (José Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024).

INEVAL completed this alignment process in 2021. This articulation exercise between the curricular proposal and the external evaluation of learning is considered an important achievement, as it allows reporting the evaluation results not only as a series of average scores or achievement levels in specific domains but also based

on each of the evaluated learning standards. According to INEVAL, perfecting the reporting processes is a fundamental element for evaluation because if the data does not translate into mechanisms for decision-making for teachers, principals, and the Ministry of Education, they will lack relevance. "Creo que hemos hecho un gran esfuerzo estos años por mejorar los procesos de reportería, porque normalmente estamos acostumbrados en el país a mirar promedios año tras año, pero ahora tratamos de llegar al profesorado [I think we have made a great effort these years to improve the reporting processes because we are normally accustomed in the country to look at the average scores year after year, but now we try to reach the teachers]" (Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024).

The new way of reporting by learning standards constitutes valuable feedback for educational institutions, as teachers can know in detail which learning standards require more attention. The standards directly refer to the contents and evaluation criteria of the curriculum, thanks to the articulation between curricular evaluation and external evaluation, between evaluation criteria and learning standards (Herrera Pavo & Cochancela Patiño, 2020).

Adopting a new reporting method, specifying each learning standard provides valuable feedback for educational institutions. This approach enables teachers to identify the learning standards that require greater attention. These standards directly refer to the contents and evaluation criteria outlined in the curriculum, highlighting the effective alignment between curricular and external evaluations and between evaluation criteria and learning standards.

> No obstante, el reto es poder llegar a cada una de las instituciones educativas con evaluaciones censales, como hace Chile. En Ecuador todavía no podemos llegar a ese punto, pero queremos hacerlo, queremos generar reportes institucionales y hacer talleres con cada institución educativa, priorizando las que presentan mayores retos y poder ir trabajando, específicamente, en procesos que den cuenta de la mejora a corto y, sobre todo, a mediano plazo. [However, the challenge is to reach each of the educational institutions with census evaluations, as Chile does. In Ecuador, we still cannot reach that point, but we want to do it. We want to generate institutional reports and conduct workshops with each educational institution, prioritizing those that present the greatest challenges and being able to work specifically on processes that account for short-term improvement and, above all, medium-term.] (Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024).

3.2 The Experience of PISA-D in Ecuador

Ecuador joined PISA for Development (PISA-D) at the end of 2014. In 2015, the instruments were adapted and prepared for the evaluation. In 2016, the pilot test was conducted. Finally, at the end of 2017, the main study was implemented. 2018, the data analysis was conducted, and the national results report was prepared and successively published in December of the same year (Instituto Nacional de Evaluación Educativa, 2018).

This report revealed that Ecuador did not reach the OECD average. Still, it exceeded the average of Latin America, the Caribbean, and all countries participating in PISA-D in the three competency domains evaluated. Of the seven countries participating in PISA for Development, Ecuador achieved the best results: 29% of the students reached or exceeded level 2 of proficiency required for achieving the Sustainable Development Goal 4 in Mathematics, 49% in Reading, and 43% in Science (Pritchett & Viarengo, 2021, p. 5), ranking 58th, with 365 points on average across the three domains, out of the 74 countries participating in PISA-2015 and PISA-D (Pritchett & Viarengo, 2021, p. 7).

Compared to those of other participating countries, Ecuador's PISA-D results can be partly attributed to the reforms in teacher policy, characterized by applying high standards for recruitment and regular processes of evaluation of teacher performance (Schneider et al., 2019). Another factor could be the implementation of the ten-year education plan that increased public spending on education (Damme et al., 2015), supporting the expansion of state education spending from 2.3% of GDP in 2006 to 4.6% of GDP in 2016 (Echavarría & Orosz, 2021), a percentage that in the 2024 budget project approaches 4% of GDP with 4.641 billion dollars (Infobae, 2024).

Despite these advances in the country's education system, the data highlights students' socioeconomic level as the most influential factor in the PISA-D results (Pritchett & Viarengo, 2023, p. 197), which Paxson and Schady (2007) already highlighted in a previous study. Figure 3.1 shows a close relationship between a higher socioeconomic level and high performance. "En Ecuador, el 25% de la población estudiantil con el nivel socioeconómico más bajo tiene una probabilidad 3 veces mayor de tener un nivel de desempeño menor al nivel 2 en todas las áreas evaluadas en PISA-D. [In Ecuador, the 25% of the student population with the lowest socioeconomic level is three times more likely to have a performance level below level 2 in all areas evaluated in PISA-D.]" (Instituto Nacional de Evaluación Educativa, 2018, p. 14).

The associated factors test developed alongside PISA-D shows the influence of violence on learning outcomes (Fig. 3.2). Given Ecuador's recent significant increase

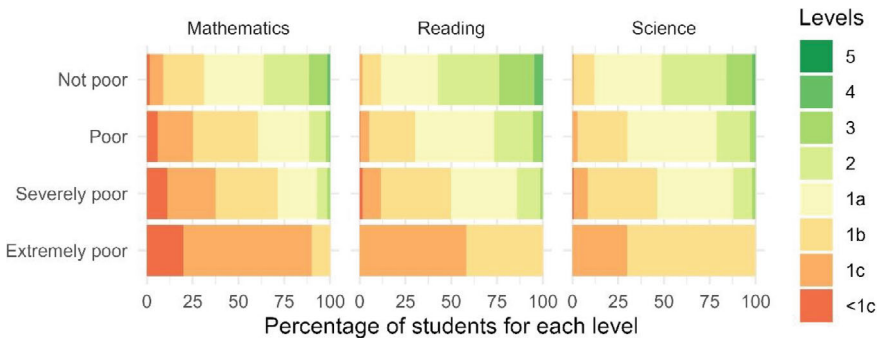

Fig. 3.1 Proficiency levels in the three domains regarding household poverty index. *Source* Created by the author from PISA-D data

in violence (Mantilla et al., 2023; Vásquez et al., 2023), it will be important to compare the current data with the results of PISA-2025.

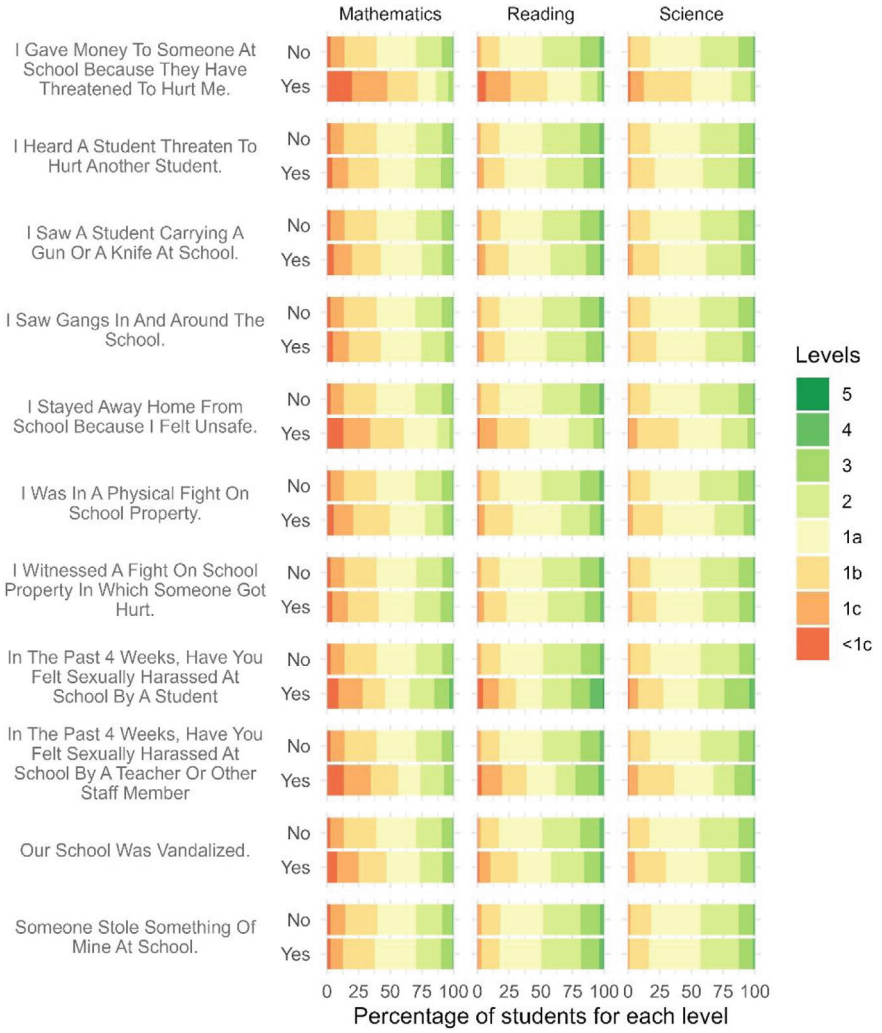

Fig. 3.2 Proficiency levels in the three domains regarding violence. *Source* Created by the author from PISA-D data

3.3 Ecuador's Current Situation After the COVID-19 Pandemic

The results of the 'Ser Estudiante' tests in 2021 and 2022 demonstrated the effects of the pandemic with a setback in the learning outcomes of students of 4th and 7th grades in all domains (Table 3.1). However, in 2023, the results of the tests stabilized compared to the pre-pandemic results. The recovery of student learning has yet to show significant progress, but improvement is evident in some domains. There is still evidence of a decline in Science, thus highlighting the necessity to pay special attention (Instituto Nacional de Evaluación Educativa, 2023b). However, student learning of 10th-grade students aged 15 does not vary significantly between pre-pandemic and post-pandemic periods in any of the domains evaluated in 'Ser Estudiante' (Instituto Nacional de Evaluación Educativa, 2022b, 2023a, 2024a, 2024b, 2024c, 2024d) if we consider the overall data.

Notwithstanding, even when international tests, such as PISA-D, showed very small rural and language gaps in Ecuador (Pritchett & Viarengo, 2021), Fig. 3.3 shows important differences by gender, ethnicity, and school funding.

Regarding the results by standards, the latest national 'Ser Estudiante' tests provide valuable information about what could happen in a new application of the

Table 3.1 Learning losses, by domain, for years 2022 and 2023 (in standard deviations)

Grade	Domain	Learning losses from 2020/2021 to 2021/2022	Learning losses from 2021/2022 to 2022/2023
Fourth	Language and Literature	− 0.41	0.07
	Mathematics	− 0.26	0.04
	Sciences	− 0.47	− 0.01
	Total (including Social Sciences)	− 0.36	0.05
Seventh	Language and Literature	− 0.52	0.27
	Mathematics	− 0.25	0.03
	Sciences	− 0.16	− 0.65
	Total (including Social Sciences)	− 0.30	− 0.05
Tenth	Language and Literature	− 0.13	0.12
	Mathematics	− 0.03	0.17
	Sciences	0.04	0.07
	Total (including Social Sciences)	− 0.06	0.09

Source Created by the author from 'Ser Estudiante' data

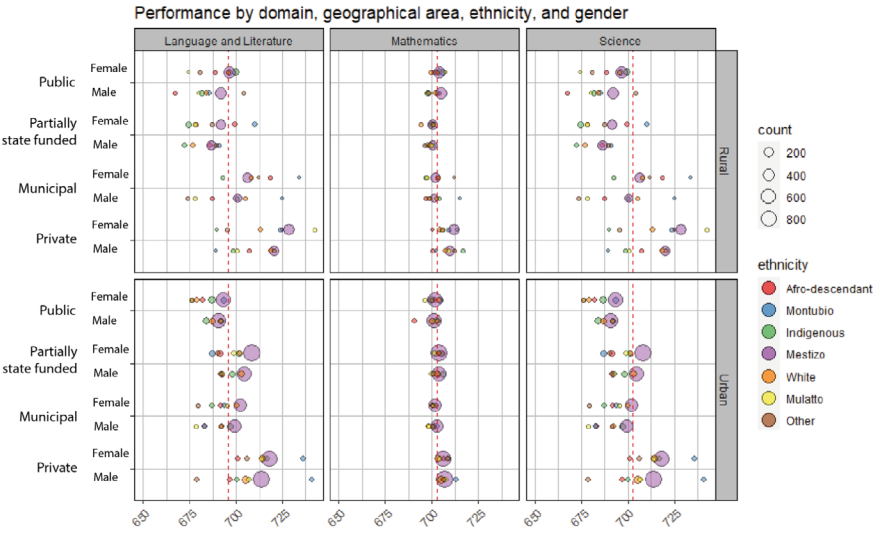

Fig. 3.3 Comparison of 'Ser Estudiante' 2023 results for 10th-grade students. *Source* Created by the author from INEVAL data

PISA test. Although Ser tests and PISA are not comparable, there are some similar issues to discuss. For example, the results of reading tests taken by 15-year-olds in the Ser-2022/2023 tests show that only 48.1% of the students reached an intermediate performance level concerning the standard. This standard is "The student can contrast and assess the explicit contents (with an emphasis on contradictions and ambiguities), implicit and critical evaluative of various bibliographic sources of the different textual typology." In addition, only 38.4% achieve that same level concerning the standard: "The student compares, assesses, and records the information consulted in various texts based on the reading purpose, the quality of the information, the reliability of the source." These data raise alerts, as more than 50% of the students fail to solve activities related to Reading comprehension standards, remaining below the satisfactory level (Fig. 3.4) (Instituto Nacional de Evaluación Educativa, 2024a, 2024b, 2024c, 2024d).

In the case of Mathematics and Science, the problems are more serious. For example, only 7.2% of students achieve a satisfactory result concerning the standard: "The student analyzes and represents a group of data using elements of descriptive statistics. Reason for possible random event outcomes and calculate probabilities applying various strategies." Only 6.7% achieved a satisfactory level concerning the standard: "The student analyzes the change in position of objects, based on the forces acting on them, direction and speed, as well as the space covered and the elapsed time." These are the areas where the most notable setbacks are presented compared to the results of previous years (Instituto Nacional de Evaluación Educativa, 2024a, 2024b, 2024c, 2024d), a problem especially significant in specific standards, such as those presented above.

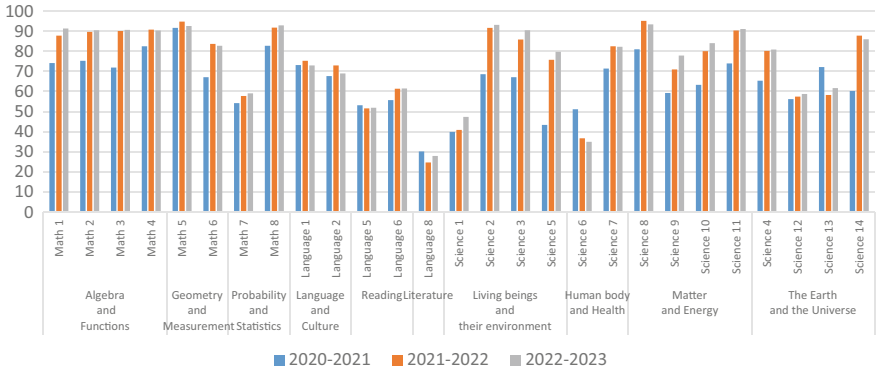

Fig. 3.4 Percentage of students not reaching a satisfactory level in Mathematics, Language and Literature, and Science domains. *Source* Created by the author from INEVAL data

This situation worsens with younger students, highlighting the need to devise a strategy that addresses this issue, preventing the hindrance of students' access to higher education. The results of Ecuador's participation in PISA 2025 will provide more data on this issue.

According to the results of the PISA test in 2022, Latin America experienced considerable setbacks in the results of the three domains compared to the previous assessment, reflecting the effects of the pandemic. Countries like Mexico or Brazil have suffered greater setbacks, while others like Chile have held steady (País, 2023). If Ecuador had participated in these tests, it is expected to produce results similar to those of the other countries in the region.

Amid Ecuador's current unrest affecting student life, it is necessary to understand how violence and socio-emotional factors affect student learning processes, considering that, for instance, 2023 'Ser Estudiante' results revealed that only 24% of students feel completely happy and that less happy students in any sample stratum perform poorly in any domain.

3.4 Towards the PISA Tests in 2025

In 2022, INEVAL signed the agreement that formalizes Ecuador's participation in the PISA-2025 tests. On this occasion, Ecuador will be able to assess the competencies of its students along with 90 other countries. Ecuador and other nations new to this process (Armenia, Egypt, Iraqi Kurdistan, Kenya, Rwanda, Tajikistan, and Zambia) join PISA. OECD representatives will visit these countries to receive feedback on the preparation process for the development of the tests in 2025 (OCDE Programme for International Student Assessment, s. f.).

The test preparation process involves three years of work beginning in 2023. During the first year, INEVAL reviewed and adapted the assessment instruments

and PISA-2025 items to the Ecuadorian context. The 2025 test is different from PISA-D, as on that occasion, only the main domains were evaluated, and there were items adapted to the characteristics of a developing country. In PISA-2025, however, Ecuador will use the same items as the rest of the territories, although voices like Rutkowski (2021) raise concerns about developing a more appropriate assessment for low-performing countries. Most of the items have already been used in other cycles, but there are also new items. The INEVAL team reviews all the items, correcting possible typos and making adaptations in terminology that need to be better understood in Ecuador. These adaptations are made by specialists in each area who are familiar with the specific terminology. However, no regional considerations are made, i.e., no differentiated evaluations for the Coast, Sierra, or Amazonia, and the test is conducted exclusively in Spanish. A single assessment instrument is developed for the entire country. The effort is to ensure that the items are understandable and unbiased and do not present differential behavior due to poor adaptation. For this purpose, INEVAL has specialists who offer diverse cultural perspectives in each area. The review process is complex because the items must ensure comparability between countries. The adaptations made by INEVAL cannot introduce bias, incorporate information, modify cognitive levels, or introduce different difficulty levels.

In PISA-2025, learning in the digital world is introduced as an innovative domain, requiring additional effort to ensure that the test, unlike PISA-D, is taken on a computer since the items in this domain are interactive. With these new items, PISA aims to assess student learning related to digital tools and knowledge about issues that may not be presented in classrooms but in students' daily lives.

Implementing computer-based assessment tests, just like the national evaluations, has required a commitment from the Ministry of Education to adapt the computer labs of educational institutions better, some of which were deplorable after years of closure due to the pandemic. This also includes setting up portable labs with all the necessary features to administer the tests in those institutions that do not have computers.

In 2024, INEVAL will plan the logistics and contact the educational institutions participating in the evaluation, conducting a pilot test. This pilot test will be the first step for INEVAL to internally evaluate the work methodology and the improvements needed for the main study in 2025 (Laura Guerra, item validation specialist at INEVAL, personal communication, January 25, 2024). From a technical standpoint, applying the test on computers will represent a significant advancement in processing and analyzing data collected in the pilot and main studies. The pilot test will involve 50 educational institutions nationwide from all types of support, regimes, and geographical areas. Approximately 2500 students will take the pilot test in May 2024. The results of this test are not public but serve to adjust the items for the final test. The main study, on the other hand, will involve 300 educational institutions and approximately 8000 students from all over the country, differentiating the type of school funding (public, municipal, private, partly public-funded), geographical regions (Costa-Galápagos, Sierra-Amazonía), and geographical areas (urban, rural), just like in the national assessment tests. Unfortunately, the PISA tests do not

consider the Intercultural Bilingual Education System in a disaggregated manner. However, intercultural bilingual institutions may be found in the sample, so it will not be possible to infer results that specifically represent them.

INEVAL has manifested that in the future, it would like to conduct tests that represent nationalities, as in the case of Spain, which has a longer history with PISA and where, from special constituencies, specific adaptations are made in the test for each nationality, allowing for better attention to the country's cultural and linguistic diversity. Although, initially, this strategy would not reach people with an oral culture, such as the Huaorani, it should allow for serving the Quichua and Achuar populations to reach intercultural bilingual educational institutions. To achieve this goal, it is necessary to develop specific capacities as a country (Laura Guerra, item validation specialist at INEVAL, personal communication, January 25, 2024).

3.4.1 Advantages of Participating in PISA

Participation in the PISA tests represents a significant learning opportunity for INEVAL. A learning experience in conducting the process and creating assessment instruments. "Es una evaluación diferente a las evaluaciones nacionales y regionales, que nos permitirá explicarnos en un contexto global. [It is a different evaluation from national and regional evaluations, which will allow us to explain ourselves in a global context.]" (José Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024). INEVAL does not want to limit itself to performing studies of comparison with other nations but to use the data collected on Ecuador's international performance to prioritize goals in the regional and global context. Moreover, a presence in the PISA test also allows for generating debates and reflections about assessment and developing educational policies.

3.5 The Role of Higher Education Institutions in Developing a Culture of Evaluation

The participation of higher education institutions in the education debate is crucial, "creo que las universidades y los institutos superiores técnicos y tecnológicos que tienen carreras de educación tienen un rol social en cuanto a la investigación y la innovación. [I believe that universities and higher technical and technological institutes that offer education programs have a social role in terms of research and innovation.]" (José Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024). In line with this idea, INEVAL has developed a national research agenda on educational evaluation. In coordination with the higher education system, INEVAL aims to address four research lines: (1) Academic performance and evaluation to contribute to improving educational quality through research focused

on the contextual analysis of student performance. (2) Professional performance and evaluation, to investigate teacher performance through the comprehensive evaluation of their management, to contribute to the strengthening of the National Education System. (3) Inclusion focused on educational evaluation, to propose strategies aimed at the application of evaluations with adaptations to the specific educational needs associated and not associated with disability, that reflect the diverse realities in which students develop in their school life. (4) Technological innovations for educational evaluation, to research the role of technology both in evaluative contexts and in educational activities in general, around the use of Information and Communication Technologies, Learning and Knowledge Technologies, and Empowerment and Participation Technologies (Instituto Nacional de Evaluación Educativa, 2022a).

Analyzing Ecuador's PISA test results will generate interesting debates within the academic community. It will also provide directions for future research based on these findings, broadening Ecuador's current research fields. Additionally, it will create interesting areas for innovation based on the interpretation given of the research findings on factors associated with our students' learning.

3.6 Conclusions

Ecuador's commendable performance in the PISA-D assessment, while still below OECD averages, reflects positively on the nation's educational reforms, including high standards for teacher recruitment and increased investment in education. This achievement serves as a benchmark for evaluating the effectiveness of these reforms and underscores the potential for continued improvement.

The pandemic has undeniably impacted learning outcomes, exacerbating existing educational disparities and introducing new challenges. However, the stabilization of test results in 2023 compared to pre-pandemic levels indicates resilience within the education system and points towards a slow but evident path of recovery.

The establishment of INEVAL and the evolution of a culture of evaluation within Ecuador highlight the country's commitment to quality education. The ongoing curriculum reform, geared towards addressing Ecuadorian students' current and future needs, is pivotal for aligning educational standards with global competencies.

The analysis in this chapter reaffirms that socioeconomic status remains a significant determinant of student performance in Ecuador. Policies that specifically address inequalities are necessary to ensure equitable educational opportunities for all students. Hence, higher education institutions in Ecuador play a crucial role in fostering a culture of evaluation and innovation in education. Their participation in educational debates, research, and teacher training is essential for sustaining improvements in the education system.

As Ecuador prepares for its next participation in PISA, the focus on refining assessment methodologies, addressing digital literacy through innovative domains, and ensuring equitable access to education for all students will be critical. Moreover, adapting to the evolving educational landscape post-COVID-19 while addressing

the socioeconomic and external factors influencing education remains a significant challenge.

Research and evaluation efforts must be accompanied by a policy that promotes sustained evaluation practices to make them meaningful so that the processes carried out can be leveraged, as in the case of participation in PISA (José Flores, general technical coordinator of INEVAL, personal communication, January 25, 2024).

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Chapter 4
England: Turbulent Years—PISA 2022 and COVID-19 School Disruption

Tim Oates

Abstract Like many nations, England suffered a decline in scores in PISA in 2022, following important improvement. It declined less than the other nations of United Kingdom, which are in different stages of curriculum renewal and development. This chapter examines key events in England's experience of COVID-19. It explores the nature and extent of COVID-19 impact in England and compares outcomes with other key nations. It suggests that there is strong, continuing and complex COVID-19 impact on education and this is likely to continue into the 2030's. It examines how this poses a highly distinctive public policy challenge which so far has been underestimated with inadequate remedy.

In this chapter I examine the top line 2022 PISA results for England in the context of COVID disruption and explore the challenges to public policy which this continues to present. For granular analysis of England's 2022 results I commend the reports prepared for the UK Government available at https://www.gov.uk/government/publications/pisa-2022-national-report-for-england (DfE, 2022).

4.1 Lead-In to PISA 2022

Most developed nations experienced a decline in PISA scores in 2022. Notable exceptions were Singapore and Japan (Table 4.1).

Singapore experienced 158 days of restrictions. Japan did not impose mass lockdown but did close elementary schools. England experienced 213 days of restriction, Finland 20 days, the USA had uneven and irregular closures.

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Table 4.1 2022 PISA scores, the change from 2018 and the periods of restriction in each nation

	Maths score	Reading score	Science score	Change maths	Change reading	Change science	Restrictions	
							Days	Periods
Japan	536	561	547	9	12	17	Voluntary	na
Singapore	575	543	561	6	− 7	10	158	4
United States	465	504	499	− 13	− 1	− 3	0–453	1 (9 states)
England	496	492	503	− 9	− 12	− 4	213	3
Estonia	510	511	526	− 13	− 12	− 4	31	1
Finland	484	490	511	− 23	− 30	− 11	20	1

Source OECD; *Source* UNESCO

There are no obvious patterns in the relation between level of disruption, preparedness and outcomes. Despite a high number of days of disruption, Singapore was well advanced in on-line learning (Goh et al., 2023). Schools in England which reported similar preparedness appeared to have preserved the performance of pupils, but even in these schools individual students could report low engagement with on-line learning—the impact of disruption was highly individualised (Coleman, 2021). Estonia is one of the most digitally-active education systems in the world (UNESCO, 2023), it experienced a low level of school closure—yet its performance in PISA 2022 significantly reduced. Superficial comparison of these nations' top level data yields no insights—it requires far more detailed analysis of practical aspects of disruption, of how pupils' and schools' behaviour regarding learning was re-framed by disruption, and myriad other factors.

4.2 The PISA 2022 Cohort

2020 and 2021 in England were dominated by disruption. Uncertainty and stress permeated public life. The death toll, economic disruption and social cost were clouds which hung over every minute of every day of every month. There was deep uncertainly regarding how long schools would be closed, whether a single closure could stall the pandemic and protect the National Health Service and, conversely, how much damage to society and economy might arise through restrictions. Schools and families rapidly moved to new daily routines and behaviours—all requiring practical and mental adjustments.

Early 2023 saw a wide range of research studies on the pattern and impact of restrictions; allowing a review of the pattern, depth and form of impact. This showed highly individualised impact, varying regional impact, differences in impact on social groups, and a 'sliding effect' of different impact for different age groups passing through education. 2022 PISA is partial: it measures students who are 15 years of

age in 2002—they were 13 and 14 during the height of COVID restrictions in 2020 and 2021. The impact on them was distinctive.

Pupils aged 13 and 14 in England are not subject to national assessments. They are in a transitionary period in most schools—at 14 they are in the process of considering the exam options (subjects) which they will take at 16. School programmes are beginning to focus tightly on the learning requirements for national examinations, and the intensity of study is increasing. The 2022 PISA cohort in England experienced variable intensity and effectiveness of home learning during the period 2020–21, and by 2022 would know that they would be a cohort taking national exams at 16 and 18—unlike the cohorts of 16 and 18 year olds in 2020 and 2021 whose exams had been cancelled.

In 2020—exams cancelled for 16 and 18 year olds, teacher grades used in place of exams
In 2021—exams scheduled but then cancelled for 16 and 18 year olds—as in 2020, teacher grades used to award national qualifications
In 2022—examinations restored for 16–18 year olds but with various modified features to compensate for the disruption to education—the PISA cohort (aged 15) knew in 2022 that they would be taking exams at 16, in 2023.

In the academic years prior to PISA 2022, the PISA cohort experienced significant disruption to key years of education in lower secondary; witnessed the disruption and uncertainties of older pupils whose exams were cancelled in ’20 and ’21; may have experienced considerable shifts in family behaviour patterns regarding employment; and may have suffered direct impact of illness or loss in the family.

Schools did not entirely close during the periods of lockdown. The children of ‘key workers’ (hospital staff, care staff, emergency services etc.) were entitled to attend school and many did so. Therefore, despite the language of ‘school closure’, it was a requirement that state schools remained open to some pupils—managing both remote learning and a small face-to-face cohort. However, this was not ‘normal schooling’ since the emerging and changing social distancing regulations needed to be observed.

In England, the two years prior to age 15 typically involve consolidation of learning in compulsory subjects, key decisions by teachers, pupils and parents about choices of examination subjects—typically 10—to be taken at age 16, and school decisions regarding entry to higher tier or lower tier mathematics, science and languages. These decisions greatly affect young peoples’ futures. The intensity of learning tends to increase at this time, with a growing focus on examination requirements. Even in a time of stability, this period involves considerable shifts for families and pupils—high levels of discussion and advice regarding choices, a greater focus on educational performance. Yet for the 2022 PISA cohort, these years were greatly disrupted. Schools needed to implement a constant mix of remote and face-to-face learning, cope with constantly changing requirements of ‘social distancing’ after each period of lockdown, deal with outbreaks of illness amongst staff and pupils, and respond to changing legal requirements regarding remote learning. In some localities they provided food and practical support to families. Restrictions on economy and

society interacted with restrictions on schooling—families had to support pupils in home learning at the same time as enterprises and organisations geared up home working.

Although the dominant discussion was of 'learning loss' caused by interrupted learning, concerns also arose regarding social isolation, poor well-being and domestic abuse and neglect, and disproportionate effects on children with special and additional needs.

Research traced an unprecedented disruption to society and schooling, but also produced unanticipated findings such as some children appearing to gain more from virtual learning than classical classroom learning (Hume et al., 2023) and child mortality reducing significantly in the first year of the pandemic and, despite increasing in the second year, still being below pre-pandemic levels (Odd et al., 2023a, b).

Researchers and agencies mobilised swiftly to try to understand the impact on pupils and schools of interrupted learning. OFQUAL, the examinations regulator, issued five key overview papers—the Learning During Pandemic series (OFQUAL, 2021).

These identified that:

Primary age pupils were in general a month behind expectations.
Primary age pupils' maths attainment was affected more than reading.
Disadvantaged groups were disproportionately affected.
Regional effects were evident although this varied over time.
Those aged 14 and 15 in 2020 and 2021 missed more school than younger year groups.

During the first Lockdown, pupils on average were studying 2–4.5 h during home learning, a drop on 6 h per day prior to interrupted learning.
Disadvantaged primary age pupils studied for one hour less per day than advantaged pupils.
Disadvantaged secondary age pupils on average studied for 1.2 h less per day, the gap was 0.9 h.
Families able to afford private tutoring for their children were likely to spend additional time studying.

During the second Lockdown, with a legal requirement to provide 5 h of remote learning per day, the proportion of pupils studying for more than 5 h per day increased from 19 to 45%.

Of considerable importance was the extremely wide variation in 'lost in-person teaching time'—which ranged from a few weeks in a two year programme to around 44 weeks, with high spread across the range.

On 'lost time' Ofqual emphasised:

> …There was extensive variation behind the averages reported in the literature about lost time though, at regional, local authority, school and student level. Therefore, it is difficult to generalise across any particular group, as lost time is unique to each individual student… (Howard et al., 2021, p. 8)

The practical issue of school absence remains a serious and persistent problem. Absence due to illness was declining slowly but steadily prior to the pandemic. This changed dramatically. After the period of intense disruption of schooling had passed, overall absence had moved to 7.6% (2021/22) compared with pre-pandemic level of 4.7% (2018/17). But the figures include more problematic issues. In 2022, 24.3% of pupils were 'persistently absent' (more than 10% of school sessions, or 19 days or more during the school year)—this is a level which has reduced to 20.1% in late 2023 but this is still very substantially above the six years preceding COVID where the figure was around 11%. Pupils with additional needs or in contact with social services have substantially higher absence rates: 56.2% of those on a protection plan and 43.8% of 'children in need' were persistently absent (Schools Week 2022).

The overall situation has improved over 2023–24, but slowly and unevenly across schools and school types. Late January 2022 saw a further peak of COVID-related school absences—from 3.7% to over 5%—followed by a substantial reduction to under 0.8% in March 2022. But then rates began to rise swiftly to 2.5%. This affected both pupil absence and teacher absence.

It is clear that the period 2020–23 was one of instability and reversals for schools, escalating management and teacher workload, and sustained pupil uncertainty. The picture was one of a dramatic rise in absence immediately following the school closures; positive COVID tests being a key part of this.

Three main phases of absence have arisen:

2020–21 Height of the pandemic.
Two major periods of interrupted learning for pupils other than children of key workers.
National controversy over cancellation of exams and implementation of alternative to exams.
Highly disrupted re-opening of schools as schools followed guidelines on responding to infections.
Significant variation and irregularity in 'return to school'.
Constantly changing national guidelines on both closures and social restrictions.
National exams for 16 and 18 year olds cancelled in 2020 and again in 2021.

2022 Emerging from restrictions.
End of social and travel restrictions.
Teachers, pupils and families continue to be affected by peaks in COVID infections.
Absence rates fall back but remain well above pre-pandemic levels.
Union action and teacher strikes begin in the face of rising cost of living.
National examinations for 16 and 18 year olds resume with mitigating measures regarding standards.

2023 Drive to normality.
Union action and teacher strikes continue.
Absence rates remain above pre-pandemic levels.

Media comment and action of the national Commissioner for Children emphasise absence as an issue.
Government announces a range of measures and public communication to reduce school absence.
National examinations return to pre-pandemic arrangements except for small adjustments.

The various lines of educational research on COVID in England provide a valuable and comprehensive insights into impact. However, the studies are predominantly cross-sectional studies of particular age groups and/or phases of education. This tends to obscure a very important characteristic of the enduring impact of COVID on education: that the impact is differential in its form and effects as it slides through education—it is different ***within*** year cohorts and it is different ***between*** year cohorts. While directly-affected children (those born or young in pandemic) may only clear the system in the mid 2030s, the overall impacts in the system may persist beyond even that date.

Backward-looking analysis help us to interpret the PISA results. But it also highlights that the problem of COVID impact are embedded in the cohorts coming up through education—the *backward* analysis highlights the need for *forward* policy formation. 'Back to normal' rhetoric following lockdowns and the gross disruption of COVID has been asserted to restore economic and social activity. But this may be causing underestimation of the extent of the impact of Lockdown and COVID on young people, including those born during the pandemic. Schooling is not back to normal; it is not just the extent of the impact which makes the enduring effect of COVID a distinctive public policy problem—it is also the way is it distributed amongst young people. The evidence on COVID impact indicates that the policy challenge from COVID is unusual in its distribution, depth and effect. Different local infection rates, varying access to online learning, different degrees of individual response to and engagement with on line learning, and differing reaction to social isolation and disruption all indicate the highly individualised impact (OFQUAL, 2021).

Children carrying some degree and form of COVID impact will only clear the education system by the mid-2030s. With around 600,000 children in each year cohort, this gives an idea of the scale and duration of the problem in England.

Those 18 in 2020 and 2021 had taken exams at 16—their next set of exams at 18 were cancelled. Those 16 in 2020 and 2021 had their exam cancelled but had to complete the next set of exams at 18; they missed the preparatory effect of exams at 16. Different impacts. In turn, right at the other end of the system, those entering Primary education in those years were differently affected. These combine with the issues of highly individualise effects of interrupted education. These played out very differently in different children even in the same family: for some it has affected subject learning, for others school connectedness, others their learning dispositions, for some all of these. The impact has played out differently in different regions and in different social groups.

These three things together—the extent, the differing character and the wide distribution and individualised nature of impact makes this a deep and distinctive public policy issue.

4.3 Adequate Public Policy Responses

A public policy response to a crisis can readily be formed when we know with clarity who has been affected and to what degree, and where they are. This enables proportionate, targeted support and action. The problem which COVID impact presents is distinctive and challenging: it is distributed right through society, with different young people affected differently. This makes it extremely challenging for central Government to target support. This was evident in England in the provision of financial support for tutoring. Ministers rapidly presented a case to Treasury for support funding, successfully releasing a 3.5 billion gbp 'catch up' fund (House of Commons, 2022). By early 2023 audit established that 226 million was unspent (approximately 14% of the budget). There also were additional elements of 'clawback' from schools based on allocated but unspent funding for individual tutoring. While later tranches of funding within the budget did require matched funding by schools, providing a disincentive to schools with stretched budgets, earlier tranches did not. The National Audit Office report (NAO 2023) highlights that good use of the emergency funds did arise, but it is clear that this was not universally the case, nor did it always reach the most disadvantaged groups (Timmins 2021). Action at the centre was rapid and proportionate. Given the widely distributed and variable nature of adverse effects, the necessary bureaucracy in ensuring well-audited spend, the need to have various steps in allocation, in a time of extreme disruption and pressure for schools—all add up to an unprecedented challenge in ensuring that resource met real need.

It is worth tracing the different cohort effects and thus appreciate the problems which are moving up through the education system.

In 2022 and 2023, young people moved up into higher education and technical education who had sat GCSEs before COVID but did not sit A levels in 2020 or 2021. All agencies, schools and universities focussed on managing progression in 2020 and 2021 in the absence of examinations. Record numbers were admitted in 2020—but from universities we have evidence of students less prepared for the demands of higher education, for assessments and for the level of self-directed study required in higher education (ONS, 2021; Guardian, 2022). The higher numbers admitted in 2020 and 21 resulted in considerable pressure on practical resources such as accommodation, as well as increased pressure on teaching staff. HE institutions mobilised increased welfare and well-being support but still there occurred higher levels of dropout from higher education than in pre-pandemic times (Allen et al., 2023).

We must recognise the different challenges facing those of different age in the pandemic. In different cohorts the issues change. In summer 2022, for those young people age 18 taking A levels, they had no experience of high stakes examinations at

16, so lacked both the experience of focussed preparation and the realities of feedback on exam technique, as well as the guidance regarding progression which comes from obtaining GCSE grades through exams—the reflection and changes which can come from the reality of grades. Although with the end of Lockdowns schools had been able to resume normal schedules of mocks and exam preparation, OFQUAL was aware that standards setting in A levels in 2023 needed to be completed in the light of the disruption which the cohort experienced (OFQUAL, 2022).

These young people were at a crucial stage of their education as they experienced interrupted education, with all the variability in schools' first start-up of remote lessons, the variability in engagement and motivation, and the stresses and shocks of illness and loss in families during the height of the pandemic. For those who found it difficult to return to study, and had problems of poor motivation, underdeveloped study habits and anxiety, schools and colleges provided high quality welfare support and worked with other local agencies to ensure that well-being as well as attainment was attended to.

But post-16 institutions will continue to receive young people who have had disruption to both subjects (learning loss) and to dispositions towards learning. While post-16 cohorts admitted after 2023 will have had experience of high stakes exams and the intensity of study needed to do well, the variability of impact of the experience of interrupted education will be present. We hope that as time passes, the increased duration of time at schools after Pandemic will reduce the impact of interrupted learning—but admitting institutions would be wise to monitor academic performance, learning dispositions and well-being issues on entry. Increased formative and on-going assessment is crucial to these cohorts, to provide them with feedback on expectations and standards.

Moving further down the system, different problems related to COVID are evident.

For those moving from primary to secondary in 2022, during COVID they experienced a depression in maths skills and to a lesser extent, literacy. While literacy had been less affected by interrupted learning than maths, it remains the case that poor reading affects a young person's ability to access all subjects—and this can quickly deteriorate into disengaged and demoralised individuals and groups (GL Assessment, 2018). Again, effects are differentiated:

> … among adolescents aged 10 to 16 years old, there was evidence that in July 2020 those with higher levels of mental health problems before the pandemic experienced improvements in their mental health, whilst those with prior lower levels of problems experienced increases in mental health problems… the COVID-19 pandemic appeared to have had a greater effect on those not previously identified with higher mental health symptoms than adolescents with previous mental health problems. This difference was not found in adolescent self-reporting….

https://www.gov.uk/government/publications/covid-19-mental-health-and-wellbeing-surveillance-report/7-children-and-young-people

Post-pandemic, the enduring problem of attendance and 'ghost children' is stark and clear. Welfare and learning dispositions remain a great concern, with children of any ability or background potentially affected by their personal experience of

interrupted learning. As outlined earlier in this chapter, who has been affected, and how, and to what extent, remains challenging to detect.

For primary and early years, research indicates that something different again is unfolding. In primary and early years, distinctive COVID effects seem present in young children who were infants in Lockdown or were born in that time. Prior research suggested that depressed social contact, reduced exposure to spoken language, a lack of guided play tend to add up to depressed executive function (ability to concentrate, plan, listen, review and learn from experience), depressed language development, and persistence of infantile movement and behaviour (Ilyka et al., 2021; De Laia Almeida et al., 2022). Although there are indications that many children aged 6 and 7 during the pandemic years have with focussed support later reached pre-pandemic levels of attainment (NFER, 2023), there is still evidence of an overall depression of attainment and a particular depression of attainment in disadvantaged primary pupils. The attainment gap, closing before 2020, has opened significantly—growing to 8.7 months in mathematics (Guardian, 2024). This is not solely a question of gaps in learning. 'Learning gaps' is a dominant phrase which understates the range and depth of problems being experienced in secondary school children. It is even more inadequate to describe what we are seeing in the affected children in early years and primary. Depressed language, socialisation and executive function add up to *depressed human development*—something fundamental, not partial.

Policy-makers need to understand that this is an unprecedented form of public policy challenge. The impact of interrupted schooling is widely distributed and highly differentiated. It is different for different age groups. The cohorts born or young in pandemic are now presenting in primary school. Meanwhile, those in primary school during interrupted learning are now presenting in secondary education. These effects will continue until those born in pandemic clear the schooling system in the 2030s. As the cohorts with different challenges pass through, schools are constantly having to respond to a succession of changing demands regarding depressed mathematical attainment, language attainment, social skills, learning dispositions, school connectedness and fundamental aspects of development. There is evidence that schools are managing responses but these are not quickly and simply returning outcomes for all pupils rapidly to pre-pandemic standards.

All of the analysis so far presented in this chapter provides vital context for the 2022 PISA results for England. As with our analysis of the 2018 PISA outcomes, it is important to note there is significant acute and chronic divergence in educational policy and practice across the four devolved administrations which make up the United Kingdom. Although OECD in many data reports amalgamates the data into single UK figures. They really cannot be considered to be a single system.

In 2006 Scotland possessed high scores in PISA. In 2010 Scotland implemented the 'Curriculum for Excellence', a 'competence-based' curriculum which emphasises cross-curriculum delivery and 'rich learning experiences', downgrading progressions in discipline knowledge. PISA results have been on a strong downward trajectory since the introduction of the new curriculum, bar an improvement in reading in 2018. There is considerable attention being paid to possible mismatch between the aims of the curriculum and national assessment at the end of lower

secondary and during upper secondary. Scottish qualifications for lower and upper secondary are different to those in the other three devolved administrations.

Currently, Wales in the midst of curriculum reform, following poor educational outcomes during the last two decades. All at the level well below that of the other three administrations of the UK, Wales' scores declined in 2009 and 2012 PISA but recovered in 2015 and 2018 to slightly exceed 2006 levels. In the last decade, reform based on Scottish curriculum developments has been put in train but the timeframes do not support attribution of the post-2012 improvements to these current proposals. Qualifications in Wales are overseen by a distinctive national regulator and now include a specific Welsh Baccalaureate, while schools also can use qualifications which use the same labels and assume the same basic form as qualifications in England and Northern Ireland.

Northern Ireland maintains a distinctive system, which is undergoing careful incremental improvement and development in the wake of cessation of conflict. Its small size means that close relations obtain between schools, local and central government, and services such as school inspection. Northern Ireland's PISA scores of 2006–2018 are at a level comparable to Scotland and England. While England's performance has improved and Scotland's significantly declined, Northern Ireland's scores have been remarkably stable. Qualifications in Northern Ireland are overseen by a distinctive regulator and have the same labels and same basic forms as qualifications in England.

England implemented a new curriculum in 2014, based on international review of high performing jurisdictions, with a focus on learning progressions in discipline knowledge. Crucial to its improved results in 2018 were two initiatives in reading and maths, implemented from 2010. The reading initiative encouraged high fidelity implementation of reading schemes with a strong phonics component. Approved learning materials and linked professional development were central to this. In maths, a model of 'Maths Mastery', based on Singapore Maths and maths in Shanghai was funded. Including exchanges of large numbers of teachers between England and Shanghai, the implementation was supported by a 40 newly-funded 'maths hub' schools which provided professional development to over 11,000 primary and secondary schools. This was co-ordinated by the National Centre for Excellence in the Teaching of Mathematics, and supported by approved textbooks. Improved results in Reading and Maths in PISA 2018 are co-incident with these initiatives and notably link more to these than implementation of the revised National Curriculum. There was no high fidelity intervention in science; results in PISA in science have remained static (Table 4.2).

4.4 Endgame—Continued

England was successfully improving performance in PISA prior to COVID and that improvement can be specifically linked to deliberate and coherent national policy implemented from 2010 (Oates, 2021). COVID had a profoundly disruptive effect in the English education system and led to lower PISA scores in 2022 and a switch

Table 4.2 England's, Scotland's, Wales', and Northern Ireland's PISA 2022 and 2018 results compared

	2018	2022	Change		Trend prior to COVID
Reading					
England	505	496	– 9*	Smallest	Improving**
Scotland	504	493	– 11	Largest	Declining
Wales	483	466	– 17		Static
Northern Ireland	501	485	– 16		Slightly improving
Mathematics					
England	504	492	– 12	Smallest	Improving
Scotland	489	471	– 18	Largest	Declining
Wales	487	466	– 21		Improving
Northern Ireland	492	475	– 17		Static
Science					
England	507	503	– 4	Smallest	Improving
Scotland	490	483	– 7	Largest	Declining
Wales	488	473	– 15		Declining
Northern Ireland	491	488	– 3		Declining

* England did not meet the full sampling criteria (OUCEA et al., 2023) and results may include an inflationary factor due to overrepresentation of higher performing pupils
** England did not significantly improve reading *scores* in 2018 but since many high performing systems' scores were declining, England's 2018 *rank order position* improved
Source: OECD

from improving to declining equity and attainment. Yet for reasons unclear, England's performance deteriorated less than the other three devolved administrations of the United Kingdom. The complexity of the impact of COVID masks obvious reasons—the relatively high accountability arrangements in England? The specific COVID support measures unlocked by the Department for Education? The strategies for improvement pre-COVID also being important for COVID recovery in schools? Teacher commitment and drive? Pupils' digital skills and persistence in learning during Lockdowns? All or some of these? Domestic research work continues on trying to decipher key factors, cause and effect. What this chapter has focussed on, however, is something of great importance: serious, enduring COVID effects are still evident in the system, are complex in their distribution, affect different age groups in different ways, and those directly affected by disruption do not clear the system for many years. Those born and young in Lockdowns are fortunate in having many years in schooling ahead of them and will have the extended support of teachers to address their challenges. But questions remain as to whether teachers and schools are adequately supported to meet these continuing and changing challenges, whether the system itself will return to pre-COVID practices or will be transformed by these rolling pressures, and of course, what will PISA 2025 tell us about how we are supporting the COVID generation?

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Chapter 5
Estonia: The Impact of Covid-19 on Education in Estonia—What Have We Learned from PISA 2022 and National External Evaluations?

Gunda Tire

Abstract PISA 2022 is the first large scale international assessment that claims to capture the impact of Covid-19 on school systems worldwide. Learning loss is observed in many countries around the globe and Estonia is not an exception. However, Estonia is still among the top performing countries showing high levels of student performance in all domains of assessment. In this chapter we look at pre and post Covid-19 data about the aspects of equity, performance and well-being as seen by the national and international studies for Estonia.

5.1 Introduction

Estonia faced the pandemic similarly to other countries with widespread school lockdowns. In March 2020 schools were closed overnight. School management, teachers, students, and parents had no time to prepare—suddenly everyone was at home. The key word in this unprecedented situation was "resilience". According to Estonian educational dictionary, resilience is defined as "an ability to adapt and develop in a difficult, high-risk environment". It helps to bounce back and bounce forward. The way individuals, schools or systems decided to react and handle this extraordinary situation was largely determined by their resilience during the pandemic.

In spring 2020 Estonian government implemented slightly less drastic measures as compared to some other European countries. People were allowed to move around, shops stayed open, schools continued online. Looking back at that time, Estonians think that they were somewhat prepared for the crisis. Widespread digitalization of the society, including IT educational tools had been available for more than a decade.

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Estonian schools had started digitalization of education already since 1997[1]—thousands of teachers had received training in digital skills, many digital solutions for teaching and learning had been an integral part of life. Some schools had even practiced "online learning" days. Despite this experience, there was some confusion and a big learning curve during the first weeks of the lockdown. Schools had to decide quickly how to proceed effectively in the given situation. As concluded by researchers from Tallinn University—"some schools were more ready to manage the change in the situation than others" (Tallinn University, 2021).[2] Those who were more resilient, managed better.

According to the study from 2021,[3] Estonian teachers thought that they managed well during the online teaching. It was extremely important that school management would be supportive, communicate clearly, support teacher autonomy and care for student and teacher well-being. Despite the Estonian optimism about managing the situation, PISA 2022 gives a somewhat different perspective. It looks at student performance, equity, and well-being to evaluate the Covid-19 impact and does not put Estonia among the "resilient education systems" (OECD, 2023a, 2023b).

Interestingly, when PISA 2022 asked students to recall the school closure periods and estimate how much they studied during that time, many of the responses are empty. 12% of Estonian 15-year-olds would not respond or remember this detail (24% in the OECD countries). 55% of Estonian students claimed that their school was closed for more than three months, 7% said their school was never closed and 4% said it was closed for more than a year. These student reports need to be handled with care but since school principals were asked the same question, the correlation between student and principal responses is strong (r = 0,78), (OECD, 2023a, 2023b). Whatever the time periods, the conclusion is clear—school closures are related to a negative influence on the learning outcomes, equity, and student well-being.

5.1.1 Some Background Facts and Statistics on Estonian Education System

Estonia is a small county with 1.3 million inhabitants. The population comprises 68% of Estonians, 22,5% of Russians and 10% of other nationalities. There are 505 general education schools with around 163 000 students. Children start school at the age of 7 and study for 9 years in the "basic school" (*põhikool*). They finish it at the age of 15 or 16 and with that they have completed compulsory education. There is high participation in pre-school education, around 96% of children have attended a kindergarten. Schools are generally owned by the local municipality and are very autonomous. Around 11% of schools are privately owned. Teachers must have a

[1] https://kompass.harno.ee/tiigrihupe/tiigrihupe-pluss-ehk-opetajalt-opetajale/

[2] https://www.hm.ee/sites/default/files/documents/2022-10/tlu_raport_distantsope_yldharidus_2810.pdf.

[3] https://haridusfoorum.ee/images/2020/Distantsppe_uuring_EHF_250720.pdf

master's degree and they can freely choose teaching methods and materials to use in their lessons. School curriculum is the main document to be followed at school and it is based on the national curriculum.

PISA 2022 was administered in 196 schools in Estonia testing 6392 students. They represented 13,640 PISA age students enrolled in Estonian educational establishments in the spring of 2022. Among the tested students 3120 or 49% were girls and 3272 or 51% were boys. All of them were born in 2006 and as confirmed by Statistics Estonia there were more boys born that year than girls. PISA sample reflected the tendency correctly. Estonian sample represented all 15 Estonian counties, 77% of students were assessed in Estonian and 23% in Russian. 78% of students were enrolled in grade 9 and 21% of students were in grade 8. Only 1% was in other grades and vocational schools (Tire, et al, 2023).

5.1.2 National Look: What We Learned from National Assessments About PISA Age Students Before and After Covid-19?

In PISA, each country determines the so-called "national model grade" where most PISA age students study. For many countries it is grade 10, in Estonia that is grade 9. Students sit the PISA test in April or May, right before the final examinations that they need to take to finish the basic school. Successful passing of the exams grants them a certificate about completed compulsory education and opens options for upper-secondary education. To finish the basic school students must take three national exams: two compulsory examinations (Estonian or Estonian as a second language and mathematics) and one examination of their choice from a list of 10 subjects. National exams are part of external evaluation. They are administered once every year and are designed to measure how well students have acquired the learning outcomes stated in the national curriculum.

With the outbreak of Covid-19 and school closures in spring 2020, national exams were cancelled. That was unprecedented and happened for the first time since establishment of external evaluation system in 1997. Exams were reinstated a year later in 2021 with the condition that they would not be linked to school finishing requirements. In other words, students had to take the exams, but the results would not affect their graduation, they would finish the basic school with any score. The same examination conditions were applied in 2022.

However, in 2023 the national examinations in mathematics and Estonian for grade 9 (compulsory for all students) were reverted to pre-pandemic conditions and were high stakes exams again. Each exam had a detailed description. The math exam tested the learning outcomes stated in the national curriculum and contained tasks examining student skills and knowledge to calculate numbers, percentages, solve tasks in algebra, functions, and geometry. Many tasks were presented in problem solving

situations that would check how well students could do mathematic reasoning, interpreting, and employing (Harno, 2023).

On June 7, 2023, there were 14 118 students sitting the 3-h mathematics exam for grade 9. The exam was offered in three languages: 76% did the exam in Estonian, 23% in Russian and 100 students or 0,7% did the exam in Ukrainian. The Ukrainian language option had just been added to support the Ukrainian students who had recently arrived as refugees. Exam results were linked to school finishing requirements and students had to get 50% of the exam right to get a passing grade. Students could use calculators and the exam paper was presented in a form of a booklet. Students could choose order in which to solve the tasks or items. Exam was marked by a teacher locally at the school (Table 5.1).

If we compare how many students failed the mathematics exam in 2019 and 2021, we see a considerable increase in shares of failing students in the post pandemic period. If in 2019 there were 13,6% of students who failed the exam, then in 2021 it was 38,6%. However, if comparing trend from 2021, 2022 and 2023 one could easily decide that exam results in mathematics are in a positive trend, and they are starting to recover after the years of pandemic. Similarly, we see that there are more students who passed the exam with high scores at the other end of distribution in 2023. However, in 2021 and 2022 the national exams were mandatory but without the need to achieve the passing grade. With such condition students might not make maximum effort in the exam. We also see that from PISA 2022 test effort measurement where 72,5% of Estonian students admitted that they would put more effort in work that affects their grades.

Since Estonian policy makers changed the conditions during the Covid-19 years we cannot measure exactly, how much of the learning loss is related to decrease of student knowledge and how big is the role of motivation and effort to do the exam well.

How big was the motivation and willingness to study during the school closures according to the students themselves? In 2020 the Ministry of Education and Research of Estonia commissioned Tallinn University (Lauristin, et al, 2020) to explore the learning habits of students during the school closures. It revealed that the student age played an important role. The older the students, the more they were ready for

Table 5.1 Shares (%) of students who failed (below 50%), got 50–74%, 75–89% and 90–100% correct in national mandatory mathematics exam in grade 9, from 2017 to 2023

School year	Below 50% or fail	50–74%	75–89%	90–100%
2017	**11,8**	**28,6**	**25,4**	**34,2**
2018	**20**	**35,1**	**20,8**	**24,1**
2019	**13,6**	**32**	**24,2**	**30,3**
2020	**Exam was cancelled**			
2021	**38,6**	**29,8**	**16,9**	**14,7**
2022	**37,9**	**27,6**	**16,8**	**17,7**
2023	**23,2**	**31**	**21,7**	**24,1**

independent study. Students were divided into three groups: those who preferred online school (38%), those who did not make a difference between online and in person (35%) and of students wanted to attend school as usual (28%). In PISA 2022 around 60% of students admitted that they did not study that much during the school closures.

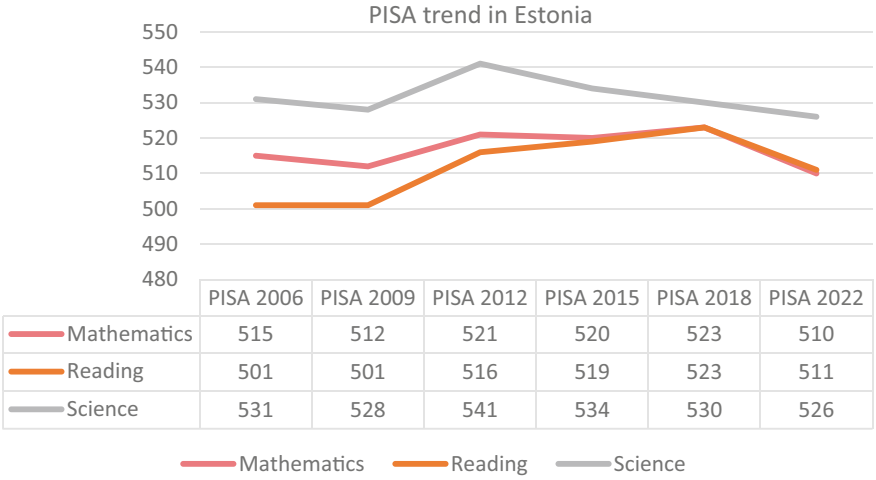
5.1.3 International Look: What We Learned from PISA 2022?

PISA 2022 data release was highly anticipated by schools and the public. December 5, 2023 was a lovely crisp winter day in Estonia. PISA 2022 results were announced by the minister in a press conference streamed online from Tartu, the headquarters of the Ministry of Education and Research. The event was attended by most media outlets and shown in all news channels in detail. The news channels took the liberty to create catchy headlines. One outlet had decided that "Estonia has fallen to fourth position" in PISA while another claimed that "we have risen to seventh". As already said, it was a positive and festive day, "a breeze of fresh air" among the depressingly negative news, as admitted by one newspaper. The minister of education and research commented in the press conference that the good results are characterized by the fact that most students in Estonia achieve baseline level of proficiency. "This means that our teachers pay a lot of attention to all children in the classroom, not only to the most capable ones. The professional skills of Estonian teachers play a key factor here."

The other news dominating mass media that same week was concerning teacher strike. Estonian teachers had already done a warning strike a few weeks earlier and since they did not get the expected results, they were preparing to take the next step. The immediate reason for the strike was the government failure to increase teacher salaries as promised. Moreover, with this initiative teachers wanted to point out the painful side of the profession—teacher shortage, heavy teaching load, missing career perspectives, and burn out. PISA 2022 results only supported the idea that Estonian teachers deserve a higher pay, they do a good job as confirmed by PISA.

What did we learn from PISA 2022 internationally? We see discouraging post pandemic results worldwide. There has never been such a steep drop in the mean scores for the OECD countries: decrease in 15 points for mathematics and 10 points for reading. Science did not change significantly.

Estonia topped the lead tables right after the high performing Asian countries and was among the top performers in Europe. It could enjoy the attention and interest of the region. In mathematics Estonia ranked seventh with 510 points after Singapore (575), Macau (China) (552), Taipei (China) (547), Hong Kong (China) (540), Japan (536) and Korea (527) showing statistically similar results with Switzerland (508). In reading Estonia ranked sixth with the mean score of 511 points after Singapore (543), Ireland (516), Japan (516), Korea (515) and Taipei (China) (515). The results in



	PISA 2006	PISA 2009	PISA 2012	PISA 2015	PISA 2018	PISA 2022
Mathematics	515	512	521	520	523	510
Reading	501	501	516	519	523	511
Science	531	528	541	534	530	526

Fig. 5.1 Trend of PISA mean scores in mathematics, reading and science (2006–2022)

reading were statistically similar to the results of Ireland (516), Japan (516), Taipei (China) (515), Korea (515), Macau (China) (510), Canada (507) and USA (504 points). In science Estonians scored sixth with 526 points after Singapore (561), Japan (547), Macau (China) (543), Taipei (China) (537) and Korea (528).

Comparing Estonian results from PISA 2018 and PISA 2022 we see a decrease in mathematics for 13,5 points and in reading for 12 points which is a statistically significant change. The results in science did not count as a statistically significant change with 4 points. Although science results do not show a significant change since 2018, we see that the downward trend in this domain started already in 2012 (Fig. 5.1).

5.1.4 Low and Top Performers in PISA 2022

PISA 2022 data indicates that there has been a change in shares of low and top performers for many countries. If we look at the data from European Union countries, the underachievement in mathematics stands at 29,5%. Almost 30% of young people in European Union countries do not reach the basic skills level! EU has set a benchmark that aims to have no more than 15% of students that could be below the baseline level. This benchmark of underachievers is met only by Estonia in mathematics and science, and together with Ireland in reading. In other EU countries the shares of low performers are larger. As the EU report notes (European Commission, 2024), Covid-19 played a significant role in the performance drop. With such large groups of underachievers, European Union is at a serious risk to become in a disadvantaged position for the future economic and social cohesion.

If we examine how Estonian students performed according to different levels of proficiency, we see that in comparison to previous PISA cycles, the shares of low performers have increased, and the shares of top performers have decreased. Again, not as much as in many other countries. Both ends of distribution are important, the top performers should indicate the future potential of the country, and the low performing students suggest number of students that will be struggling in their future studies. Estonia has paid a close look at these groups and marked them as its strategic indicators in the Educational Strategy 2021–2035. The general objective of the strategy is to "equip the population of Estonia with knowledge, skills and attitudes that prepare people to fulfil their potential in personal, occupational and social life and contribute to promoting the quality of life in Estonia as well as global sustainable development".[4]The target indicators for 2035 are to achieve 20% of students to be top performers in reading, 25% in mathematics and 20% in science. If Estonia showed an increasing trend up until PISA 2018 then PISA 2022 shows a trend away from the set indicators. The decline in top performers has been from 15,5 to 13,1% in mathematics, from 13,7 to 10,6% in reading and from 13,5 to 11,6% in science. Who are the students that have contributed to this decline? We see that in reading and science the decline is observed among students from Estonian language instruction schools who in previous years showed higher results.

Even though shares of low performing students have increased, they are still among the smallest in Europe. 85% of students in Estonia have reached the baseline levels of proficiency in mathematics leaving 14,9% to below the baseline (it is 31,1% for the OECD countries). This share has increased by 4,7% points since PISA 2018 (the increase for the OECD countries is 7,1 points). In reading the shares of low performers have increased from 11,1 to 13,8% and in science from 8,5 to 10,1%.

As observed in the past PISA studies there is a significant gap between students from different language groups in Estonia. Students from Russian language instruction schools perform significantly lower than their peers from Estonian language instruction schools. The results for Estonian language schools were 517 points, Russian peers scored 485 points in mathematics which is significantly lower, but above OECD mean (472 points). The shares of low performing students in the Russian language schools are about 25% for boys and 23% for girls. In Estonian language schools the corresponding numbers are 14% for boys and 15% for girls.

The situation is similar in reading and science as students from Estonian language of instruction schools perform better in those domains. However, the overall drop since the last PISA cycle in the results is observed more among the Estonian students. The results for Russian students in reading and science are similar to those from PISA 2018.

[4] https://www.hm.ee/en/ministry/ministry/strategic-planning-2021-2035#indicators

5.1.5 Equity and Student Socioeconomic Background

One of the main Estonian education policy priorities has been to guarantee equal access to education for all students. Until PISA 2022 Estonian education system measured high in equity. However, this has changed and for the first time we see that the student socio-economic background plays a role in student achievement. In PISA 2022 13,4% of the variance is impacted by the student's socioeconomic background which is statistically the same as for the OECD countries (15,5%). In PISA 2018 it was only 8,8% for reading which was statistically significantly lower than the OECD average of 13,8%. This change could be the consequence of COVID-19 as the most vulnerable groups of society were impacted more during the lockdown. The Government Office of Estonia published data about increasing inequality of family income in May 2020. 55% of the population reported decrease in their family income and 36% said that they had lost their job during the crisis (Riigikantselei, 2021). Similarly, a year later 25% of population reported financial problems. This is supported by data from Statistics Estonia.[5] In 2022 the share of Estonians living in relative poverty was 22,5%, while 3,5% lived in absolute poverty. Compared to 2021 the share of relative poverty decreased by 0,3% while people living in absolute poverty increased by 2,1% points. Statistics Estonia notes that rural areas were affected most. We see the same in PISA 2022 data. Students from many rural regions show more than 50 points drop in PISA scores since 2018.

In PISA 2022 the gap between advantaged and disadvantaged students in mathematics was 81 points (93 points for OECD countries). In 2018 this difference between high and low socio-economic status (SES) students was 63 points, which means that the gap has increased by 18 points. This change is triggered by the decrease of 23 points of low SES students. At the same time, the high SES student score dropped only by 6 points. OECD notes that in 48 countries out of 69 the gap between high and low SES students did not increase between 2018 and 2022 which was not the case for Estonia. In the neighbouring countries the drop was much smaller: 10 points in Finland, 6 points in Latvia. This change should make us very alert to the fact that around 25% of low SES students performed below the baseline level of proficiency (level 2) and only 6% of students from high SES backgrounds did not reach the baseline level of proficiency. Numbers are reversed if we look at the top performing students. Only 6% of low SES students are top performers and around 25% of top performers come from high socio-economic backgrounds.

If we look at schools with Estonian and Russian language of instruction, we see that low SES students perform similarly in both medium schools, however, high SES students in Estonian language schools show 45 points higher results than their high SES peers in Russian medium schools.

[5] Https://www.stat.ee/en

5.1.6 Student Well-Being and Mathematics Learning

Student well-being during the Covid-19 has been captured by different qualitative and quantitative studies conducted in Estonia.

On 18 March 2021, Estonian Literary Museum launched a public collection initiative of lockdown experiences in the form of diaries (Kutsar & Kurvet-Käosaar, 2021). Children were invited to be sources of information about their own lives during the school closures, write about their relationships with family members, Describe fears and hopes and what they thought about the processes in the society. Data was anonymized and analyzed. Analyses of these diaries suggest different experiences—for example, social distancing from friends being intolerable, spending too much time in front of the computer, sleeping problems. For older students, the biggest source of stress was not the virus but not knowing whether they would be able to finish school with good results and continue their education. This study from very personalized experiences analyzed the impact of lockdown policies on children well-being and the long-term impact and adequacy of the measures.

Student well-being has been under focus for Estonian education already since 2015 when national wellbeing surveys were introduced.[6] The goal of monitoring well-being is to get the picture at the system level and provide individual schools with reports about their general well-being and school climate. Additional questions were added to the well-being surveys during the Covid-19 time.

Another study (Mägi, 2021), commissioned by European Commission interviewed a sample of Estonian school principals, teachers, and students in 2021 during the second year of Covid.[7] The interviews examined different aspects of student life. They note the decrease in student motivation and increase in levels of anxiety if compared with the beginning of Covid-19 lockdowns in 2020. During the second year of Covid-19 students were tired of being at home, they wished to be elsewhere. As an example, the study presents an interview with a grade 9 student. She expresses fear and insecurity about her future study possibilities: “Perhaps we have not been able to learn that much but we still need to take exams. If exams were cancelled, it would be such a relief, but at the same time, if we want to enter other schools, there will be exams and that would be a first-time experience for us.” It can be assumed that such thoughts crossed minds of many adolescents during Covid-19 increasing levels of stress and anxiety.

OECD notes that students whose teachers were available during the school closures scored higher in mathematics and were more confident about self-directed learning (OECD, 2023a, 2023b). Around 76% of Estonian students agreed that “My teachers were available when I needed help” during the online learning. Lack of teacher support increased levels of insecurities and anxiety. As noted in another interview from the European Commission study: „I am not sure about my math skills, because I study by myself. Even though the teacher is with me in the online lesson, she cannot follow what I am doing and how I am doing it. “The fear of failure

[6] https://harno.ee/riiklikud-rahulolukusitlused.

[7] https://publications.jrc.ec.europa.eu/repository/handle/JRC125454.

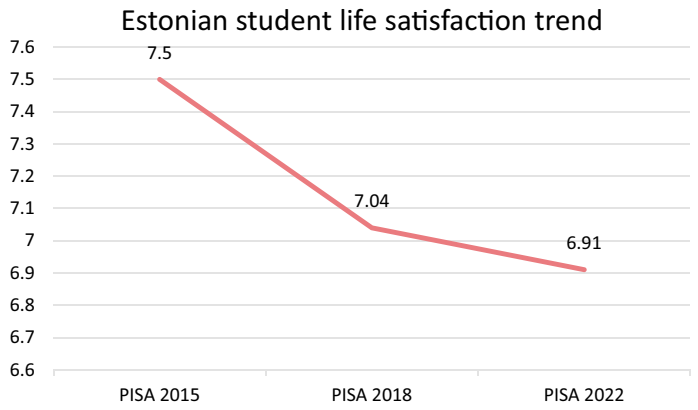


Fig. 5.2 Trend in Estonian student life satisfaction

about working without the teacher indicates the importance of the teacher during the process of instruction. If PISA asked students to assess the quality of their mathematics lessons, we see that math results are very closely related to quality of the math teacher. About half of the Estonian students thought that they have a very good math teacher and that was reflected in the results.

Student well-being suffered during the lockdown as students spent extensive periods of time in front of digital devices and did fewer physical activities. Estonian Human Development report in 2023 notes that quality of life of young people in Estonia has never been as good as it is now, however the mental well-being shows negative trends.[8] Mental well-being in adolescents is associated with nutrition, physical activity, and sleep quality.

In general, we see that since 2015, Which is the first time the well-being indicator was added to PISA, in many countries it has been in a downward trend. Students are asked in the student questionnaire: "How satisfied are you with your life these days?" on the scale from one to ten. One being the least satisfied and 10 being the maximum or completely satisfied. The mean score for Estonia is 6,91 while the OECD mean is 6,75. Similar life satisfaction is seen for students from Sweden (6,91), higher for Finland (7,41) (Fig. 5.2).

It should be also noted that life satisfaction score does not correlate with the test results. Data shows that life satisfaction is higher for boys than girls, higher for advantaged students, students from urban areas and students from Estonian language of instruction schools.

[8] https://inimareng.ee/en/estonian-human-development-report-2023/

5.1.7 A Way Forward

In November 2021 Estonian policy makers announced a government funded recovery plan for learning losses caused by Covid-19. The plan included development of computer-based tests available for all schools in all subjects. These tests would help teachers detect learning gaps and provide more efficient instruction to their students. It was stressed that individual needs of students should be detected and supported wherever possible. Schools would be given additional funding to provide instruction in smaller groups. Also learning oriented summer camps were financed for students to catch up in different subjects and boost motivation for learning. Universities were funded to provide free courses to high school students in national examination subjects. Different online courses for teachers were developed to support them on different aspects of instruction.[9]

In early spring of 2022 Estonian schools had just resumed regular schoolwork after Covid-19 disruptions as Russia invaded Ukraine and the Ukrainian refugees started to arrive. This was happening during the PISA 2022 testing in Estonian schools. The immediate decision of the policy makers was to involve refugee children into schools and make them busy after freshly experienced traumatic escape from their country. The war made Estonian policy makers act on a reform that had been discussed for years. Already since PISA 2006 we have seen in all PISA cycles that students from Russian language schools show significantly lower results than their peers in Estonian language schools. To fix that a political decision was made that Russian language schools would gradually transition to studies in Estonian. The goal is to provide high quality education to all young people growing up in Estonia. On December 12, 2022 Estonian parliament adopted the legislation change stating a strict timeline for transition of all children in Estonia to study in Estonian.[10]

Another issue that Estonian education system must deal with immediately is the shortage of teachers. PISA 2022 reports that 73% of Estonian students studied in schools where the principal admitted that schoolwork was somewhat disrupted by lack of teachers and 51% of students went to schools where principals noted that there is lack of qualified teachers. In 2018 the respective numbers were 44% and 33%. A month after PISA 2022 data release Estonian teachers went on a two-week strike, demanding the promised salary increase and change in the way the teacher career is currently set. Estonian teachers demanded government action in helping to preserve high education standards that are repeatedly supported by PISA. The strike resulted in a government promise to deal with the problematic issues in education. There is a promise that by 2027 Estonian teacher salary will be increased to 120% of the average salary in Estonia.

For the first time OECD talks about resilience as part of education system that should be mastered at both individual and systemic levels. Estonian education system should become more resilient. That can be achieved by not lowering the student performance and supporting equity for students from more vulnerable backgrounds.

[9] https://opleht.ee/2021/11/distantsoppes-tekkinud-opilungad-tuleb-siluda/

[10] https://www.riigiteataja.ee/akt/128122022008.

Schools should pay more attention on student sense of belonging; it has decreased after the Covid-19, and it plays a role in student outcomes. We should work on supporting the low performers as well as high performers. All students need to develop their full potential and that is the task of education system.

In conclusion, we see that Covid-19 left a negative impact on learning outcomes, equity, and well-being on young people in Estonia. At the same time, we are pleased with PISA 2022 results despite the negative trends. They were widely resonated in the society and picked up by the Estonian president Alar Karis in his annual Independence Day speech on February 24, 2024. He said: "A high place in international rankings is something to be proud of, but zealously comparing ourselves to our neighbours cannot turn into a provincial ranking obsession. It is my firm belief that our comprehensive school is the cornerstone for our future and wisdom and must remain so. Our education system has helped all young people—regardless of their family background or place where they live—to receive quality education and open doors that otherwise would have remained closed" (Office of the President, 2024). This is a compliment to our education system, at the same time indicating that all the good qualities should be preserved also for the future. That is everybody's responsibility and the way forward.

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Chapter 6
France: How COVID-19 Pandemic Affected Learning and Equity of the Education System

Elise Huillery

Abstract This chapter examines French educational outcomes before and after the onset of the COVID-19 pandemic. Pre-COVID trends reveal a slow continuous decline in academic performance over time, and steadily strong social inequality. Post-COVID evolution is mixed: PISA 2022 shows a sharp decline in performance for 15-year-old students, stronger than in the average OECD country; but PIRLS 2021 shows a remarkable stability in the reading skills of 4th Grade students, which looks like an exception in the context of a global decline in performance; finally, social inequality did not deteriorate in France, which also contrasts with the typical OECD country. These mixed results may be related to the fact that French school closed much less than in most countries during the pandemic, and to the class-size reduction reform implemented in 2017 in Grade 1 and 2 in disadvantaged schools. These policies may have counteracted the pandemic losses for young students, although not for adolescents.

6.1 Introduction

After the historic disruption of the COVID-19 pandemic, the time has come for assessing the damage done and lessons learned. The pandemic affected more than 1.6 billion students and youth globally, with substantial amount of schooltime lost in 2020 and 2021. The loss of learning opportunities for students deserves careful attention because it could have serious implications for their future, especially for the most vulnerable learners. However, school systems may have developed some form of resilience limiting learning losses in the medium and long run, so the actual damage on learning outcomes still needs to be assessed.

Before the pandemic, national education systems already differed in many ways and exhibited different trends in terms of educational outcomes, with some countries

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evolving upward, others downwards, or flat. We thus cannot attribute entirely the evolution of educational outcomes after the pandemic to the pandemic itself and related governmental responses. However, it can be instructive to at least examine the evolution of educational outcomes before and after the shock and read them in the view of governmental responses to the pandemic as well as baseline characteristics of the education systems to shed light on what worked to counteract the pandemic losses.

This chapter applies this exercise to the case of France. It starts with a brief overview of French government's response to the pandemic as well as of important education policy that was undertaken in the recent period and could thus contribute to explaining the evolution of French educational outcomes. This analysis shows that France resorted much less to school closures than the average OECD country. Besides, an important class-size reduction policy was implemented from 2017 on in Grades 1 and 2 in disadvantaged schools with the aim of reducing social inequality in education outcomes. When comparing the evolution of educational outcomes after the COVID-19 pandemic in France and international benchmarks, it is important to acknowledge that the interpretation encounter confounding effects stemming from the disruptions caused by school closures at the same time as this ambitious class-size reduction policy.

Second, the chapter examines how performance of French students in primary school and middle school evolved after the COVID crisis, and whether the evolution shows a marked discontinuity compared to the pre-COVID period. The objective of this part is to contrast the French evolution to what happened internationally to assess whether the COVID crisis seems to have hit France in a different way than the average OECD or European country. It involves a comprehensive analysis of educational outcomes in France before and after the onset of the COVID-19 pandemic. It takes the longest perspective possible to compare the evolution of educational outcomes after COVID-19 to its historical trend. Specifically, I juxtapose pre-COVID PIRLS and PISA data from 2001 and 2000 respectively with their post-COVID counterparts in 2021 and 2022.

Finally, this chapter examines the evolution of social inequality in performance before and after the COVID crisis. In fact, from 2006 on, France was consistently characterized by one of the strongest correlations between students' performance and their socioeconomic background. The second objective of the chapter is thus to analyze whether French government's response to the pandemic changed this long-lasting specificity of the French education system in a way or another. As French schools closed much less than in most countries during the pandemic, one may expect the pandemic to have increased social inequality more in other countries than in France. It is thus interesting to examine how social inequality in the French education system evolved after the pandemic comparatively to the average OECD country.

6.2 Background on French Education Policy

This section presents some important elements of French education policy in the past few years to provide the necessary background to read the evolution of educational outcomes that will be presented next. The first important element is the governmental response to the pandemic, and the second important element is the class-size reduction policy implemented from 2017 on.

6.3 COVID-19 and Policy Responses to the Pandemic

It is very interesting to examine how the French school system responded to the pandemic and how other education systems responded to similar challenges. To this end, I rely on OECD/UIS/UNESCO/UNICEF/World Bank' effort to collect comparative education statistics to track policy responses of OECD countries' governments, and in particular school closures (OECD/UIS/UNESCO/UNICEF/WB, 2021). This database shows that, after a quasi-systematic closure of schools in most countries in mid-March 2020, approaches diverged significantly between September 2020 and the first part of 2021. In some countries, schools remained closed as viral transmission increased, while others kept them open even in a difficult pandemic context.

Figure 6.1 reports the number of instruction days of school closure from 1 January 2020 to 31 May 2021, distinguishing between full and partial closures (excluding school holidays, public holidays and weekends). As we can see, the number of days that school were fully closed increases with the level of education. On average in OECD countries, pre-primary schools were fully closed for an average of 55 days between 1 January 2020 and 20 May 2021 while primary schools closed for 78 days, lower secondary schools for 92 days, and upper secondary schools for 101 days. The number of days of school closure represents roughly 28% of total instruction days over an academic year at pre-primary and more than 56% at upper secondary level on average across OECD countries.

In France, the response to the pandemic shows a sharp difference with the average OECD response. In fact, schools were much less likely to close both fully and partially, and at every level of education. The number of days of full closure between January 2020 and May 2021 is only half the average number in OECD countries, and the number of days of partial closure only a third (and even a quarter in middle school). Basically, French schools closed only twice: for 7 weeks (on top of 2 weeks of school holidays) during the national lockdown from March 16 to May 10, 2020; and for 2 weeks in April 2021 when the number of COVID-19 cases reached extremely high levels due to the Omicron variant. But even during this period between January and May 2021 of highest cumulative numbers of COVID-19 cases ever experienced, France did not fully close schools except for 10 days in April, which was presented as a strong willingness to preserve educational opportunities against health outcomes. France is not the only country which adopted such a pro-education strategy: Belgium,

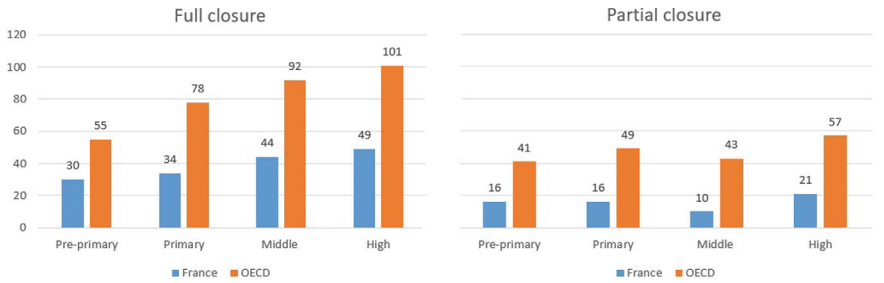

Fig. 6.1 Number of days of school closure from January 2020 to May 2021. *Notes* Author's calculations based on OECD/UIS/UNESCO/WB Survey on Joint National Responses to COVID-19 School Closures Database, version 3 (14th September 2021): https://www.oecd.org/education/Preliminary-Findings-COVID-Survey-OECD-database.xlsx. The figure presents the number of days of school closure from 1 January 2020 to 31 May 2021 in France and the average across OECD countries

Spain, or Switzerland for instance also kept schools largely opened despite high prevalence of COVID-19 during the same period.

As schools shut down, arrangements were made to ensure learning continuity, but such arrangements varied substantially from a school to another, and even from a class to another, since teachers were largely responsible for developing their own tools for distance learning—especially during the first lockdown from March 16 to May 10, 2020. While school closures were decided at the national level, the organization of distance learning was decided at the local level. Online platforms operated in different ways: at the national level, the National Centre for Distance Learning (Centre National d'Enseignement à Distance, CNED) provided access to educational resources and virtual classes ("*Ma Classe à la Maison*") while at the local level, other platforms were also used.

To track the volume of learning continuity and its quality during this period, the French ministry of education administered large representative surveys to teachers and parents right after the first school closure period, in May 2020. According to these surveys, 77% of primary school teachers and 68% of middle school teachers were satisfied with the level of learning of their students (Ministère de l'éducation, de la jeunesse et des sports, 2020). Such statistics are rather reassuring since they suggest that most teachers did not observe important learning losses after the 7-week school closure. However, it is important to note that in disadvantaged schools (i.e., schools in the Priority Education program which represent 20% of French students), the corresponding numbers fall to 64% and 49% respectively. This indicates that learning continuity varied substantially depending on the socio-economic background of students. These surveys also indicate that the proportion of students whom teachers had no contact was small, with only 6% of students in primary schools and 10% of students in middle schools, but these proportions were substantially larger in Priority Education, respectively 10% and 19%.

6.4 The Class-Size Reduction Policy

To interpret the evolution of French educational outcomes after the COVID-19 pandemic, it is important to be aware of a class-size reduction program which was implemented in Priority Education schools. Priority Education schools enroll 20% of French students, mostly disadvantaged since the criteria to receive the Priority Education label are based on the socio-economic background of students. Priority Education schools benefit from additional resources compared to the other schools, mostly smaller class-size and bonuses for teachers. However, even in Priority Education, class size is typically 21–22 students per class at the primary level, hence above international standards. Therefore, in 2017, the French government launched an unprecedented effort to reduce class size in Grades 1 and 2 in Priority Education schools. The reduction of class-size starting in Grade 1 in September 2017 in the most disadvantaged schools and was then extended to all Priority Education schools in September 2018, as well as in Grade 2 in the most disadvantaged schools, and finally to all Grade 2 in September 2019. When COVID-19 hit, all Grade 1 and Grade 2 students in Priority Education were thus enrolled in reduced-size classes.

The impact evaluation of the reform shows that class size was reduced from 22 down to 13 pupils per class on average in Grade 1, and from 21 down to 14 pupils per class on average in Grade 2 (Andreu et al., 2021). Therefore, students enrolled in Priority Education schools benefited from a sizeable reduction in class size. The impact evaluation also shows positive impacts on students' learning at the end of Grade 2, with a 14% of a standard deviation increase in mathematics and a 9% of a standard deviation increase in French for students who benefitted from the reform compared to similar students who did not benefit from the reform. This reform is Important to keep in mind when reading French results at PIRLS 2021 since Grade 4 students who participated in PIRLS 2021 entered Grade 1 in September 2017, exactly when the reform was implemented in most disadvantaged schools.

6.5 The Evolution of 15-Year-Old Students' Performance After the COVID-19 Pandemic

The evolution of 15-year-old students' performance after the COVID-19 pandemic can be assessed thanks to OECD's Programme for International Student Assessment (PISA) which measures the performance in mathematics, science, and reading of 15-year-old students.

Figure 6.2 presents the average performance in mathematics, science, and reading in France and compares with the average performance in the 23 OECD countries which participated in all PISA rounds since 2000 and in all subjects. The restriction to these 23 OECD countries allows for a stable sample of countries throughout the period 2000–2022, which makes the evolution easier to interpret.

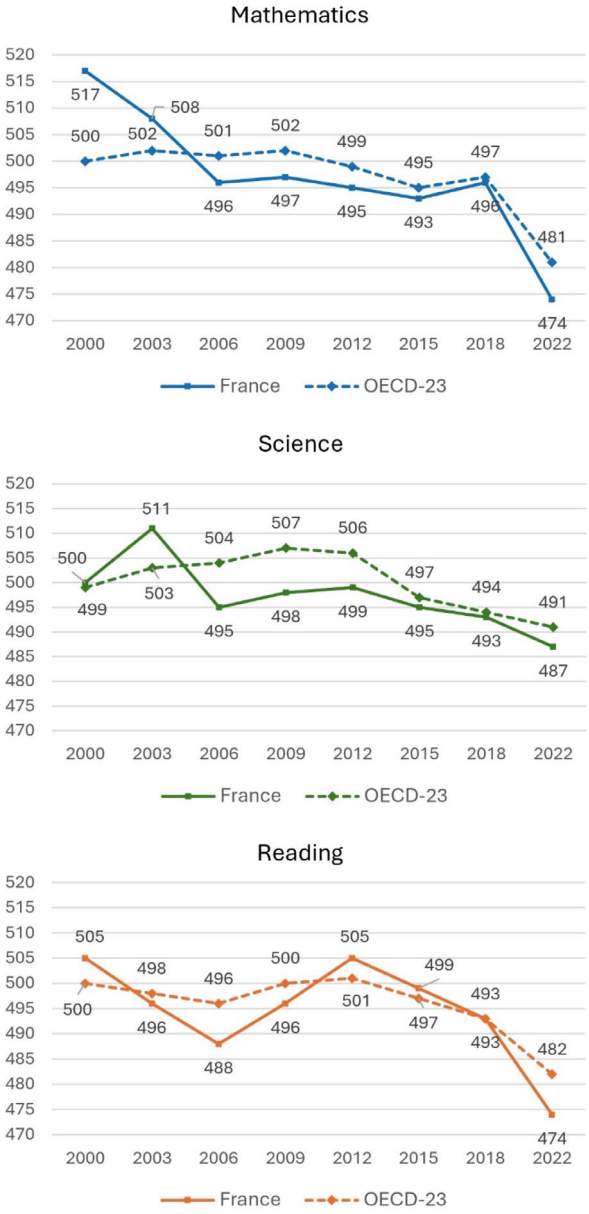

Fig. 6.2 Long term evolution of average PISA scores in France and OECD-23. *Notes* Author's calculations based on OECD PISA Databases 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2022. The figure presents the evolution of the average scores at PISA in mathematics, science and reading between 2000 and 2022 in all OECD countries which participated in all PISA assessments in all subjects. This includes 23 countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Korea, Mexico, New Zealand, Norway, Poland, Portugal, Sweden, Switzerland, and the United States

After a decrease in performance in all subjects between 2000 and 2006, France's performance has been stable between 2006 and 2018 in math and science. In reading, performance is also quite similar in 2006 and 2018 but varied in between, with an increase from 2006 to 2012 and then a decrease from 2012 to 2018. The global picture that emerges from Fig. 6.2 is that France performed better than the OECD-23 average at the beginning of PISA in 2000 but ended up very close to the international average in 2018, the last point before the pandemic. However, in 2022, the drop in math, sciences and reading skills was more pronounced in France than in the other OECD countries: after the pandemic, French average performance was 7-point below the OECD-23 average in mathematics, 4-point below in science, and 8-point below in reading. Although it is not possible to attribute this entire drop in performance to the pandemic with confidence, the relative stability of French results over a long period up to 2018 produces a sharp discontinuity that is likely largely due to the COVID-19 crisis. Similar discontinuities are observed for all topics in the OECD-23 average, but the average OECD country proved slightly more resilient than France. This result is even more disappointing because, as mentioned above, the government adopted a pro-education strategy with much more limited school closures than in other OECD countries during the pandemic. This result suggests that school closures may not have been an insurmountable obstacle to skills acquisition in other countries thanks to learning continuity. French schools closed much less but learning continuity may have been of lesser quality than in other countries.

6.6 The Evolution of Grade 4 Pupils' Performance After the COVID-19 Pandemic

The evolution of Grade 4 pupils' performance after the COVID-19 pandemic can be assessed thanks to the IE's Progress in International Reading Literacy Study (PIRLS) which measures the reading performance of pupils in Grade 4. Surprisingly, the alarming drop in performance for 15-year-old students is not observed for Grade 4 students tested in PIRLS. Figure 6.3 shows the average reading score in France and in 17 European countries which participated in PIRLS 2016 and 2021 (and most previous rounds). First, it shows that France performs consistently lower than the European comparison, which indicates a structural difficulty of the French education system which is not efficient at supporting the development of students' reading skills at the primary level. However, after a continuous decrease in performance in reading from 2001 to 2016, French students' performance did not decrease–and even slightly *increased*–from 2016 to 2021, despite the pandemic. The pandemic thus did have the same detrimental effect on young French students as for older ones tested in PISA. This evolution also contrasts with the evolution in the other European countries where the average reading performance decreased by 10 points between 2016 and 2021, compared to a 3-point increase in reading performance in France.

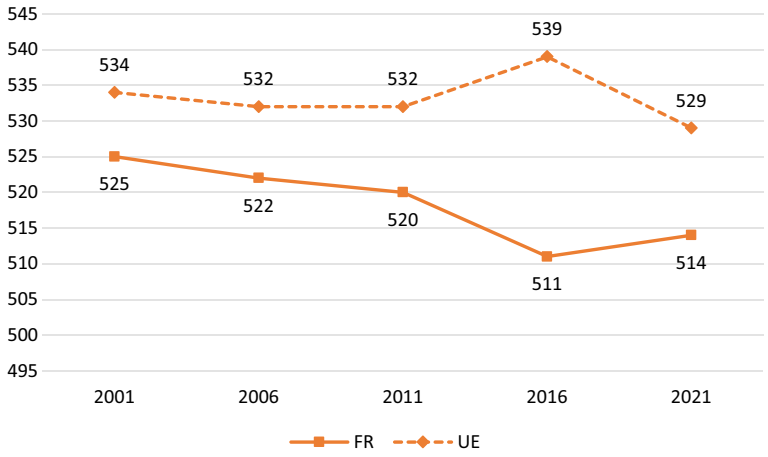

Fig. 6.3 Evolution of average PIRLS scores in France and European countries. *Notes* Author's calculations based on PIRLS databases 2001, 2006, 2011, 2016 and 2021. The figure presents the evolution of the average scores at PIRLS in France and in all European countries which participated in the corresponding round. In 2016 and 2021 it includes 17 countries/regions: Austria, Belgium (Flemish), Belgium (Wallon), Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, and Sweden. Belgium (F) is not included in 2001–2006–2011. Czech Republic is not included in 2006. Austria, Belgium (W), Denmark, Poland and Spain are not included in 2001

Figure 6.4 takes a shorter-term perspective but disaggregated at the country level: it shows the evolution of reading performance at PIRLS between 2016 and 2021 for the 17 European countries which participated in both rounds. It shows that France is the only country which experienced an increase in performance over the period, as every other country experienced a negative evolution. PIRLS 2021 results are thus particularly striking in the French case, suggesting that despite the pandemic crisis the reading performance of Grade 4 French students was maintained as opposed to students in other countries and older French students.

What can explain this specificity of French 4th graders' results? One explanation can be the limited school closures in France, as noted above. Belgium (W) and Spain where school closures were also limited relative to the rest of the world also experienced smaller decline in performance at PIRLS than the EU average, which reinforces the idea that school closures may be an important factor behind the comparative evolution of PIRLS score across countries. In fact, a study on the impact of school closures on reading achievement at PIRLS shows a significant and substantial negative correlation between school closures on reading achievement even after controlling for pandemic severity and lockdown stringency: the estimated effect implies that a year of school closures corresponds roughly to the loss of a little more than half a school year of learning (Kennedi and Strietholt, 2023). The absence of decrease in French performance at PIRLS in 2021 compared to 2016 may thus be partly explained by the limited school closure policy. However, it is puzzling that

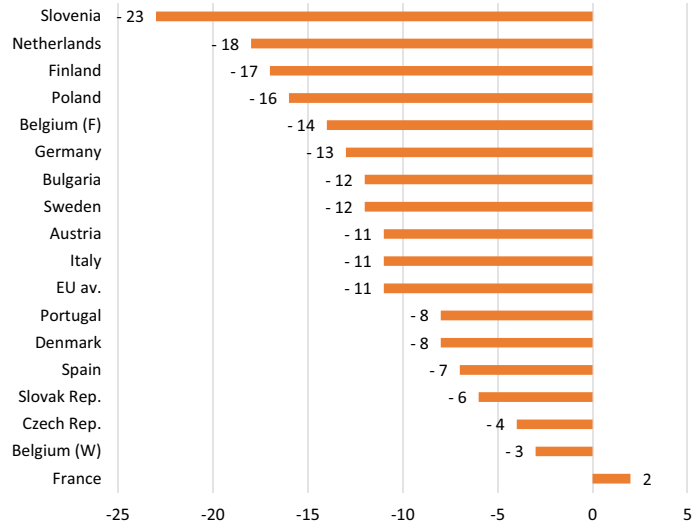

Fig. 6.4 Evolution of average PIRLS scores between 2016 and 2021. *Notes* author's calculations based on PIRLS databases 2016 and 2021. The figure presents the evolution of the average scores at PIRLS between 2016 and 2021 at the country level. European countries presented are those which participated in both 2016 and 2021 rounds

French performance at PISA decreased a lot over the same period despite similar school closure policy.

Another factor explaining the French results could be an age gradient in COVID-19 effect, with the effect of the pandemic being stronger for older pupils compared to younger pupils in general. However, the evidence presented above does not support this explanation since in other countries, the decline in performance observed for 4th graders is about the same size as the one observed for 15-year-old students. The global decline in academic skills after 2020 rather suggests that the COVID crisis generally had a negative effect for both younger and older pupils.

Another explanation may be the initial performance of French 4th Grade students which was significantly lower than in the other European countries. When initial performance is already low, it may be possible that COVID-19 hit less as there may be a smaller potential of harm in a school system which already produces high proportions of low-performing students. Similarly, Belgium (W)' students also perform very low at PIRLS compared to other OECD countries, and the average performance at PIRLS was also stable between 2016 and 2021. More generally, the countries which lost more than 10 points in performance between 2016 and 2021 were initially much more performant (average 2016 performance 548) than those which lost less than 10 points (average 2016 performance 527). This indicates clearly that the loss in performance after COVID-19 depends on initial performance. The fact that French 4th graders performed initially very low at PIRLS may thus contribute to

the absence of detrimental effect on the performance in 2021, whereas 15-year-old students who performed averagely at PISA before the crisis were hit more severely.

The specificity of France regarding the positive evolution of reading skills in 2021 for 4th graders may be related to the class-size reduction reform undertaken in 2017 discussed above. In France, there was no increase in the proportion of low-performing 4th graders (levels 1 and 2) between 2016 and 2021 (28%), whereas this proportion increased from 18 to 22% in the other EU countries, which drives the 10-point decrease in the average score. As mentioned above, the impact evaluation of the 2017 class-size reduction reform has shown a significant and positive impact on students' performance (Andreu et al., 2021). The class-size reduction reform in Priority Education may thus have had a compensatory effect that cancelled out the detrimental effect of COVID-19 by preventing weaker (disadvantaged) students to suffer from learning losses as in the other European countries. Since there was no such reform in middle schools, this explanation is consistent with the differential evolution of French performance at PIRLS and PISA in the recent period.

Finally, apart from the positive effects of this reform, one may also interpret the stability of reading performance of 4th graders in France in the light of parental involvement in schooling during school closure. As noticed by the ministry of education based on May 2020 survey administered to parents, the level of implication of parents in learning continuity was high at all levels of socio-economic background. Parental involvement in home schooling was eased by the government decision to compensate French firms for short time working during the lockdown period, which allowed many parents for staying at home with limited financial consequences. In parallel, a few students whose parents had to work (such as nurses, doctors, and workers of the food industry) were able to go to school and learn with a teacher, even during the time of general school closure. In this context, the pandemic may have had limited effects on the reading performance of French 4th graders because parents, even low-educated ones, may have been productive enough at developing elementary reading skills in young children. Parent involvement may not have worked as well for older children in middle school who were expected to be more autonomous and may be more difficult to help, and for whom the expected academic skills are at a higher level.

6.7 The Evolution of Social Equity in the Education System After COVID

International assessments show that France has always been characterized by one of the highest levels of social inequity in education among OECD countries. Two measures of social inequity are used in PISA: the slope and the strength of the relationship between performance and socio-economic status. The slope of this relationship is the difference in performance observed across socio-economic groups: it corresponds to the score-point difference in mathematics performance associated

with one-unit increase in the Economic Social and Cultural Status (ESCS) index. The larger this difference, the more distant the performance of advantaged and disadvantaged students. The strength of this relationship refers to how well socio-economic status predicts performance: it is the percentage of variance in mathematic performance explained by ESCS. The larger the percentage, the more a student's socio-economic status predicts his or her performance. These measures provide a useful benchmark against which to compare school systems.

Figure 6.5 presents the slope and strength of the socio-economic gradient in reading performance over all rounds of PISA. It compares the French measures to the average OECD measures to provide a benchmark. We focus on reading performance for the sake of simplicity, but all results discussed hereafter are also observed for mathematics and science. The first result is that, despite an important reduction in performance's socio-economic gradient in 2018–2022 compared to 2012–2015, France remains one of the countries with the strongest association between performance and socio-economic status among OECD countries, well above the international benchmark.

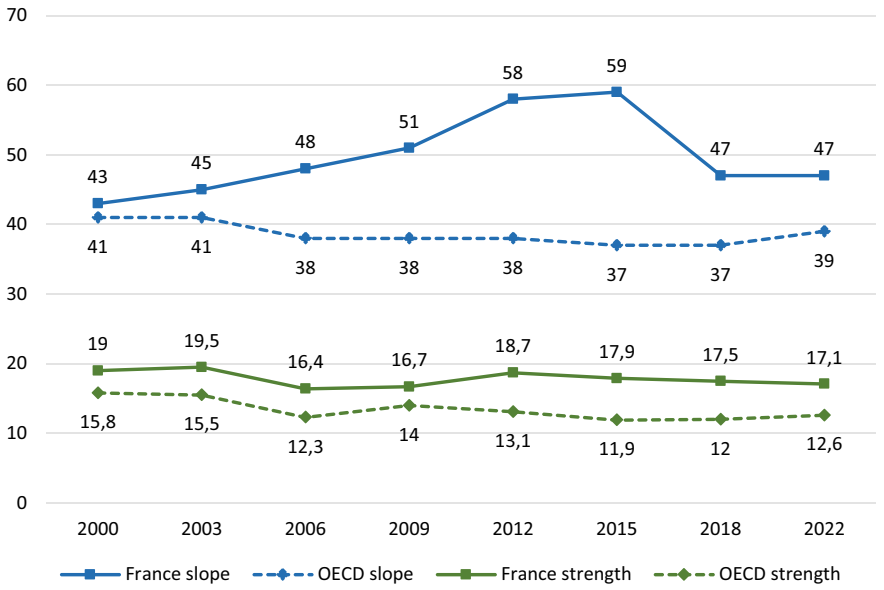

Fig. 6.5 Long term evolution of social inequity in PISA scores in France and OECD. *Notes* author's calculations based on PISA Databases OECD PISA Databases 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2022. The figure presents the evolutions of the slope and strength of the relationship between reading performance at PISA and Economic Social and Cultural Status (ESCS) between 2000 and 2022. Statistics on OECD include 24 countries in 2000 (all but the UK, Netherlands, Luxembourg, Japan, Turkey, and Slovak Rep.), 29 countries in 2003 (all but the UK), 29 countries in 2006 (all but the US), 34 countries in 2009 and 2012, 35 countries in 2015, and 36 countries in 2018 (all but Spain), and 37 countries in 2022 (all but Costa Rica)

Second, after the pandemic in 2022, social inequity of the French education system did not deteriorate. The slope of the association between performance and socio-economic status in France was unchanged (47-point both in 2018 and 2022), and the strength even slightly decreased (from 17.5% in 2018 down to 17.1% in 2022). This result is important as it indicates that the huge drop in 15-year-old academic performance after the pandemic observed in the previous section hit all students similarly independently from their socio-economic status. In comparison, in the average OECD country, both the slope and the strength of the socio-economic gradient in performance slightly increased between 2018 and 2022, although the differences in slope and strength are small (+2 points for the slope, + 0.6 percentage points for the strength). The literature on the effects of COVID-19 also shows an increase in social inequalities (Betthäuser et al., 2023; Kennedi and Strietholt, 2023).

However, the situation seems different for younger pupils. Reports based on standardized assessments from the French ministry of education raise concerns about the exacerbation of social inequalities due to school closures for young students at primary level. In September 2020, following the first school closures in the spring 2020, the ministry observed a substantial decline in reading performance and mathematics for students in Grades 1 and 2, especially those from low socio-economic background (Ministère de l'éducation nationale, de la jeunesse et des sports, 2021a). While the decline had been reversed by January 2021 for the average student, students from disadvantaged schools continued to exhibit lower improvements in reading than their peers over the period (Ministère de l'éducation nationale, de la jeunesse et des sports, 2021b).

6.8 Conclusion

Over the last two decades, before COVID-19 pandemic, French students performed averagely at PISA tests, and below average at PIRLS tests, compared to other OECD and European countries. The analysis of pre-COVID historical trends reveals a slow continuous decline in academic performance over time, and steadily strong social inequality. How did COVID-19 affect these patterns? As we have shown in this chapter, post-COVID evolution is mixed. First, PISA 2022 shows a sharp decline in performance for 15-year-old students, stronger than in the average OECD country; second, PIRLS 2021 shows a small increase in the reading skills of 4th Grade students, which is the exception to the rule as all other countries experienced a decline in average performance; finally, social inequality did not deteriorate in France, which also contrasts with the typical OECD country.

These mixed results may be related to different factors that were discussed in this chapter. One factor that may explain the positive evolution of reading performance of 4th Grade students between 2016 and 2021 is the class-size reduction reform implemented in 2017 in Grade 1 and 2. This reform may have counteracted the pandemic losses for young students by preventing the increase in the proportion of low-performing students which is observed globally but not in France. Another

explanation may be the involvement of parents in supporting the young students at the primary level during school closures, in relation to the national decision to implement short time working associated with quite generous compensation. However, if parental involvement may have counteracted the pandemic losses at the primary level, it was clearly not efficient at the middle school level.

Future rounds of PISA results should be particularly interesting for France, as reforms in middle school were recently implemented to improve the performance of French students and reduce the high level of social inequity of the French education system. One reform is "Schoolwork Done" (*devoirs faits*), which consists in additional hours at school at the end of the day dedicated to personal schoolwork with the support of adult tutors. This program was proposed to voluntary students starting from 2017 and became compulsory for Grade 6 students starting from 2023. Another reform launched in September 2023 is "Personalized tutoring" (accompagnement personnalisé), which offers a one-hour per week tutoring in small-sized groups based on academic performance. We look forward to analyzing PISA 2025 results to assess whether these national reforms contributed to greater levels of academic performance and reduced social inequity.

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Chapter 7
Italy: Student Performance and Learning Loss

Tommaso Agasisti and Mara Soncin

Abstract Recent evidence from the 2022 wave of the OECD Programme for International Student Assessment (PISA) sheds light on the phenomenon of learning loss exacerbated by the COVID-19 pandemic. Italy, having implemented one of the longest national school closures during the pandemic, serves as a notable case study. This chapter reviews studies exploring the extent of learning loss that reveal significant negative results—particularly in mathematics and reading—with the only exception of reading in primary education. The learning loss in lower and upper secondary school ranges between 0.05 and 0.41 standard deviations (SD) respectively in reading, and 0.03 and 0.39 SD in mathematics, with impacts intensifying at higher educational levels. Despite efforts to address learning loss through measures such as online tutoring programmes, the long-term consequences remain a concern, particularly for upper secondary students. Further research is crucial to understanding the full scope of COVID-19's impact on education, including its implications for student well-being and the enduring effects of the adoption of digital technology.

7.1 What We Know About Learning Loss

The analysis of student performance in the 2022 wave of the OECD Programme for International Student Assessment (PISA) in any of the participating countries should be interpreted in light of the emerging evidence on learning loss caused by school closures for the COVID-19 pandemic (Betthäuser et al., 2023). Italy is a case in point among Western countries as the education system that first decided on national school closure and among those keeping schools closed the longest—13 weeks of complete closure, from March to June 2020 (UNESCO, 2022). The reopening after the summer break in September 2020, and the entire 2020/21 school year, varied

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greatly among different levels of education, with a total of 24 additional weeks of partial opening (UNESCO, 2022). Upper secondary school students were largely taught remotely, while in-person learning was generally guaranteed for pre-primary and primary school students. However, significant regional differences emerged, generated as a result of the protocol labelling each of the twenty Italian regions by three levels of risk based on multiple indicators measuring the severity of the spread of COVID-19. Whenever the region was labelled highest risk, most of the school activities were moved online, and this happened more frequently in Northern Italy, where COVID-19 was more severe. Students taking PISA 2022 in Italy were enrolled in upper secondary education, which includes grades 9–13 and students from 14 to 18 years old, and these students were between lower secondary (grades 6 to 8) and upper secondary during the school years 2019/20 and 2020/21. Thus, they were largely affected by school closures in both school years.

Recently, multiple papers have addressed the measurement of learning loss in Italy, highlighting the negative impact of school closures on educational achievement. The list of those studies, reviewed in this section, is presented in Table 7.1. The first study giving us and idea of the extent of the learning loss in Italy is by Contini et al. (2022), who collected data on mathematics proficiency in a sample of students from the province of Turin (North-West Italy) before and after the start of the pandemic, during the school year 2019/20. The results from a difference-in-differences model show a decrease of 0.19 standard deviations (SD) in the performance of students due to school closures.

All the other studies exploring the learning loss in Italy exploit administrative data collected at national level by the National Evaluation Committee for Education (hereafter INVALSI). INVALSI assesses annually the proficiency of Italian students at given grades, namely grades 2 and 5 for primary school (second and last year of primary education), grade 8 for lower secondary school (last year of lower secondary education) and grades 10 and 13 for upper secondary school (second and last year of upper secondary education). Due to the unprecedented conditions in which schools were operating, the tests were suspended in the school year 2019/20,[1] thus making impossible to estimate the short-term impact of school closure. The tests were resumed in 2020/21, except for grade 10, for which it was resumed in 2021/22. INVALSI tests students in Italian (hereafter reading), mathematics and English language (only from grade 5, reading test and listening test). Most of the studies on learning loss focus on reading and mathematics performance and, despite slightly different methodological approaches (described in the section below), all tend to agree on the negative impact of school closure that increases in in correlation with the grade of education. A graphical overview of the magnitude of the estimated impact is presented in Figs. 7.1 and 7.2 (for reading and mathematics, respectively).

Results for the last year of primary education (grade 5) show a small negative impact on mathematics and a non-significant or even significantly positive effect of school closure on student achievement in reading. Borgonovi and Ferrara (2023) applied a regression model for the national population of fifth graders considering

[1] The test is usually taken in May, when all the schools were closed in the school year 2019/20.

Table 7.1 List of papers estimating the impact of COVID-19 school closures on educational achievement in Italy

Authors	Data and cohort	Level of education	Subject	Methodology
Contini et al. (2022)	Ad hoc data collection in the province of Turin, year 2020	Primary (grade 3)	Mathematics	Difference-in-differences model
Bertoletti and Cannistrà et al. (2023a, 2023b)	Representative sample of schools for INVALSI data + ad hoc survey, 2020/21 + 2018/19 as control (for the same schools)	Primary (grade 5) and lower secondary (grade 8)	Reading, Mathematics, English reading, English listening	Regression model with propensity scores as weights
Borgonovi and Ferrara (2023)	National INVALSI data, cohorts 2020/21 and 2018/19	Primary (grade 5) and lower secondary (grade 8)	Reading, Mathematics	Difference-in-differences model
Carlana et al. (2023)	National INVALSI data, cohorts 2020/21 and 2018/19	Lower secondary (grade 8)	Reading, Mathematics	Regression model
Battisti and Maggio (2023)	National INVALSI data, cohorts 2020/21 and 2018/19	Primary (grade 5), lower secondary (grade 8), upper secondary (grade 13)	Reading, Mathematics	Difference-in-differences model
Bazoli et al. (2022)	National INVALSI data, cohorts 2020/21 and 2018/19	Primary (grade 5), lower secondary (grade 8), upper secondary (grade 13)	Reading, Mathematics	Regression model with coarsened exact matching
Contini et al. (2023)	National INVALSI data, cohorts 2020/21 and 2018/19	Upper secondary (Grade 13)	Reading, Mathematics	Difference-in-differences
Moulin and Soncin (2023)	National INVALSI data, cohorts 2020/21; 2021/22 + 2018/19; 2017/18	Primary (grade 5) and lower secondary (grade 8)	Reading, Mathematics	Difference-in-differences plus triple difference estimator

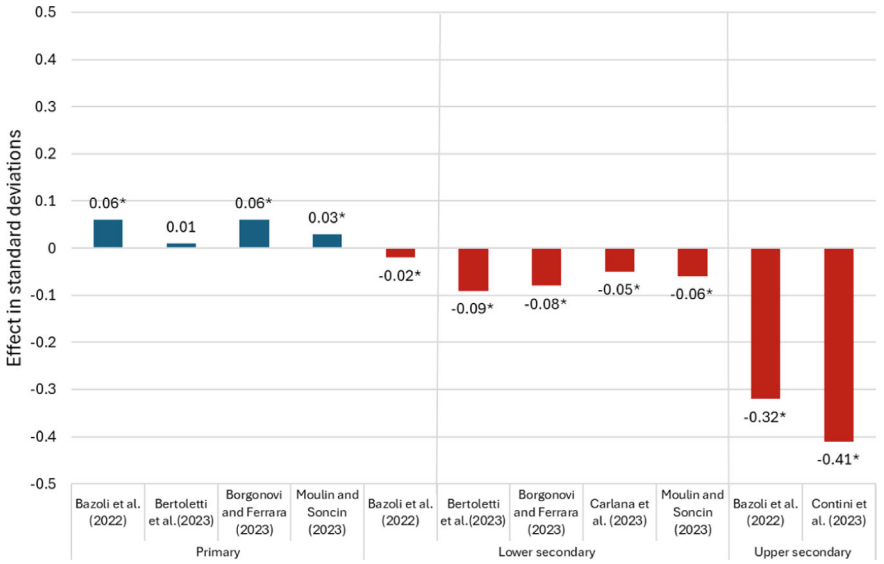

Fig. 7.1 Magnitude of the estimated impact of COVID-19 school closure in Italy on reading skills, by level of education. *Note* Magnitude of the impact in standard deviations. The star represents a statistically significant effect. Improvement in blue, decline in red. The results by Battisti and Maggio (2023) cannot be directly compared as they are not reported in standard deviations

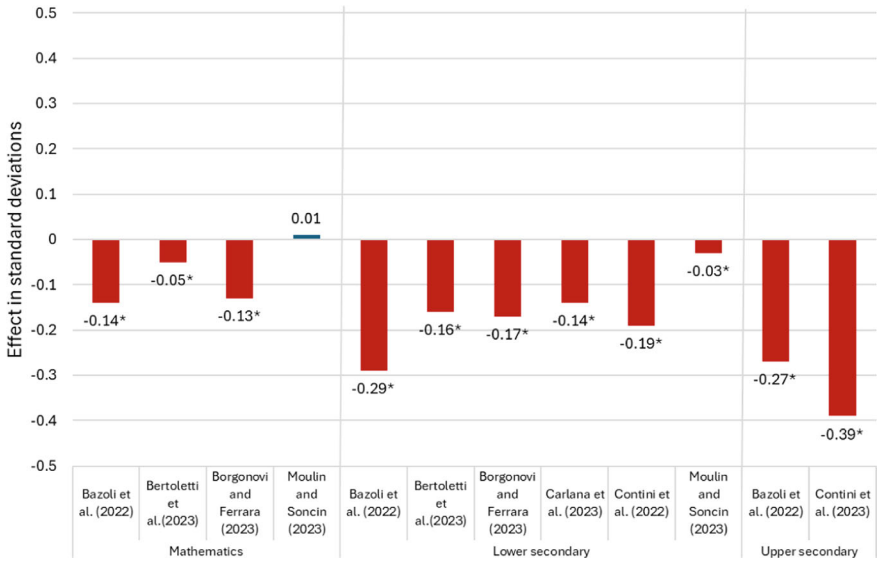

Fig. 7.2 Magnitude of the estimated impact of COVID-19 school closure in Italy on mathematics skills, by level of education. *Note* Magnitude of the impact in standard deviations. The star represents a statistically significant effect. Improvement in blue, decline in red. The results by Battisti and Maggio (2023) cannot be directly compared as they are not reported in standard deviations

prior achievement, comparing the cohort 2020/21 with 2018/19 (as with all the papers reviewed below). While a learning loss of 0.13 SD was detected in mathematics, the impact on reading was positive by 0.06 SD. Almost the same impact is reported by Bazoli et al. (2022), who focused on the same cohorts, employing a regression model with coarsened exact matching to compare students across cohorts. Bertoletti and Cannistrà et al. (2023a, 2023b) analysed a sample of representative schools by employing a regression model with observations weighted by their propensity scores, and confirmed the tendency of a non-significant impact on reading and a 0.05 learning loss in mathematics. In this case, the authors also estimated the impact on proficiency in English and reported a greater negative impact than in the other subjects: 0.28 SD in English reading and 0.11 SD in English listening, a result that is explained by the relative greater difficulty in teaching a second language online to younger students.

Evidence on lower secondary school (grade 8) reports a statistically significant and negative impact on both mathematics and reading. Borgonovi and Ferrara (2023) reported a 0.17 SD decline in mathematics and a 0.08 decline in reading. Bazoli et al. (2022) showed a more pronounced negative impact on mathematics, of 0.29 SD, while the loss in reading was small (0.02 SD). Carlana et al. (2023) specifically focused on eighth graders, employing a regression model that considers prior achievement (among the other covariates) and reported a decline of 0.14 SD in mathematics and 0.05 SD in reading. Bertoletti and Cannistrà et al. (2023a, 2023b) confirmed the trend in mathematics and reading, and added findings for English, with an educational loss of 0.03 SD in English reading and 0.01 SD in English listening (thus a smaller impact than in primary education).

The analysis of the impact in upper secondary school is more complex because students in Italy are divided into three possible educational pathways, starting from grade 9 (academic, technical and vocational). The average impact can thus conceal a great heterogeneity of impact among different types of education. Despite this caveat, Bazoli et al. (2022) estimated for 13-graders a decline of 0.27 SD in mathematics and a 0.32 in reading. Contini et al. (2023) specifically focused on grade 13, employing a difference-in-differences model, and confirmed a decline of 0.39 SD in mathematics and 0.41 in reading. Thus, for students attending the last year of secondary education, the learning loss is the highest and even greater in reading than in mathematics—as compared to the other grades. Despite not differentiating by grade, the results reported by Battisti and Maggio (2023) on the national populations of students attending grades 5, 8 and 13 confirmed the learning loss in all stages.

The evidence so far refers to the cohort of students attending the refence grade in the school year 2020/21. The contribution by Moulin and Soncin (2023) used a difference-in-differences model to estimate the learning loss in both 2020/21 and 2021/22 school years. The triple difference estimator showed a statistically significant recovery among students attending grades 5 and 8 in 2021/22 compared to the previous cohort, despite the fact that the learning loss for fifth graders was still estimated around 0.02 SD in mathematics and 0.01 in reading, while it was 0.03 SD in mathematics and 0.01 SD in reading for eighth graders.

In summary, evidence on the learning loss in Italy shows a significant decrease in educational performance due to school closures. This negative impact increases in

higher educational levels and reaches its peak in grade 13. This finding is particularly alarming as this is the final year of secondary education and students who then enter the labour market have no further opportunities for remedy, with potential significant impacts on labour productivity and other long-term outcomes (World Bank et al., 2021). Moreover, the negative impact is greater in mathematics than in reading (except for grade 13), and this finding is similar to the post-COVID result observed in OECD PISA 2022. Indeed, Italian PISA 2022 results compared to the pre-COVID wave of PISA 2018 show an upward trend in science (477 vs. 468 points; this subject is not assessed by national standardised tests), a comparable performance in reading (482 vs. 476 points) and a decline in mathematics (471 vs. 487 points). The drop observed in mathematics brings Italy back to the poor performance observed in the early waves of OECD PISA in 2003 and 2006 and this is particularly worrying, especially since the performance by Italian students is traditionally poorer than that of students in several other Western countries. However, OECD PISA results show a certain resilience of the educational system, given that the sense of belonging among Italian students improved and the test performances were comparable to those in countries that experienced shorter school closures (OECD, 2023).

The average results on learning loss are likely to conceal a broad heterogeneity in terms of socio-economic status (SES), gender or level of ability. From a purely descriptive perspective, the comparison between PISA 2018 and 2022 does not reveal an increase in disparity between high and low SES, nor according to gender or immigrant background (after accounting for the student's relative SES). National studies on the learning loss tend to report a scattered situation. When analysing differences across students of varied SES, Carlana et al. (2023) reported a widening gap and revealed learning loss of 0.21 SD in mathematics and 0.10 SD in reading for students in the bottom quintile for SES, while students in the top quintile showed a much smaller learning loss (0.05 SD) in mathematics and actually improved their scores in reading by 0.04 SD. Contini et al. (2022) also reported a greater learning loss in schools with disadvantaged students. However, Borgonovi and Ferrara (2023) showed a stable difference in performance across different student SES in lower secondary schools, and even a certain reduction in inequality in primary education. Bazoli et al. (2022) also did not report any significant difference by SES, and similar findings were presented by Contini et al. (2023).

The analysis by gender and level of prior achievement also provides conflicting results. Carlana et al. (2023) found no differences between genders, Borgonovi and Ferrara (2023) report a reduction in gender-based disparities (except for primary school in mathematics), while Contini et al. (2022) and Moulin and Soncin (2023) showed a more negative impact on girls. When looking at prior achievement, Contini et al. (2022) found that high-achieving students coming from disadvantaged families suffered the most from school closure, while Borgonovi and Ferrara (2023) identified middle achievers as the category worst hit. Finally, Contini et al. (2023) reported that low achievers were more severely penalised. While all the existing studies agree on the existence of learning loss, the evidence is unclear when disaggregated by category. Given that almost all the studies rely on the same cohorts and administrative datasets,

differences across studies may depend on slightly different model specifications, which are detailed and discussed below.

7.2 How Learning Loss is Estimated

The causal evidence on the impact of school closures on student achievement would ideally be tested, in an experimental setting, by comparing the cohort of students affected by school closure with the cohort of students that continued to attend classes in person. Unfortunately, no such comparison group exists, as the peculiarity of the countermeasures to curb the spread of COVID-19 lies precisely in their nationwide application by law. For this reason, studies estimating the learning loss feature a quasi-experimental design and a counterfactual approach, in which the cohort of students affected by COVID-19 school closures represents the treatment group (cohort 2020/21), while the control group is composed by students attending the same grades just before COVID-19 (cohort 2018/19). Thus, the results rely on the pre-post comparison of learning outcomes, after considering a set of individual characteristics and fixed effects. The modelling specification is generally divided by grade and subject and assumes the following form:

$$Y = \alpha + \beta \text{COVID} + \gamma X + \varepsilon$$

where Y is the student performance in the test, X is a set of student-level characteristics (e.g., gender, SES, immigrant background) and COVID is a dummy variable equal to 1 for the post-COVID cohort and 0 otherwise. ε represents the error term, usually clustered at class level (as in Bertoletti, Cannistrà et al., 2023a, 2023b; Borgonovi & Ferrara, 2023). Instead of clustering the error term, Bazoli et al. (2022) adopted a fixed school effect to account for cross-sectional school differences that affect achievement, while Borgonovi and Ferrara (2023) and Moulin and Soncin (2023) employed respectively fixed provincial and regional effects. Among the set of individual-level covariates, Borgonovi and Ferrara (2023) considered student prior achievement in the INVALSI test (thus three years before the outcome period, i.e., grade 2 for grade 5 and grade 5 for grade 8). This specification recalls the difference-in-differences model also employed by Battisti and Maggio (2023) and Moulin and Soncin (2023). In this setting, the difference is estimated between the time periods t = 1 and t = 0, that are represented by the grades in which INVALSI tests are taken (e.g., grades 8 and 5 or grades 5 and 2), while the treatment and control groups are the through-COVID (i.e., the cohort for which t = 1 is 2020/21) and the pre-COVID (i.e., the cohort for which t = 1 is 2018/19) student populations. However, testing the parallel trend assumption (i.e., the assumption that, without the COVID-19 shock, the two groups would have performed equally) is challenging as the difficulty of standardised tests could vary from year to year before 2018/19.

As an alternative specification, Bazoli et al. (2022) and Bertoletti and Cannistrà et al. (2023a, 2023b) did not consider prior achievement (thus they could not design

a difference-in-differences model), but they balanced the two cohorts of pre- and post-COVID students by means of matching algorithms. Specifically, Bertoletti and Cannistrà et al. (2023a, 2023b) employed propensity scores, while Bazoli et al. (2022) used coarsened exact matching. In both cases, the two cohorts were matched on the basis of individual student characteristics and the generated weights were included in the regression models to ensure the correct balancing between the treated and control groups. In this specification, similar weights are attributed to students who have the most similar pre-treatment characteristics, except for the fact that one belongs to the COVID and the other to the pre-COVID cohort. In this case, the reliability of the estimations is based on the ability to discern all the factors that affect the predicted probability of receiving the treatment.

7.3 How to Recover from Learning Loss

Given the current evidence on learning loss and its expected short- and long-term consequences (World Bank et al., 2021), interventions aiming to mitigate the negative effects of school closures are advocated yet still scarce. In 2021, the Italian Ministry of Education launched a national program called the 'Summer School Plan' providing financial support to schools presenting projects for activities to be delivered during the summer break (between June and September), thus in a period in which schools are traditionally closed. The ministry's call for projects specifies the cognitive and relational nature of the required educational objectives, offering at least partial remedial opportunities in both areas. However, to the best of our knowledge, there has been no assessment of these remedial activities.

Remedial action on a smaller scale was instead designed and evaluated in an experimental setting by Carlana and La Ferrara (2021), who reported on the impact of an online programme involving lower secondary school students tutored by university students enrolled on a voluntary basis. A total number of 1059 struggling lower secondary students were selected by their school principals, who also specified the subject they were most behind in among Italian, mathematics and English. Half of them were randomly assigned to the tutors, who were in turn trained and supported by educational experts. The online tutoring lasted on overage for five weeks during the school year 2019/20, and students showed significant improvement in both cognitive and non-cognitive outcomes. The performance in a standardised tests increased by 0.26 SD, psychological well-being by 0.17 SD, and aspirations and socio-emotional skills by 0.15 and 0.14 SD, respectively. The study provided clear evidence of the potential usefulness of low-tech interventions, especially in an emergency context (Angrist et al., 2022). However, this was a pilot study that ended with this one project, which, to the best of our knowledge, has not been replicated. While previous research showed the effectiveness of in-person tutoring, the low costs of delivery reported by Carlana and La Ferrara (2021), just under €50 per student, make this type of online tutoring particularly cost-effective, and thus worthy of consideration as a remedial solution in Italy and other countries.

7.4 Conclusions

The evidence that has emerged on the impact of COVID-19 school closures in Italy is aligned with international findings showing greater learning loss in mathematics than in reading (Betthäuser et al., 2023). Moreover, Patrinos et al. (2022) estimated an average learning loss at international level of 0.17 SD (equal to nearly one year of learning), while in Italy the loss is even greater, especially in higher levels of education. This is indeed a matter of urgency from a policy perspective: the existence of learning loss that is particularly accentuated among upper secondary school students makes the potential consequences for the labour market more worrying given that these students are soon to leave the education system with no further opportunity for remedy.

The long-term effects of COVID-19 are one of the most important areas for future research, especially by tracking student performance over time through longitudinal studies investigating the transition from primary to secondary school and from secondary school to university or the labour market. On this point, there is one important consideration: despite the fact that there is a body of evidence on learning loss, research should continue to focus on the impact of COVID-19 in education, as we are still far from fully understanding the complexity of the overall impact. Italy is a peculiar case, as all the evidence available (with the only exception of Contini et al., 2022) refers to the school year 2020/21, more than one year after the COVID-19 outbreak. Despite the reasonable decision taken by INVALSI to suspend student tests at a time of emergency, this has led to a gap in the data that makes impossible to estimate the short-term effect of school closures and to estimate fully the extent to which the loss has been recovered (if at all).

Besides the multiple negative effects of COVID-19 in education, school closures have also been a factor in the massive and forced acceleration in the use of digital technologies. While part of the literature addressed in part how digital tools have been used to support student learning during the emergency (e.g., Bertoletti et al., 2023a, 2023b), there is the ongoing need for further studies on the persistence in use of digital technology for teaching. As a final important point, the analysis of the impact of school closures should not be limited to the purely cognitive sphere. This chapter does not cover the still limited but existing literature on the impact of school closures on student well-being, while there is scarce evidence on the impact on social and emotional skills, which are again an important area for future research.

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Chapter 8
The Netherlands: Comprehension of Basic Skills and Covid-19

Carla Haelermans and Sabine Baumann

Abstract The PIRLS and PISA results that were published in 2023 severely shook things up in the Netherlands and reinforced the need for sustainable educational policy improvements. In this chapter, we show examples of how educational interventions are accompanied by structural monitoring based on national assessment data on school performance for mathematics and reading comprehension for pupils in primary schools in the Netherlands. From the analyses it becomes clear that both the national data as well as the international comparisons done by PIRLS and PISA show worrisome downwards trends in pupils' performance. The international comparisons show a larger decrease than the national data, for which there are many possible reasons, such as different age groups and types of tests. However, the overall picture from all sources shows that there is still a lot of progress to be made in the Netherlands.

8.1 Introduction

Monitoring learning curves for pupils at primary school level is quite common in the Netherlands. Pupils in primary education are tested on a regular basis by means of standardised tests. The necessary data infrastructure is available to monitor and analyse test scores in several domains, such as mathematics and Dutch language reading on a national level. Very recently, three events in particular have put the school performance of Dutch pupils in the spotlight and have emphasised the importance of such an infrastructure. These events are the covid-19 pandemic, the latest results of the large-scale international comparison on the reading performance of 10-year-old pupils (PIRLS) and those of PISA on the performance of 15-year-olds in mathematics, reading, and science. Both PIRLS and PISA were published in 2023. In this chapter, we discuss each event and stipulate actions taken or programmes introduced, after which we show examples of learning curve monitoring in the Netherlands.

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The first event is the covid-19 pandemic, which disrupted the regular educational schedule and as such created a momentum to explore the impact of this disruption on learning losses more structurally. Since 2020, a team of dedicated researchers have published a number of studies reporting on the evolvement of learning gains and losses in the Netherlands comparing the situation before and after the start of covid-19 (Bol, 2020; Engzell et al., 2021; Haelermans et al., 2021a, 2021b, 2022; de Leeuw et al., 2023). After the first period of the covid-19 pandemic, a drop in learning growth was observed as large as 0.14 standard deviations for reading and 0.21 for mathematics (Haelermans et al., 2022). It emerged that the observed learning losses were much larger for disadvantaged pupils. In order to remediate learning losses, the Dutch Ministry of Education, Culture and Science (in Dutch abbreviated to OCW) soon released substantial funds to eligible schools to introduce targeted remediation programmes aimed at catching up on learning losses of specifically the lowest performing pupils, and supporting the development of non-cognitive skills (OCW, 2021). In the second year of the pandemic the Ministry of Education released the National Programme for Education (in Dutch abbreviated to NPOnderwijs) with a total value of 3.4 billion Euros. As part of this programme, schools received additional funding based on the share of disadvantaged students, and they could choose different remediation measures to spend this money on (for more information see www.nponderwijs.nl). This programme is an example of a data driven approach on a national level where it was possible to identify vulnerable groups, design educational programmes targeting specific groups, and eventually be able to evaluate the effectiveness of remediation intervention programmes (Haelermans et al., 2021a, 2021b).

The next event that emerged was the publication of the international comparisons of reading literacy—PIRLS—results. These results show that Dutch ten-year-old pupils have a significant lower reading literacy in 2021 compared to 2016, whereas the reading performance had been quite stable between 2001 and 2016. Split by gender, girls perform better than boys. Although a decline has been noted between 2016 and 2021 across the 21 reference countries as well, the Dutch decline was sharper for boys and girls alike. This happened especially at the higher and advanced difficulty level, whereas Dutch ten-year-old pupils performed comparably more favourably to their reference group at the lower and medium difficulty level (Mullis et al., 2023; Swart et al., 2023).

Unfortunately, the results did not come as a surprise since the decline in the mastering of reading comprehension skills had already been noted at the national level and was also addressed in Dutch studies (Inspectie van het Onderwijs, 2020, 2021). Explanations reach beyond the covid-19 effect and are related to the teaching methods and the way standardised tests in reading comprehension are designed (Swart et al., 2023). Several policy measures were put in place. However, before we describe the policy measures taken to reverse the downward trend, we will first summarise the last event, namely the latest PISA findings.

In late 2023, the newest PISA results were published, in which the performance of 15-year-old pupils across many countries in the domains of mathematics, reading and science were compared (OECD, 2023; Meelissen et al., 2023). In this chapter, we only focus on the mathematics and reading of the Dutch pupils. The drop in math

performance between 2018 and 2022 was unprecedented. Between 2003 and 2015 only a gradual decline in average test scores could be noted. Analyses by proficiency levels show that 27% of 15-year-olds did not reach level 2 in 2022, compared with 16% in 2018. Proficiency level 2 is considered the minimum level to participate in society as an autonomous citizen. When comparing these results with reference to OECD countries and EU-14 countries, we see an overall decline for these countries as well and compared to these averages Dutch 15-year-olds are still performing better.

However, in the domain of reading, the story is quite different. When looking at PISA results over time, a decline in reading scores among the Dutch 15-year-olds started as early as 2012. Between 2015 and 2022, Dutch scores are consistently lower compared with EU-14 reference countries and the OECD average. The negative trend even accelerated between 2018 and 2022. Also, one out of three pupils do not reach the proficiency level enabling them to participate fully in society. Although these results have been received as a shock, national studies had also already signalled these downward trends in reading among15-year-old pupils (Hooge et al., 2022; Inspectie van het Onderwijs, 2020, 2021).

Setting up educational interventions takes time though. For example, the results of PIRLS 2016 (Gubbels et al., 2017) and PISA 2018 (Gubbels et al., 2019) already led to a joint appeal from the Dutch Education Council and the Council for Culture to start a national reading initiative involving structural co-operation between schools and the network of libraries (Van Engelshoven & Slob, 2019; Van Zoonen et al., 2019). Also, a stimulation programme for pupils with above-average cognitive abilities was introduced in 2019 (OCW, 2019). Unfortunately, the potential effects of these interventions are not yet visible in the PISA and PRILS results published in 2023.

Being sufficiently literate in reading and mathematics is considered as conditional not only for school success but also to be part of and to participate in society. Therefore, in 2022, the Ministry of Education introduced a programme called "*Masterplan basisvaardigheden*" (Masterplan Basic Skills), in order to get a grip on the basic skills of the Dutch youth—consisting of mathematics, literacy including reading comprehension and spelling of the Dutch language, civic society skills, and digital proficiency (Wiersma, 2022). Part of this programme is a structural targeted investment in the educational system with a threefold focus: improving and aligning the national curriculum, improving the educational quality, and introducing a data driven monitoring structure on the re-visited targets both at primary and secondary school level. Furthermore, in early 2023 the programme "school meals" was introduced, targeting schools with a large share of disadvantaged pupils by providing either breakfast at school or assisting families in doing groceries with food stamps (Muskens et al., 2023).

Before we discuss a set of descriptive analyses specifically developed to monitor the performance of pupils in Dutch primary education as part of the programme Masterplan Basic Skills, we will describe the data structure and available data in more detail in the next section.

8.2 National Assessment Data

In the Netherlands, primary school pupils are tested bi-annually from grade 1 to grade 5 by means of proficiency tests. These tests are standardised, compulsory and comprise reading comprehension, spelling and mathematics. Test scores are stored in the administration systems of schools. Schools can opt to share these results with the Netherlands Initiative for Education Research (NRO) as part of the Netherlands Cohort Study on Education (abbreviated as NCO: *Nationaal Cohortonderzoek Onderwijs*) (Haelermans et al., 2020). With the permission of schools and the consent of parents, standardised test scores are exported to Statistics Netherlands where researchers can use the pseudonymised data for their analyses. Parents have the right to object to sharing the test scores of their child for educational research purposes, but in practice, only one or two parents per school do so. By 2023, more than 50% of schools take part in the NCO programme. In the secured virtual environment of Statistics Netherlands, standardised test scores could be matched to background information of the students and their parents. For this chapter, we only use the test scores for mathematics and reading comprehension taken at the end of each school year.

The dataset includes more than 900,000 observations from about 2700 schools in the Netherlands. The sample is considered to be without selection bias and largely representative (Haelermans et al., 2020). The conclusions can therefore be generalised to Dutch primary school children. To remove the potential influence of outliers, the top and bottom 1% of the scores are not included in the analyses.

The results in this chapter are based on analyses with the above-described dataset to study the performance of Dutch pupils in primary education over time. In the next section we show for mathematics and reading comprehension trend analysis by grade based on average achieved test scores and on proficiency levels over six school years. Furthermore, we compare the test scores relative to the period prior to covid-19 by subject. For reading comprehension we also show split analyses by gender and the educational level of the parents. We standardise the average test scores of the years since covid-19 on the two school years prior to covid-19, those being school years 2017/2018 and 2018/2019. We would like to emphasise that the magnitude of the absolute test scores are different by subject and therefore cannot be compared.

8.3 Results

In this section we first analyse achieved test scores by grade between school year 2017/2018 and 2022/2023. Figures 8.1 and 8.2 show the trends of average achieved test scores for grades 1–5 for mathematics and reading comprehension, respectively. Figure 8.3 shows the share of pupils that achieve a certain proficiency level for mathematics and reading comprehension in grade 5. For the remainder of our results, we focus on reading comprehension only, since PIRLS has comparably aged students

in their data. In Fig. 8.4 we present the achieved test scores for reading comprehension for the four school years since the covid-19 restrictions, compared with the period prior to covid-19. Finally, in Figs. 8.5 and 8.6, we show these comparisons between pre- and post-covid-19 years, separately for gender and parental education levels.

Figure 8.1 shows the development in the mean achieved test scores of mathematics between school years 2017/2018 and 2022/2023 for each grade separately, including confidence intervals around those means. Note that the conference intervals are very small, due to the large sample size. Figure 8.1 shows a clear and highly significant drop in the covid-19 school year of 2019/2020, for all grade levels, where pupils in grade 1 were the least affected. Furthermore, Fig. 8.1 also shows that the means continue to decrease slightly but significantly since the covid-19 school year, in comparison with the pre-covid-19 period, except for grade 5. Although differences between one school year and the next are often not significant (when we disregard the covid-19 school year), the trend over these 6 years is clearly one of significant decrease. For pupils in grade 5 the decrease is the largest, from an average achieved test score of 268 in school year 2017/2018 to 261 in school year 2022/2023.

Figure 8.2 shows a slight decrease in average test scores for reading comprehension, between school year 2017/2018 and 2022/2023, which does not exceed a change of three absolute test score points in any grade. For grades 2, 4 and 5 we see that the average test score for reading comprehension after the covid-19 year is significantly lower than in the school years before. Figure 8.2 also shows that the drop in scores in the covid-19 year (2019/2020) is less evident for reading comprehension than it was for mathematics and is visible only in grades 2–5 and not in grade 1. Interestingly, for grade 1 we see the largest drop in average test scores in 2021/2022, the first full school year after the two school closures that we observed in 2019/2020 and 2020/2021. It is possible that children that were in the pre-school age during the covid-19 school years were even more influenced than children that were already in school during those years.

Absolute test scores do not necessarily provide enough information when it comes to evaluating the mastery of basic skills. For this reason, we translated the achieved scores into three categories of proficiency levels as defined at the national level in 2009: below fundamental level 1F, at fundamental level 1F and at target level 1S or higher for mathematics and 2F or higher for reading comprehension (Commissie Meijerink, 2008). At the end of primary school, as many pupils as possible should achieve at least 1F, which is considered a sufficient level for secondary school entry. The left part of Fig. 8.3 shows that between 74 and 78% of grade 5-pupils achieve at least fundamental level 1F for mathematics. From 2020/2021 onwards this share decreases to about 70%. The difference between the two pre-covid-19 school years is significant, as is the difference between the three post-covid-19 school years and the pre-covid-19 school years. School year 2019/2020 is an exception: The share of pupils achieving at least 1F in grade 5 dropped to less than 60%, again a significant difference to both the period before as well as the period after. The share of pupils who did not achieve the fundamental level 1F at all is also clearly higher in school year 2019/2020 than in previous and subsequent school years. At the other end, the

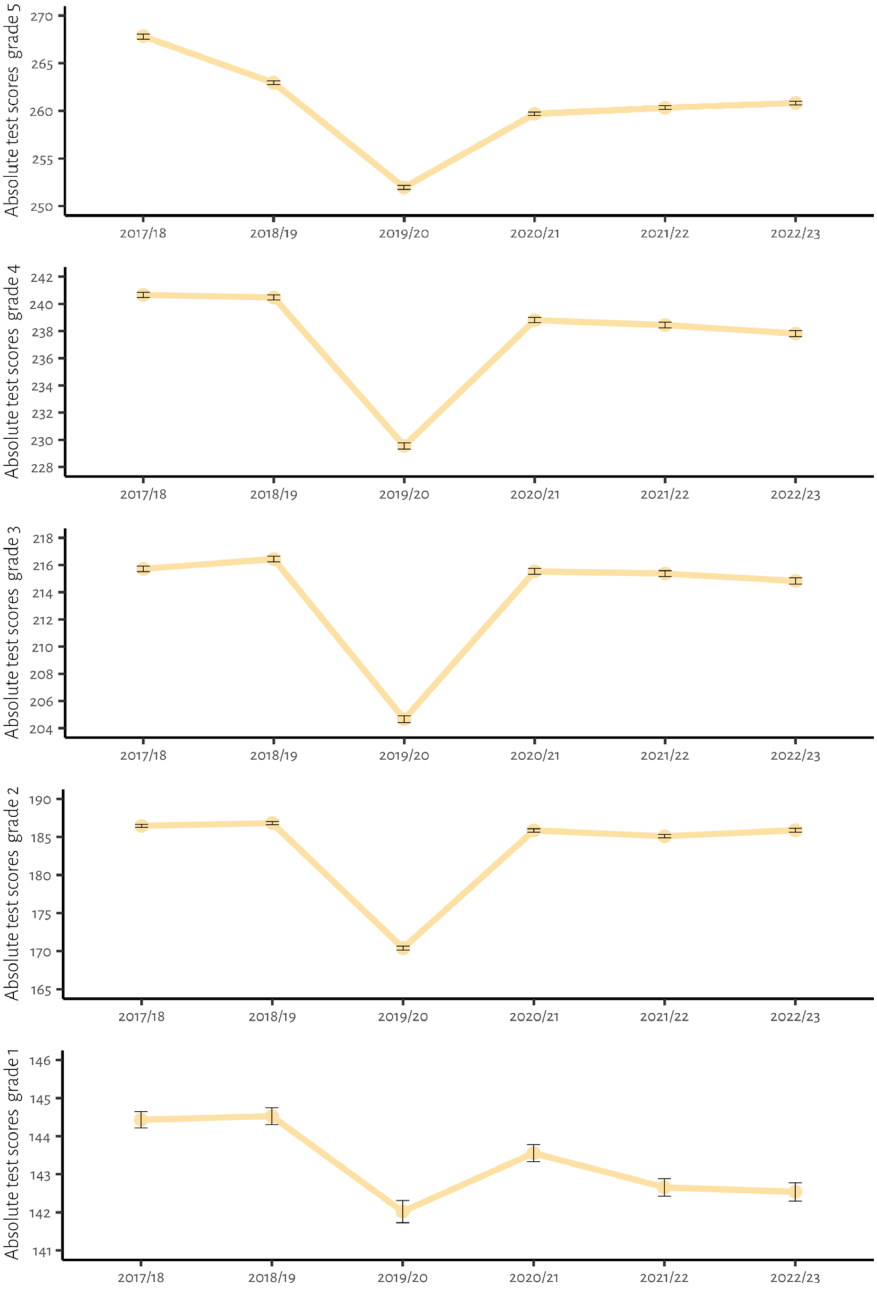

Fig. 8.1 Absolute test scores of **mathematics** for grades 1–5, school years 2017/2018–2022/2023

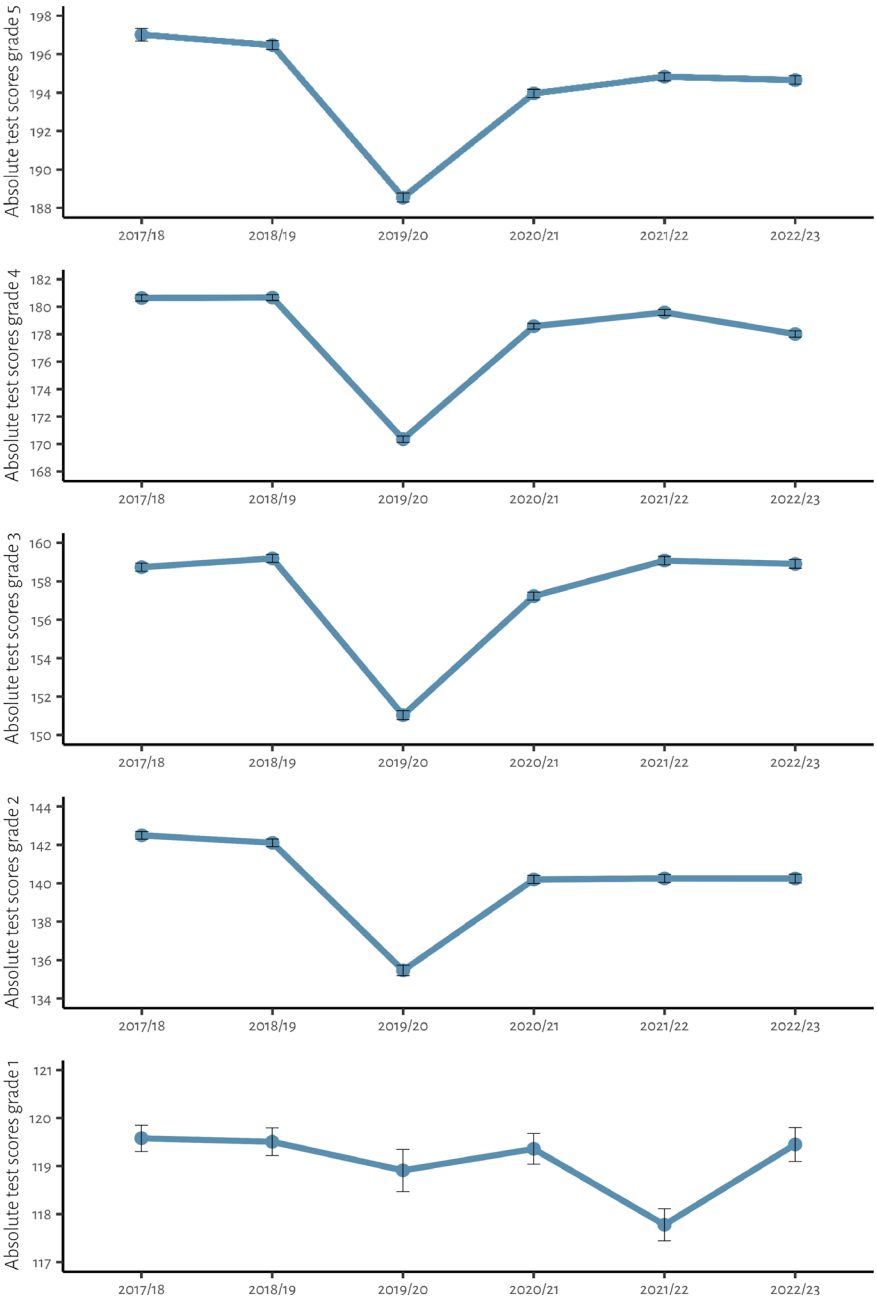

Fig. 8.2 Absolute test scores of **reading comprehension** for grades 1–5, school years 2017/2018–2022/2023

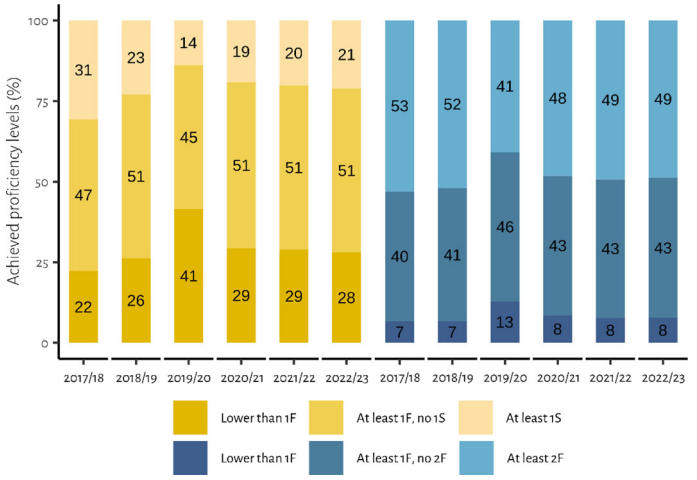

Fig. 8.3 Percentage of pupils in grade 5 by achieved proficiency level in **mathematics (yellow, left) and reading comprehension (blue, right)**, school years 2017/2018–2021/2022

share of pupils achieving a proficiency level higher than 1F is significantly lower in 2019/2020.

On the righthand side of Fig. 8.3 we see that the trend for reading comprehension is similar to mathematics, but the shares of achieved proficiency levels look quite different and the differences are smaller. With the exception of school year 2019/2020—again, the school year affected most by the covid-19 restrictions—about 90% of pupils achieved at least fundamental level 1F in grade 5. Only between 7 and 8% did not reach that fundamental level and around 50% already achieved levels higher than 1F. However, although the absolute differences may seem small, we still observe that the pre-covid-19 levels of the percentage of pupils reaching higher than 1F are significantly higher than in the post-covid-19 levels.

For comparison reasons with PIRLS, which assesses pupils of about the same age as our grade 5 students, we focus on reading comprehension from now onwards. In the following three figures we first present average achieved test scores of reading comprehension per grade, by gender and by parental educational level. To get a better idea of the magnitude of the difference, test scores of the school years 2017/2018 and 2018/2019 were standardised and used as a baseline to compare the achieved test scores across grades of the post-covid school years 2019/2020–2022/2023. The largest drops can be observed for pupils between grades 2 and 5 in school year 2019/2020. For the school years that followed, recovery of achievement scores to the pre-covid-19 situation seemed hardest for pupils of grades 2, 4 and 5, similar to Fig. 8.2.

Split by gender, girls achieve on average lower test scores than boys in the school years 2020/2021 through to 2022/2023 when compared to the period before covid-19 as shown in Fig. 8.5. Although this applies to all grades, it is to a slightly lesser extent for grades 3 and 4. Furthermore, there are hardly any significant differences between

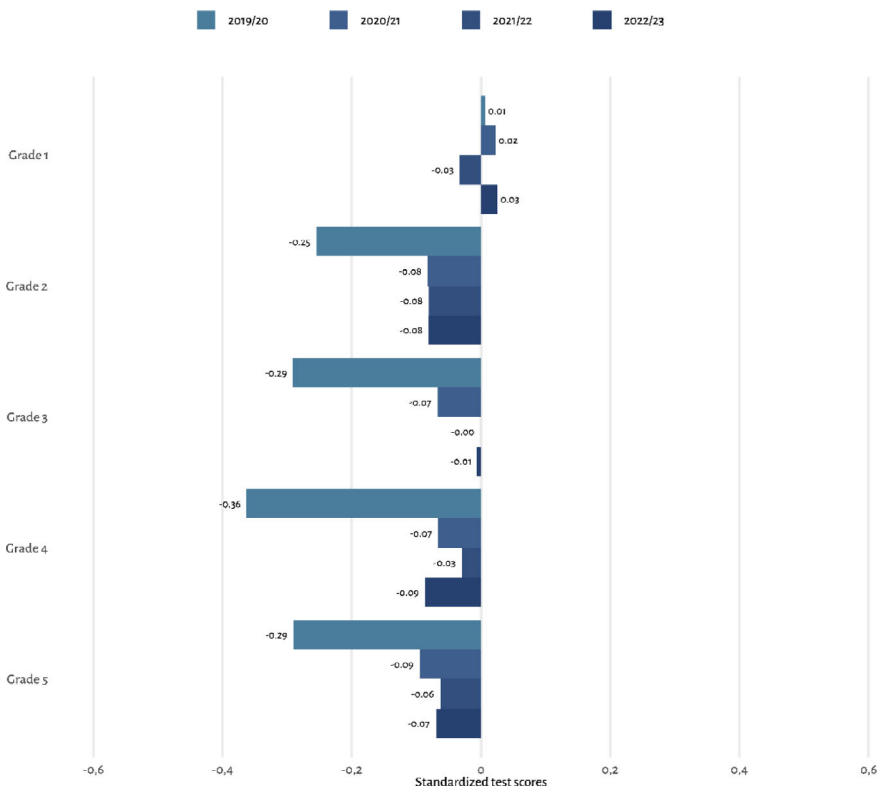

Fig. 8.4 Test scores on year-end tests **reading comprehension** for grades 1–5, school years 2019/2020–2022/2023, standardised on mean test scores for school years 2017/2018 and 2018/2019 (before covid-19)

girls and boys on average test scores by grade, and none of these are in the covid-19 school year 2019/2020.

Analysing reading comprehension by the educational background of parents, which proves to be a strong proxy for parental socio-economic status, shows that pupils with parents of a low and medium educational level achieved lower average test scores than pupils with parents of a high educational level, in the school years starting from 2019/2020 onwards compared to the period before covid-19. As shown in Fig. 8.6 this is especially true for pupils in grades 1 through 4 during the covid-19 school year 2019/2020. Although the differences in average test scores are often not significant during the subsequent school years, in 2019/2020 we find that pupils with parents of a low and medium educational level achieve significantly lower test scores when comparing them to pupils with parents of a high educational level and to the pre-covid situation.

To sum up, in this section we showed three different analyses on the achieved test scores by grade level for standardised national tests taken by pupils at the end of

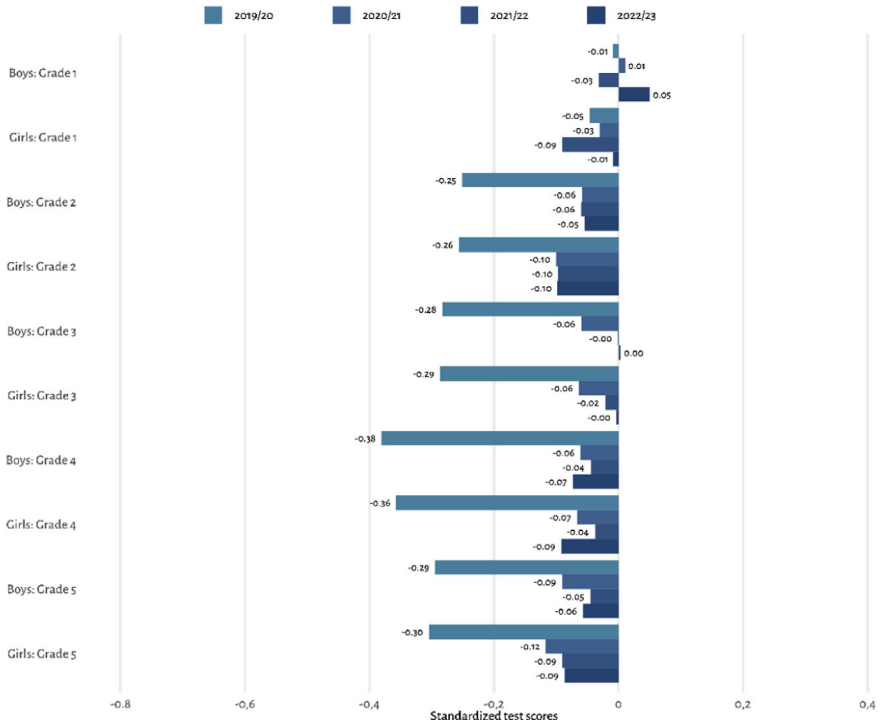

Fig. 8.5 Test scores on year-end tests **reading comprehension** for grades 1–5 **by gender**, school years 2019/2020–2022/2023, standardised on mean test scores for school years 2017/2018 and 2018/2019 (before covid-19)

each school year over a period of six years. The combination of analyses provides us with a first indication of the average performance in mathematics and reading comprehension of primary school children in the Netherlands over time. This first indication shows a general significant declining trend over the years for most grade levels at most indicators. Also, the effect of the covid-19 pandemic on test scores becomes painfully clear for both mathematics and reading comprehension, especially in the school year 2019/2020.

8.4 Discussion and Conclusion

We started this chapter by highlighting the latest findings of the international trend comparisons PIRLS and PISA published in the course of 2023. According to PIRLS the reading literacy achievement of Dutch ten-year-olds declined at a sharper rate between 2016 and 2021 when compared to 21 western-oriented countries, particularly among the higher and advanced difficulty levels. This even implies that the

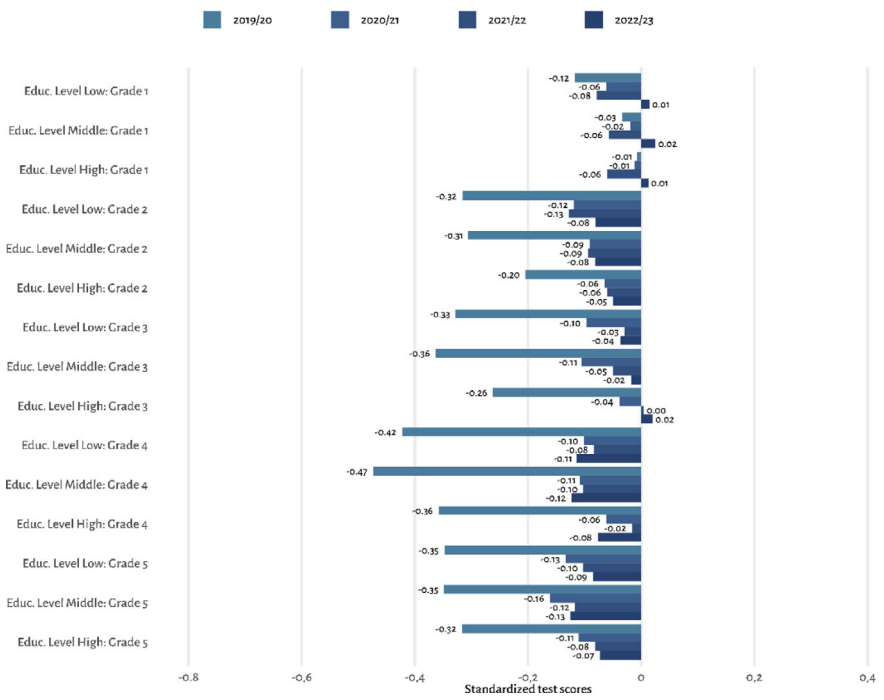

Fig. 8.6 Test scores on year-end tests **reading comprehension** for grades 1–5 **by educational level of parents**, school years 2019/2020–2022/2023, standardised on mean test scores for school years 2017/2018 and 2018/2019 (before covid-19)

reading literacy among ten-year-old pupils in the Netherlands is on average at a lower level in 2021 than it was in 2016. In PISA a negative trend in reading literacy among Dutch 15-year-olds between 2015 and 2022 is also found, especially between 2018 and 2022. When comparing the averages, Dutch pupils score lower compared to EU-14 reference countries and the OECD average. In mathematics, although a sharper decline in performance was also noted between 2018 and 2022, Dutch 15-year-olds are still performing above EU-14 reference countries and the OECD average. To concretise these implications: one out of three pupils did not reach a reading proficiency level enabling them to participate in society as autonomous citizens; and for mathematics this is about one out of four. In general, PISA publications provide powerful comparisons, and the findings impact national policy making. As such, several policy measures have already been introduced—such as the programme Masterplan Basic Skills—based on the alarming PISA-results 2018. The PISA results 2023 underlined the necessity for a long-term commitment on equipping pupils with the best possible education.

At a national level, the Netherlands also monitors the performance of its pupils on a structural basis. At primary school level, the results of test scores on national standardised and compulsory tests for grades 1–5 provide a rich source to do so. We

visualised trends and categorised test scores into achieved proficiency levels, and by standardising test scores on the school years 2017/2018 and 2018/2019 we were able to compare average test scores since covid-19 and compare them to the situation before covid-19 (the null-line). For both mathematics and for reading comprehension, we clearly see a significant downward trend over the years, with a clear drop in the covid-19 school year 2019/2020. At the end of primary school, as many pupils as possible—the Ministry of Education suggested a benchmark of 85% (Wiersma, 2022)—ought to achieve at least proficiency level 1F. When comparing school year 2022/2023 with 2017/2018 for mathematics, we find the percentages of pupils with at least a proficiency level of 1F has significantly decreased and is much lower than the benchmark of 85%. This is mostly because the percentage of pupils that do not even reach the level 1F has increased, at the cost of the percentage of pupils that reach the level higher than 1F. In school year 2022/2023 only 72% of pupils in grade 5 achieved that minimum level, whereas that was 78% in 2017/2018. Results for reading comprehension showed that the decline of average test scores from one year to the next was smaller than for mathematics, but still significantly different, with the same clear drop in the covid-19 school year. Around 90% of pupils achieved proficiency levels of 1F or higher for reading comprehension and these percentages were quite stable over the years investigated, except in the covid-19 school year. When comparing average achieved test scores of the school years since covid-19 to the pre-covid situation, we hardly find significant differences, although we did observe that girls and pupils with parents of lower educational levels, compared to boys and pupils with parents of higher educational levels, experienced higher learning losses. Hence, the overall picture, particularly of reading comprehension based on the national assessment data in primary education, is slightly different from what we see in the international comparisons, although generally the trends are significant and in the same (negative) direction.

As this chapter shows, it is important to bridge the findings of international comparisons with those based on national data and discuss similarities and differences, not only in results but also in the tests and procedures. First, the age group of the pupils as presented in the results section is not comparable with PISA results that investigate the level of literacy skill at secondary school age among 15-year-olds. Only PIRLS would be suitable to compare with the national results presented in this chapter on reading comprehension for grade 5. Although we see a similar (significant) downward trend in reading comprehension as PIRLS, the differences between the years are smaller in our national data. Furthermore, we find that around 90% of pupils in grade 5 achieved a proficiency level of at least 1F, which is above the 85% benchmark as suggested by the Ministry of Education, and 50% of pupils even reached the more advanced level. However, it is important to emphasize that the tests of PIRLS are hardly comparable with the national standardised tests for comprehensive reading, even though they are both low stakes tests taken at the same grade level. There are large differences in how reading comprehension is tested and which topics are covered between PIRLS and the national framework for reading comprehension (Swart et al., 2023). For example, the length of the text passages is longer in PIRLS in the first place and subsequently more questions are asked. Also,

there is a mix of both multiple-choice questions and open questions. In the national standardised tests, text passages are shorter, the number of questions is lower, and primarily multiple-choice questions are used. Therefore, it is difficult to compare the results of the different data sources one-on-one, although it is reassuring that the trends are in the same direction.

Based on the multiple data sources that we used in this chapter, we can conclude that the development of basic skills in the Netherlands is deteriorating over time, with quite large drops in the covid-19 school year, but also—although at lower levels—since covid-19. However, mastering basic skills is crucial to participate at school and in everyday life and pupils need to be best equipped to be successful in modern societies. Although with the introduction of the Masterplan Basic Skills programme it has been acknowledged that improvements to both the national curriculum and educational quality are necessary for pupils of both primary and secondary education, the Netherlands still has a long way to go. The introduction of the Masterplan programme is a good first step, but more action is needed, such as encouraging children to read more. Furthermore, reaping the benefits of these programmes takes time, and these changes might not always have the impact one would hope for, as they also take place in times of severe teacher shortages. Rewards—in terms of an improvement in test scores both on a national level and in international comparisons—will most likely only be revealed in the longer run and it is unlikely that they will already be visible in PISA 2025. This is to be expected because the then 15-year-olds who will be tested, are pupils that were in primary school during the covid-19 restrictions, for whom we saw the drop in performance in 2019/2020. Hence, it is important to not lose the focus on basic skills and eventually reverse the downward trend that unfortunately has been visible for quite some years now.

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Chapter 9
Poland: Education During and After COVID-19 Pandemic and Educational Reforms

Tomasz Gajderowicz and Maciej Jakubowski

Abstract The COVID-19 closures lasted at least 26 weeks in Poland, longer than in most EU countries. The Polish government's response revealed inadequacies in planning and execution. Evidence from international and national studies shows that the related achievement decline is equivalent to at least one year of education and probably more immense for some students. We calculate that the lower estimate of the achievement decline is associated with reduced GDP growth by 0.35% points. The estimated wage loss per student over a 45-year working life sums up to an economic loss of 7.2% of Poland's 2021 GDP.

9.1 Introduction—The Pandemic and School Closures in Poland

The educational landscape in Poland during the COVID-19 pandemic underwent significant transformations, primarily characterized by the shift to online and remote learning due to school closures. All educational institutions in Poland remained shut for at least 26 weeks, a period longer than that experienced by most Western European nations, which were better equipped for online teaching (UNESCO, 2022). It is worth noting that the COVID-19 school closure was an additional crisis after a series of harrowing experiences in Polish education. First, a highly controversial educational reform shortened obligatory general education. Second, a wave of teacher protests and strikes erupted, mainly against the decline in real and relative wages but also against the reforms that had no substantive basis or teacher support. Teacher morale has declined: PIRLS 2021 teacher's questionnaire data showed that Polish teachers'

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job satisfaction of 4th graders is the lowest among participating countries (PIRLS, 2023).

Poland did not start remote teaching immediately during the pandemic as it was unprepared for the shift to online education. While Poland had a reasonable infrastructure, with 96% of students having access to a computer at home, the effectiveness of online learning platforms and the capacity of schools to utilize them varied. Only 35% of students were enrolled in schools with effective online learning support platforms, a figure significantly lower than the OECD average of 54% (OECD, 2023).

The pandemic exacerbated educational inequalities, particularly affecting students from socio-economically disadvantaged backgrounds. Although a high percentage of students reported having access to computers and quiet places for studying, the situation was less favorable for those from the lower socioeconomic quartiles. The necessity for shared device use among family members during the pandemic likely hindered consistent access to educational resources (OECD, 2023). Engagement and support from parents became more critical during remote learning. However, the level of parental support in Poland was below the OECD average, which could impact student motivation and learning outcomes.

During the COVID-19 pandemic, the Polish government faced significant challenges in managing school closures and transitioning to remote learning. The Supreme Audit Office conducted a thorough review covering the period from January 2020 to August 2021, assessing the actions of the Ministry of Education and Science along with five regional educational inspectorates, five local government units, and fifteen schools across various regions (NIK, 2021). The audit revealed that the government initially responded with emergency recommendations and guidelines, adjusting regulations to meet the immediate needs. This approach was deemed justifiable only in the early months of the pandemic, specifically during the second semester of the 2019/2020 school year. Subsequently, however, the lack of a systematic approach to remote and hybrid education led schools to decide how to implement online classes independently. The range of online classes varied widely, with some subjects like physical education, religion, and ethics largely relying on students' independent work, shifting the teaching burden onto children and their parents.

Regarding adherence to mandatory school attendance, it was found that in two out of eight inspected primary schools, attendance checks were not conducted in the 2019/2020 school year, following the education minister's guidelines (NIK, 2021). Moreover, issues were noted with the control mechanisms for fulfilling the compulsory education duty in certain schools, with one school retroactively marking full attendance for the period of remote learning, a practice that contradicted existing regulations. NIK also highlighted significant digital exclusion due to insufficient equipment, inadequate internet access, and a lack of technological know-how among students. According to the audit, this led to educational disparities that necessitated the launch of additional compensatory programs.

NIK report lists all actions of the Ministry during the pandemic (NIK, 2021). From the onset of the pandemic in March 2020, when schools were first closed, to June 2021, the education ministry issued 58 regulations, including two critical ones about the limitations on school operations and the organization of remote learning,

which were revised 28 times by the end of the audit period. The ministry's response included launching projects like "Remote School" and "Remote School+" funded by EU resources, which aimed to enhance remote teaching capabilities and reduce digital exclusion by financing the purchase of computer equipment for students and teachers. Despite these efforts, training for teachers on conducting online lessons was found to be inadequate, with key initiatives either underutilized or delayed. The need for improved psychological and pedagogical support in schools became evident, with measures to address this being introduced too late into the pandemic, underscoring the government's reactive rather than proactive approach.

In what follows, we review evidence from international studies PIRLS and PISA, which allow us to estimate long-term trends for Poland and other countries and see how the most recent results depart from the trend due to the pandemic. We also review the results of TICKS, a national study that uses PISA-aligned testing instruments and is based on a representative sample of secondary school students in Warsaw. We estimate achievement decline related to the pandemic and how that translates into future economic losses caused by lower human capital. Finally, we review possible measures that could be implemented to minimize the long-term impact of the pandemic on students.

9.2 Learning Loss in Primary School—Evidence from PIRLS

Poland participates in two international primary school assessments: PIRLS and TIMSS. After the pandemic, PIRLS 2021 was the first international student assessment measuring the achievement of 10-year-old students, mainly in the 4th grade. The new TIMSS results from the assessments conducted after the pandemic are not yet available. Polish primary school students do not participate in other standardized assessments in primary schools, so the PIRLS data are now the only source of information about the learning loss in their achievement.

The PIRLS 2021 data includes results for 65 countries and benchmarking participants. Still, for our comparisons, we rely here on the analysis using data from 24 education systems of the European Union (22 countries and separate data for the Flemish and French parts of Belgium) and for the additional seven countries from Europe and Central Asia (Patrinos et al., 2023). PIRLS results from all rounds are compared to estimate achievement trends and the departure from these trends in 2021. Our sample includes nearly 600,000 students, representing data for almost 30 million 4th-grade students across 20 years. These data mainly serve as a reference group for the trends estimated for Poland.

Most countries participated in the PIRLS 2021 assessment as planned—at the end of the fourth grade. Poland, like most countries in the northern hemisphere, assessed students between February and July 2021. New Zealand and Singapore assessed students between October and December 2020. Some countries delayed the

assessment to the beginning of the fifth grade in September-December 2021 or even assessed students one year later. Details can be found on the PIRLS 2021 website (https://pirls2021.org/results/). In our regressions, we control for these differences by adding dummy variables denoting the year and season of testing, student age, and student grade, and by including or excluding countries that delayed the assessment. The results are qualitatively the same when considering these differences. The main results reported in this chapter are for the sample with all countries, to increase sample size, but with controls for student grade and age.

The Polish sample includes 18,451 students from the four assessments: 2006, 2011, 2016 and 2021. The assessments in 2006 and 2011 were conducted in the 3rd grade, but for students who, on average, are around ten years old or younger than in other countries, as Poland starts education later when students are seven. In 2016 and 2021, the assessments included 4th-grade students who were significantly older than in most countries. Thus, when using PIRLS data in general and Polish data in particular, one needs to adjust age and grade distribution. We do that in the linear regression framework by controlling for the time trend in student achievement and estimating the departure of results in 2021 (the learning loss) for student sex and by including age and grade dummies that consider the average age-related effects across countries (see Jakubowski et al., 2023, for details).

The results are presented in Fig. 9.1. The raw difference in results between 2016 and 2021 equals − 15.5 points on the international PIRLS scale. Considering that the standard deviation of reading results in Poland in 2021 was around 71.9 points, this effect equals around 21.5% SD (Standard Deviation) or an equivalent of about one year of education (Avvisati & Givord, 2023). The direct comparison between 2016 and 2021 should be treated as the baseline estimate of the learning loss. Reading achievement of the Polish students was steadily improving, and a positive time trend in student achievement holds even after considering changes in student grade and age over time. Comparing the 2021 results to the positive time trend in reading achievement in Poland, the decline in 2021 is much larger. Various estimates from different regression specifications, as presented in Fig. 9.1, suggest a decline in reading achievement equal to around 40 to 48% of SD, depending on the specification.

The samples of students in 2016 and 2021 represent the populations of all eligible 4th-grade students in Poland, which are highly similar in terms of background characteristics. Both samples represent populations similar in crucial characteristics like age or socioeconomic status. Thus, one can directly compare changes in results for various groups of students to see how they changed during the pandemic.

Multiple factors influence the changes in student achievement over time. Thus, one could doubt that the decline in student achievement after the pandemic is related only to this factor. Figure 9.2, however, shows a placebo test, simulating similar impacts in the same regression framework for years before 2021 (Jakubowski et al., 2023). Clearly, while country average scores vary over time, only in 2021 do the average scores across countries significantly depart from the long-term trends. While other interpretations are possible, the pandemic was the only factor affecting all countries between 2016 and 2021. Thus, we argue that the decline in scores for Poland and other countries is mainly driven by the pandemic and school closures, as countries that

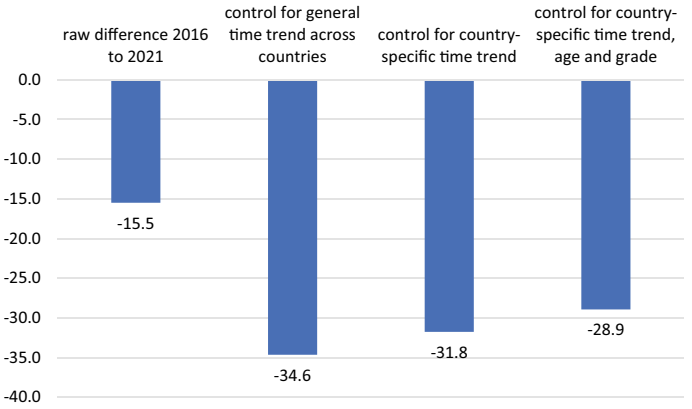

Fig. 9.1 Reading achievement decline estimated by comparison with 2016 results and as a departure from the achievement time trend. *Source* Own calculations based on PIRLS 2021 (and earlier cycles) microdata

closed schools for longer tend to have a larger decline in achievement (Jakubowski et al., 2023).

Focusing on the comparison between 2016 and 2021 results in Poland, Fig. 9.3 shows that the decline in achievement was the lowest for low-achieving boys (to the left on the figure) and high-achieving girls (to the right on the figure). In these two groups, the reading achievement declined by around 10–12 points. For average-achieving students, those in the middle of the graph, the decline was similar for boys

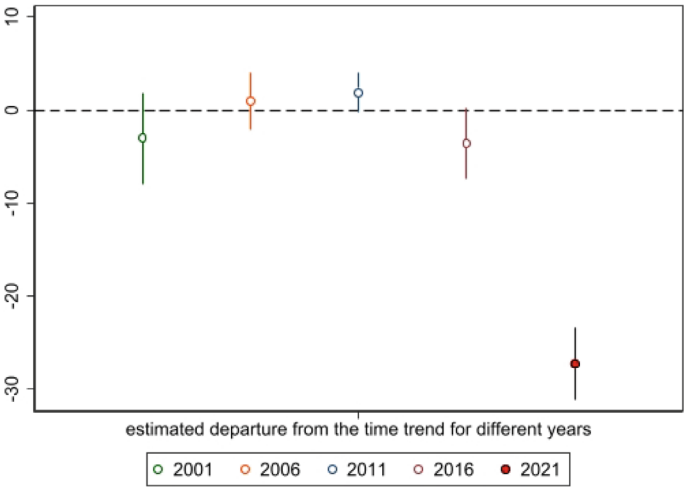

Fig. 9.2 Placebo tests for the departure from long-term trends in PIRLS reading achievement. *Source* Jakubowski et al. (2023)

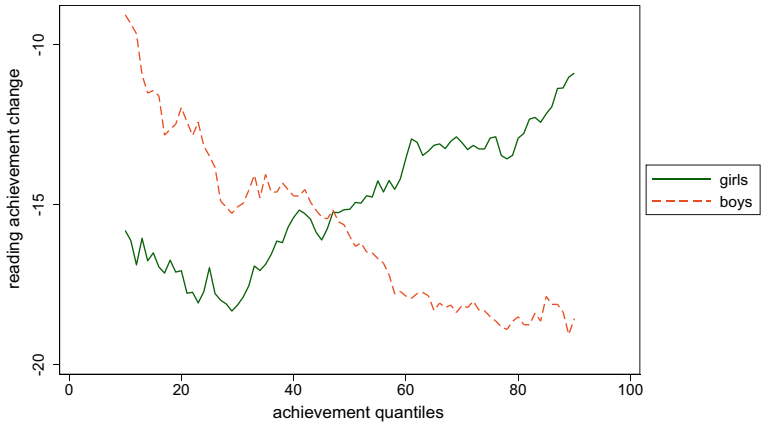

Fig. 9.3 Achievement changes between 2016 and 2016 for girls and boys at different achievement quantiles. *Source* Own calculations based on PIRLS 2021 (and earlier cycles) microdata

and girls and equal to around 15 points, as reported above. The decline for the low- and average-achieving girls was larger than for those at the top of reading skills. The reading scores declined most for the high-achieving boys. Here, the decline equals 18–20 points, twice as much as for the lowest achieving boys. While multiple interpretations of this evidence are possible, they cannot be directly tested with PIRLS data. Researchers point to differences in attitudes of boys and girls towards reading and different support at home (for example, see Bertoletti et al., 2023). These trends should be observed over time to see if reading deficiencies for different groups of students remain after the pandemic in higher grades.

9.3 Learning Loss in Secondary Schools—Evidence from PISA and TICKS

9.3.1 Evidence from PISA

PISA 2022 results show student achievement after school closures caused by COVID-19 and after at least one year of regular education in most European countries. For Poland, it is a picture of student achievement after more than a year of undisrupted instruction—a period of what many believed would be a learning recovery. However, the results still revealed a significant decline in student achievement in 2022 compared to the long-term achievement trend, which was related to the overall impact of the pandemic but also the length of school closures.

For Poland, PISA 2022 showed the impact of the pandemic and the reversal of the successful 1999 reform, which delayed vocational education. Research suggests that the 1999 reform substantially increased test scores (Jakubowski et al., 2016) and

labor market outcomes (Drucker et al., 2022; Liwiński, 2020). Despite that, in 2016, the school structure was reversed to what Poland had before 1999. As the reform in 1999 proved to improve student scores, mainly due to an extension of the general education program by one year, it was expected that the 2022 results would show a decline caused by the reversal of the reform. This change did not affect students tested in PISA 2018, as the reversal of the 1999 reform took three years to roll out, but students tested in 2022 were already affected by the reform. In short, students in 2022 finished eight years of schooling with the same curriculum, and when tested in PISA, they were already in different types of upper secondary education. Students tested in 2018 were in the last year of lower secondary schools with the same curriculum for all students after finishing a shorter six-year elementary school (for details, see Jakubowski, 2021).

Figure 9.4 shows a change in scores in 2022 compared to the long-term time trend in achievement estimated using data including all PISA rounds from 2000 to 2022 (see Jakubowski et al., 2024, for details). The first bar in each domain compares the trend in OECD countries and Poland separately and shows an estimate of the long-term departure in Poland in 2022 compared to the average departure for the OECD countries. The second bar shows a departure from the time trend using the data for Poland only, so it does not adjust for changes in the OECD countries. In all cases, the results were obtained from linear regression, which estimated the time trend in achievement, controlling for student gender, immigrant background, and socioeconomic status (see Jakubowski et al., 2024; for model specification and testing).

Results in Fig. 9.4 suggest that the overall decline in reading is around 22–26 points, close to 21–25% SD of student reading achievement in 2022, equivalent to at least one year of schooling. In mathematics, the decline is around 29–32 points,

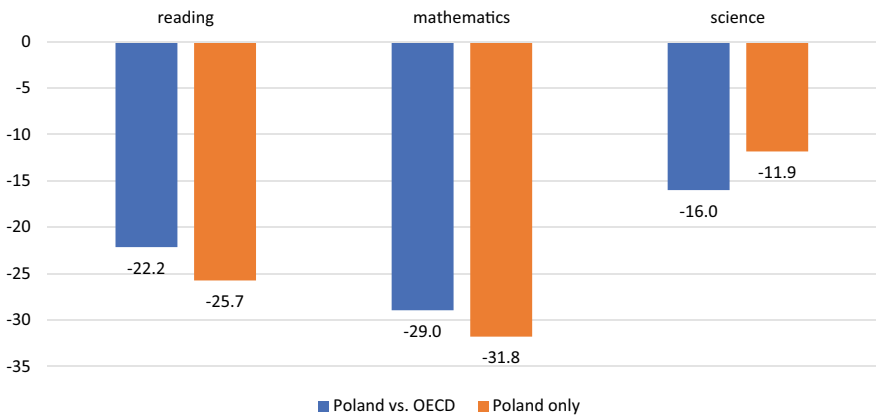

Fig. 9.4 Reading, mathematics, and science achievement change in PISA 2022 in Poland compared to the time trend and OECD countries. *Source* Own calculations based on PISA 2022 (and earlier cycles) microdata

close to 32–35% of SD, equivalent to around 1.5 years of education. In science, the decline is the lowest, around 12–17% SD, below the equivalent of one year of education. Generally, the declines estimated in PISA for Poland are larger than in most European countries. This can be due to more prolonged school closures, but it can also reflect the detrimental effect of the 1999 reform reversal.

9.3.2 Evidence from TICKS

In the early stage after the pandemic, in light of the absence of standardized tests that facilitate longitudinal student performance tracking, the Evidence Institute Foundation conducted PISA-scaled assessments in mathematics, science, and reading in October 2021. This assessment used some of the revealed items from PISA and was scaled using the IRT model to align with the PISA scale used by the OECD for international comparisons. This study drew on a Warsaw municipality representative sample of secondary school students from grades 10 to 12 in 2021. These results were then juxtaposed against historical PISA data, specifically from samples of students in Warsaw spanning from 2003 to 2018. Each cohort size exceeded 1000 students. All the methodological details were described by Gajderowicz et al. (2022).

Figure 9.5 shows the study's results, comparing the average expected and actual results with 95% confidence intervals, highlighting a noticeable decline in academic performance among Polish students across different grade levels. The expected results were calculated based on the prediction using PISA 2003–2018 results, adjusted for the lower bound estimate of achievement growth between grades. Tenth-grade students exhibited the most significant drops, with their scores falling short of expectations by roughly 0.4 standard deviations (SD) in mathematics and nearly 0.6 SD in reading and science, an equivalent of around 2–3 years of education. Eleventh graders also showed lower-than-expected results, with a decrease of about 0.3 SD in mathematics and reading and nearly 0.4 SD in science, an equivalent of 1.5–2 years of education. Twelfth graders experienced the smallest decline, around 0.2 SD across subjects, a gap that was not statistically significant.

Due to school closures, the estimated learning loss was equivalent to more than one year of schooling for secondary school students. This substantial setback in learning outcomes was more severe for students who were also affected by the 2016 educational reform, which shortened the period of general compulsory education.

To distinguish the pandemic's impacts from other adverse effects experienced by Polish education, we compared achievement changes in cohorts impacted by both factors (10th and 11th grades) against the 12th grade, which was only affected by the pandemic. We conducted a regression analysis using PISA scores from 2003 to 2018 as a baseline. We compared these with the 2021 results after adjusting for the expected minimum achievement gains from a year of schooling. This allowed us to isolate and assess the separate contributions of each factor to student performance.

The learning losses due to the pandemic are around 0.3 SD in mathematics and science and are greater than those caused by structural changes (around 0.2 SD). In

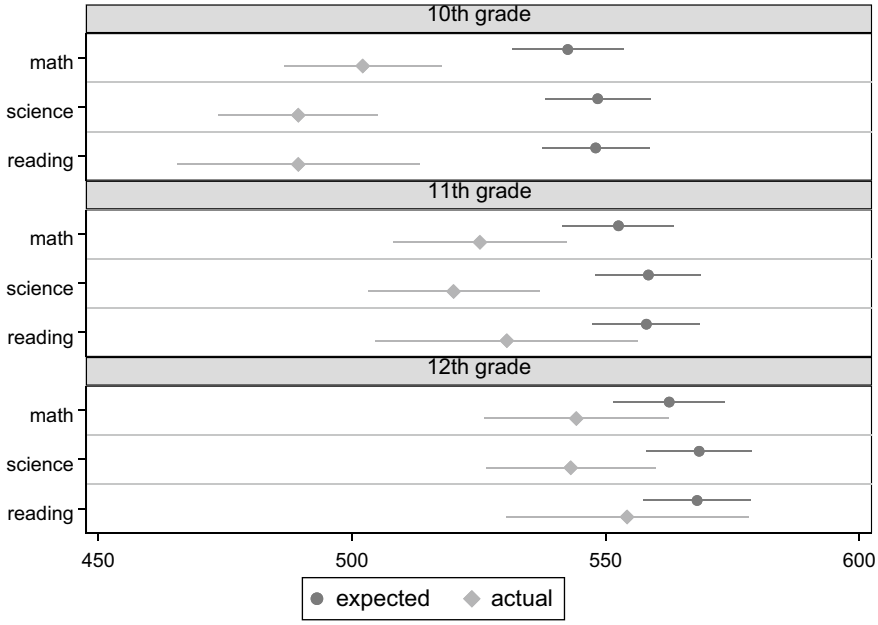

Fig. 9.5 The actual and expected achievement of secondary school students in Warsaw. *Source* Gajderowicz et al. (2022)

reading, the learning loss is smaller, around 0.2 SD, and statistically insignificant in most specifications.

The analysis points out that these learning deficits are challenging to compensate for and likely persist, affecting students' further educational and career outcomes. The broader economic implications include potential long-term decreases in productivity and earnings for the affected students.

9.4 Economic Consequences

Assessing the economic impact of learning losses necessitates evaluating both the broader economic implications (GDP) and the effect on individual productivity, as reflected in wages. These effects will become notable only after many decades, but are significant for the overall nation welfare. At the macroeconomic level, following Gajderowicz et al. (2022), who used the Hanushek and Woessmann (2010) estimate linking educational achievement in PISA to GDP growth (coefficient equal 1.74 for OECD countries). Using this simple scaling, a conservative estimate of a 0.2 standard deviation (SD) loss in achievement, as indicated by TICKS assessment, would translate to a reduction in GDP growth by 0.35% points. With a larger estimate of a 0.3 SD learning loss, the GDP growth reduction is expected to reach 0.52% points.

This shows that learning loss is not just the problem of educational sector, this is about the entire country welfare in the long term.

Understanding the individual-level impact of remote education on wages requires looking at individual productivity, as shown by Psacharopoulos et al. (2021). Their model integrates mean annual earnings, the extent of school closures, and the economic return on education to estimate the effect on wages. In Poland, average annual earnings in 2021 were around USD 18,300[1], according to official statistics. The rate of return on one year of schooling, estimated by Wincenciak et al. (2022), is 7.8%. Following Gajderowicz et al. (2022), and considering the 26-week duration of school closures during the pandemic, the estimated wage loss per student is estimated at USD 744. Over a typical 45-year working life, this translates to a cumulative loss of USD 18,981 per student in present value. When these figures are scaled to encompass the entire affected student population, the total economic impact becomes staggering. To put this into perspective, this figure represents approximately 7.2% of Poland's GDP for the year 2021.

These figures underscore the profound long-term consequences of the learning losses incurred during the pandemic. Not only do they represent a significant setback for each individual, impacting future earnings and career potential, but they also indicate a substantial economic burden on a national level. The losses emphasize the critical importance of educational resilience, the need to mitigate learning disruptions, and the imperative for comprehensive strategies to ensure that future generations can recover from and adapt to such challenges.

9.5 Implemented Measures and the Way Forward

As stated in the NIK report (NIK, 2021), the new government should prioritize establishing a robust, systematic approach to remote and hybrid learning that can be quickly and efficiently implemented in times of emergency. This includes clear, standardized guidelines for conducting classes across all subjects to ensure uniformity and equity in educational delivery. This should be supported by focusing on infrastructure development, particularly in enhancing internet access and technological resources for students and teachers to prevent digital exclusion. While the central government implemented similar measures, NIK reports point to the lack of sufficient resources in the local governments to fund school-level actions and the lack of continuity in these actions.

Considering that Polish schools were closed for much longer than in most EU countries, the evidence presented in the paper showing the negative impact of school closures on student achievement questions these decisions. Schools did not have to be closed for that long and a system of partial openings, following standardized safety guidelines and strict monitoring should be implemented in Poland during

[1] 72,000 PLN transferred to EUR using exchange rate from National Bank of Poland. (2023, December 29). Table No. 251/A/NBP/2023. Publication Date: December 29, 2023.

the pandemic. None of this has happened, and in most cases, schools were closed centrally for the whole country, which resulted in much longer school closures in Poland.

To address the educational challenges exacerbated by the pandemic, immediate evidence-based policies should be rolled out. For example, research has demonstrated the efficacy of online tutoring in mitigating learning losses (Carlana & La Ferrara, 2021; Gortazar et al., 2024). Additionally, the government should invest in comprehensive training programs for teachers, equipping them with the necessary skills and evidence-based tools to manage education effectively. These programs should include ongoing support and resources to adapt to changing circumstances.

Equally important is the implementation of well-structured psychological and pedagogical support systems to address students' mental health and well-being, which were significantly affected by the pandemic. The PISA 2022 non-cognitive scales revealed that the Polish educational system is in a deep crisis concerning students' sense of belonging and well-being. This data underscores significant issues affecting students' feelings of inclusion and overall mental health within the educational environment. Up to now, psychological support at Polish schools is limited. The government provided funds to "diagnose" the situation in 2021. However, until 2023, most schools did not have psychologists or other trained specialists who could support students with mental health or well-being issues.

9.6 Conclusions

The COVID-19 pandemic has posed unprecedented challenges to educational systems worldwide, and Poland's experience offers critical insights into these disruptions' far-reaching implications. The Polish Supreme Audit Office (NIK, 2021) conducted an audit that sharply critiques the government's handling of school closures, revealing a concerning absence of strategic planning for remote and hybrid learning. This deficiency has precipitated significant educational disparities and a measurable decline in student performance, particularly in key subjects like reading and science. The audit exposes the adverse consequences of sporadic policy updates and inadequate support for teachers and students, which have failed to bridge the widening educational gap. Beyond the immediate learning losses, these shortcomings hold significant economic ramifications, as declining academic achievement ultimately translates into a less skilled workforce and diminished national productivity. Furthermore, the reversal of previous educational reforms, coupled with the pandemic's impact, has intensified disparities in learning opportunities, disproportionately affecting students from socio-economically disadvantaged backgrounds.

Recently, international large-scale assessments such as PISA and PIRLS have provided strong evidence that learning losses exist across various grades, with students underperforming in crucial subjects like mathematics, reading, and science.

In PIRLS 2021, Polish fourth graders showed a noticeable decline in reading achievement compared to the steady improvements observed in previous years. The results indicated a decline of approximately 40–48% of a standard deviation (SD) in reading, equivalent to almost two years of schooling. Similarly, PISA 2022 data reflected a broad regression in academic performance, with declines of up to 35% of SD in mathematics and science and 25% in reading. The TICKS assessment on a representative sample of secondary school students in Warsaw underscored the substantial drops across grade levels, particularly in the 10th grade, where learning losses exceeded 0.4 SD in core subjects. Comparing different cohorts showed that these setbacks can be attributed to school closures and the reversal of the 1999 educational reform, which shortened general education. These educational setbacks threaten long-term economic prospects, underscoring the urgent need for targeted interventions to mitigate these losses and support affected students. The findings highlight the necessity for a proactive and systematic approach that ensures continuity in education and addresses the psycho-social needs of students during crises. Instruments such as intensive online tutoring, teachers training in inclusive education methods, and psychological support are immediately needed.

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Chapter 10
Portugal: COVID-19 Learning Losses Through the Lenses of ILSA and Local Low Stake Assessments

João Marôco

Abstract This chapter examines the impact of the COVID-19 pandemic on student learning in Portugal from 2018 to 2022. It highlights a decline in student performance on international assessments like PISA and TIMSS, attributing this to several factors, including shifts in education policies, pandemic-related school closures, and the devaluation of external high-stakes assessments. The chapter also analyzes the national assessment of learning losses and remedial measures taken in response to the pandemic. Comparisons with other countries' learning losses underscore the complexity of attributing the decline solely to the pandemic. Importantly, the chapter concludes that the dip in Portuguese students' performance is not solely due to the pandemic, as it began before the outbreak and worsened due to post-2015 education reform. The estimated learning losses, approximately one year of schooling, are attributed equally to school lockdowns and the consequences of ongoing education policies. Overall, the study prompts reflections on the effectiveness of these policies and the broader impact of the pandemic on student learning outcomes.

10.1 Introduction

The COVID-19 pandemic struck the world at the start of the second decade of the XXI century with a serious death toll, and multiple disruptions in worldwide health, economic and educational status quo. As of December 2023, according to the World Health Organization (WHO), more than 750 million infections occurred worldwide, resulting in 7 million deaths (WHO, 2023). In Portugal alone, the WHO estimates

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that 5 million persons, half of the country's population, got infected with the SARS-CoV-2 virus and that the death toll amounted to 28 thousand as of December 2023 (WHO, 2023).

10.1.1 Schools Closure

Despite the increasing global trend to close schools as a preventive measure against the spread of the SARS-CoV-2 virus, the Portuguese government initially hesitated to take such action, despite facing pressure from teachers and parents. The government's rationale was based on concerns that closing schools could result in some children not receiving proper meals, lacking access to computers and the internet for remote learning, not having a favorable study environment at home, and being without assistance in their studies. Additionally, teachers were reported to lack adequate training and equipment for conducting remote distance lectures.

However, influenced by technical recommendations from a national task force on COVID-19, the Portuguese government eventually mandated the first closure of schools on March 16, 2020 (Decree-Law n.º 10-A/2020, 2020). Higher education institutions in Portugal started reopening on May 4, 2020, followed by upper secondary education on May 18, 2020. Basic education, on the other hand, continued through distance learning until the conclusion of the academic year (OECD, 2020).

Following a sudden surge in COVID-19 cases in January 2021, attributed to a new SARS-CoV-2 variant, Portugal emerged as the worst-hit country globally in terms of population size. In response, the government implemented a second national lockdown, leading to a second wave of school closures starting on January 21, 2021 (Decree-Law n.º 8-B/2021, 2021).

As part of the second phase of the gradual societal deconfinement plan, elementary school students resumed in-person classes on March 15. Subsequently, on May 4, 2021, 500 thousand children up to 15 years old returned to school as part of the ongoing efforts to restore normalcy amid the pandemic.

10.1.2 Remediation Mediation during Schools' Lockdown

Several measures were implemented to overcome the students' learning limitations during the 2020 and 2021 school closures. A "Support Schools" website from the Ministry of Education was introduced and consistently enriched with tools, resources, and guidance for Emergency online learning and teaching. An online course named "Training for Digital Teaching" commenced, attracting the registration of approximately 750 schools and school clusters for the inaugural session. In conjunction with online learning initiatives, Portugal initiated a "Study at Home" program, featuring

eight hours of daily educational programming broadcasted through the national television channel, YouTube, and a mobile application (OECD, 2020). Through a collaborative effort between the public and private sectors, teachers reinforced the ability to upload classes to YouTube and share resources within online communities all while accessing training and technical support from peers (e.g., the Facebook page of #SomosSolucao/E-learning-Apoio" that united more than 30 thousand teachers in less than four weeks after the 2020 schools' closure). In higher education, classes and assessments persisted through institutional digital platforms, including the reinforced "COLIBRI" and "NAU—Sempre a Aprender" Ministry of Science-owned platforms during school closures. Due to the circumstances, Portugal canceled basic education assessments and standardized examinations for grade 9 both in 2020 and 2021. However, upper-secondary examinations, crucial for tertiary education admissions, were maintained but postponed, with students facing a reduced number of subjects examined. These students received prioritized attention when schools reopened. Tertiary institutions implemented online examinations as needed (OECD, 2020).

10.1.3 Learning Losses during Schools' Lockdown

Schools, for more than 168 million children globally, were closed for a full year. As missed school days passed, these children fell further behind, and the most vulnerable paid the heaviest price (UNICEF, 2021). According to the "The State of the Global Education Crisis: A Path to Recovery" report published in December 2021 by the World Bank, UNESCO, and UNICEF, school closures resulted in significant learning losses in math and reading. Analysis shows that in some countries, like Brazil, Pakistan, rural India, South Africa, and Mexico, among others, learning losses were, on average, roughly proportional to the length of the closures (The World Bank et al., 2021). Another study, from the Netherlands, compared primary school performance in national exams just before and after the schools' closure due to the COVID-19 pandemic. Despite the relatively small period of school closure (8 weeks), Engzell et al (2021) found a learning loss of about 3 percentile points or 0.08 standard deviations. The effect is equivalent to one-fifth of a school year, the same period that schools remained closed. Reviewing data from 36 robust studies Patrinos et al. (2022) found average learning losses amounting to 0.17 of a standard deviation, equivalent to roughly a one-half years' worth of learning. Using data from IEA's Progress in International Reading Study (PIRLS) 2021, Jakubowski et al. (2023) estimated that reading scores declined an average of 33 percent of a standard deviation, equivalent to more than a year of schooling. Losses are larger for students in schools that faced longer closures. While there are no differences by sex, lower-achieving students experienced larger losses. Economic losses due to increased worldwide learning poverty estimates amount from 14% of today's global GDP, the equivalent to USD 17 trillion in lifetime earnings (The World Bank et al., 2021), up to a 0.68 percentage point reduction of GDP growth for a global loss of USD 66 trillion (Jakubowski et al., 2023).

As far as Portugal is concerned, Bem-Haja et al. (2022) found, in a study with 11,158 preschoolers in 318 Portuguese pre-schools, a detrimental effect of the pandemic lockdown on pre-school skills, particularly pre-literary and pre-math abilities, markedly during the first lockdown. Socioeconomic status (SES) appeared to potentiate some inequalities with the gap between high and low SES significantly increased (Bem-Haja et al., 2022). To the best of my knowledge, there are, by January 2024, no other published estimates of learning losses associated with school closures during the 2020 and 2021 COVID-19 lockdown. Thus, this chapter gathers evidence from international as well as national assessments to estimate plausible learning losses in Portuguese basic and secondary education. Specifically, I will juxtapose pre-COVID PIRLS and PISA data with their post-COVID counterparts. Additionally, I will delve into the results of national schools' internal classifications in grades 4 and 9 as they align closely with the TIMSS/PIRLS and PISA grade levels, respectively. This comparative analysis will show how these results have evolved in the wake of the pandemic and whether they align or diverge from the findings of the International Large-Scale Assessments (ILSA). This chapter will also include a brief overview of remedial measures, supported by available evidence derived from low-stakes tests, demonstrating their impact on student outcomes. It is important to acknowledge that the analysis may encounter confounding effects stemming from the disruptions caused by school closures due to the COVID-19 pandemic and considerable changes in curricula and assessment policies implemented since 2016. The post-pandemic period was further characterized by teachers' protests and strikes, which may have, at least partially, hindered the process of learning recovery.

10.2 Evolution of Portuguese Students' Literacies

Portugal has participated in ILSA for math and science in grade 4 since 1995 with TIMSS (IEA's Trends in International Math and Science Study); for math, science, and reading for 15 years old since 2000 with PISA (OECD's Programme for International Student Assessment); and reading literacy for 4th graders since 2011 with PIRLS (IEA's Progress in International Reading Literacy) (Marôco, 2020). Figure 10.1 displays the trends of Portugal on the ILSA mentioned above.[1] Reading literacy for 4th graders has been decreasing since 2011 at a negative rate of − 2.1 points per year ($\beta_{Read} = -0.99$; $p = 0.087$). For mathematics at the same grade,

[1] Overall content and concurrent validities with national high-stakes exams for mathematics have been demonstrated for TIMSS 2015 and PISA 2015 (Marôco, 2020, 2021). For students who took both the ILSA tests and the national exams, the correlation between 2015 TIMSS Math plausible values and the national mathematics exam scores was 0.68 for 4th graders, while for 15 years the correlation between PISA Math plausible values and the grade 9 national mathematics exam scores was 0.62. The correlation between the 2015 TIMSS Advanced Math and the grade 12 national exam was 0.77. These correlations are similar to the observed correlations between the national exam scores and the internal scores that teachers assigned students by the end of the school year (Marôco, 2020).

Portugal had the first participation in the TIMSS 1995 edition, where it ranked at the bottom places of the ordered table. The following participation occurred only in 2011 and in 2015 Portugal achieved its highest score, ranking significantly above countries like Finland, Netherlands, and Sweden. The average growth rate in the period was 5.1 points per year ($\beta_{\text{Math 1995–2015}} = 0.99$; $p = 0.068$). Following the highest score in 2015, math literacy dropped by − 4 points per year. A similar trend was observed for science, but the maximum score was observed in 2011 (average growth rate of 4.1 points/year ($\beta_{\text{Sci 1995–2015}} = 0.92$; $p = 0.242$), decreasing thereafter at an average rate of − 2.3 points/year (see Fig. 1A). In contrast, the OECD mean, calculated for all member countries who take part in TIMSS or PIRLS, displayed positive growth rates for both Reading ($\beta_{\text{Read}} = 0.67$; $p = 0.214$), Mathematics ($\beta_{\text{Math}} = 0.80$; $p = 0.057$), and Science ($\beta_{\text{Sci}} = 0.88$; $p = 0.020$).[2]

Maximum reading, mathematics, and sciences literacies were also observed for 2015 in the PISA studies. Between 2000 and 2015 the average growth rate was 1.8 points/year for reading ($\beta_{\text{Read}} = 0.91$; $p = 0.01$), 2.6 points/year for mathematics ($\beta_{\text{Math}} = 0.95$; $p = 0.003$), and 2.8 points/year for science ($\beta_{\text{Sci}} = 0.96$; $p = 0.002$). After 2015, the average decrease rate was − 3 points/year for reading ($\beta_{\text{Read}} = -0.99$; $p = 0.102$), − 3.3 points/year for mathematics ($\beta_{\text{Math}} = -0.90$; $p = 0.281$), and − 2.4 points/year for science ($\beta_{\text{Sci}} = -0.99$; $p = 0.074$). As far as PISA is concerned, as emphasized by OECD Secretary-General Angel Gurría in the PISA 2018 OECD report, up to 2015 Portugal was the only OECD country displaying a positive growth rate in contrast with all other OECD countries (OECD, 2019). In the PISA period, OECD displayed an average negative growth rate of − 0.6 points/year for reading ($\beta_{\text{Read}} = -0.66$; $p = 0.106$), − 1 points/year for mathematics ($\beta_{\text{Math}} = -0.84$; $p = 0.018$), and − 1 points/year for science ($\beta_{\text{Sci}} = -0.90$; $p = 0.015$) (see Fig. 1B). From 2015 to 2022 Portuguese students dropped to the performance of 2006 students: a loss of one full school year for mathematics (20 points; see OECD, 2023a, p. 157).

[2] A note on statistical versus practical significance: Linear regression with few data points, 5 or fewer as is the case of Portugal's participation in TIMSS and PIRLS generally lacks statistical significance although displaying high R^2. However, I consider standardized regression coefficients (β) as a measure of effect sizes, following standard practices in biomedical, education, and the social sciences. By definition, β estimates the number of standard deviations (SD) of change in the outcome variable for one SD unit change in the explanatory or predictor variable, while controlling for other predictors. According to some empirical reviews, a β value of 0.10 to 0.19 SD is considered a small effect, 0.20 to 0.29 SD is a medium effect, and 0.30 SD or greater is a large effect (Cohen, 1998; Nieminen, 2022). Recently, a variation of 0.2 SD in the PISA scale (i.e., 20 points) was considered to be equivalent to a full school year in students' literacy (OECD, 2023a, p.156).

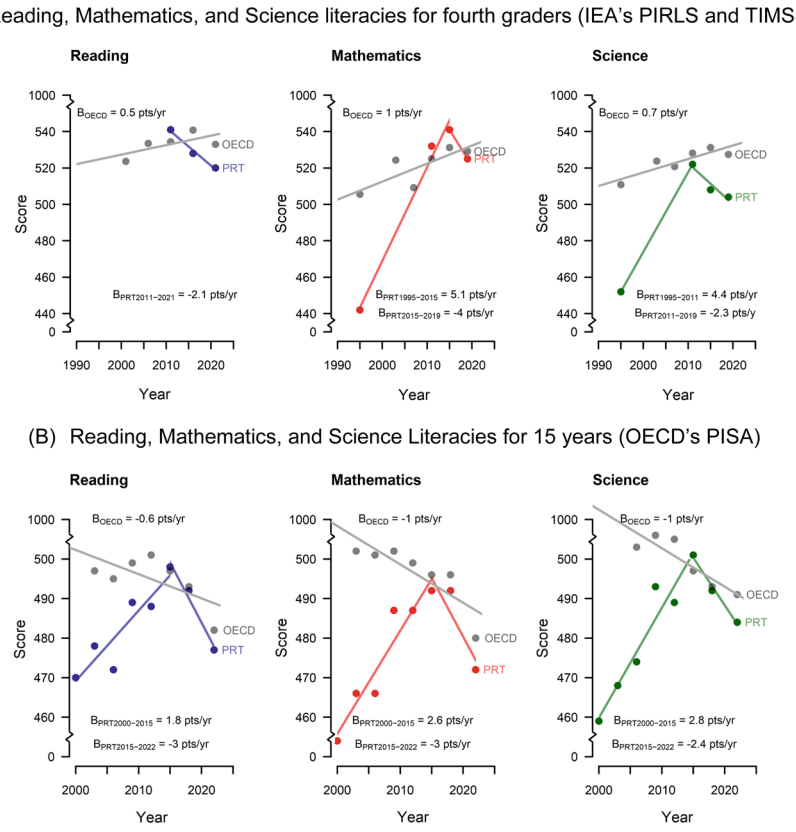

Fig. 10.1 Evolution of Reading, Mathematics and Science literacies in Portugal (colored circles) for fourth graders **(A)**; and for 15 years-old (data from OECD's PISA) **(B)**. *B* values are the linear non-standardized regression slopes for the period of the studies. See the text for the corresponding standardized slopes (β). OECD's PISA (grey circles) shows the average trend up to 2018 across 23 OECD countries that can compare performance across all PISA assessments together with the mean performance observed in 2022 in these same countries (and not the 37 OECD members who did the 2022 assessment), see OECD (2023a, p. 158; 2023b). Fourth graders data are from IEA TIMSS and PIRLS (2023). TIMSS and PIRLS OECD averages are the averages of OECD members who took the TIMSS and PIRLS Assessments in each cycle

10.3 The School Lockdown Effect on Students' Literacy from the ILSA Perspective

Figure 10.2 illustrates the relationship between the total days of school closure in 2020 and 2021 for OECD countries with officially reported data (OECD, 2021) and the average PISA 2022 scores in reading, mathematics, and science (OECD, 2023a). Overall, no discernible trend was observed in any of the three domains measured in PISA 2022 after the pandemic. For instance, Mexico, with 428 days of reported

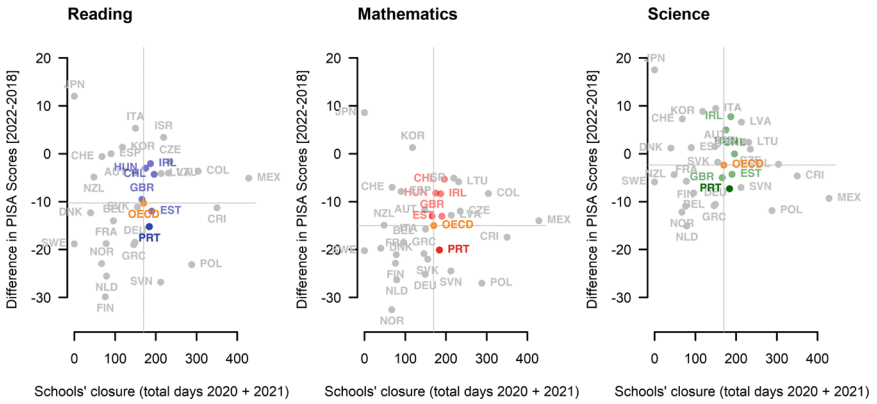

Fig. 10.2 Variation in Reading, Mathematics, and Science literacies scores between PISA 2022 and PISA 2018 and total days of Schools' full closure during 2020 plus 2021 in OECD countries with official reported data. Data from OECD (2021, 2023a)

schools' closure, exhibited a similar drop in reading literacy (− 5 points) as Chile (with 196 days of full schools' closure) or New Zealand (48 days). Similar variation patterns were observed for mathematics and science.

In most OECD countries, students taking the PISA test in 2022 were in grade 10, corresponding to grades 9 and 8 during 2021 and 2020, respectively. Differences in curricula, local remediation measures implemented during school closure (such as distance digital learning and digital learning infrastructure reinforcement), as well as support measures for students and teachers, may explain the variations in learning losses between countries.

It is essential to note that estimates of learning losses due to the pandemic are confounded by pre-existing learning losses in the majority of OECD countries well before the pandemic years. The PISA 2022 assessment revealed a significant regression in academic performance across OECD nations. Compared to the 2018 evaluations, there was a noticeable decline of ten points in reading and a 15-point decrement in mathematics, equating to three-quarters of a standard year's educational advancement. Despite being partially attributed to the COVID-19 pandemic, the regression began before the pandemic, with earlier deteriorations in mathematics, reading, and science scores. Importantly, the correlation between pandemic-induced school closures, often considered the primary catalyst for the decline, lacks straightforwardness (see Fig. 10.2). Across the OECD, roughly half of students experienced closures lasting more than three months. Nevertheless, PISA outcomes reveal no clear distinction in performance trajectories between educational systems with limited closures, such as Japan, Iceland, Sweden, and Chinese Taipei, and those enduring extended closures, including Mexico, Costa Rica, and Ireland (OECD, 2023a). Regarding Portugal, the total days of full school closure during 2020–2021 (184 days) aligned with the OECD average (170 days). However, Portugal's literacy losses between PISA 2022 and PISA 2018 were substantial: − 15 points for reading, − 20 points for mathematics, and − 7 points for science. In comparison, the OECD average for

countries with officially reported data on school closures was five points less in all three literacy domains (see Fig. 10.2).

When examining learning losses among countries with a similar duration of total days of school closure, such as Ireland, Chile, Hungary, and Estonia, Portugal stood out with almost double the losses in both reading and mathematics. Notably, Ireland witnessed an increase in its science scores between 2018 and 2022, whereas Chile and Estonia exhibited marginal variations.

The impact of easing accountability measures, such as high-stakes exams at the culmination of lower secondary education, varied across OECD countries during the lockdown. However, as illustrated in Fig. 10.3, nations that either lacked regular high-stakes examinations in their national education system or suspended these exams due to school closures had mean scores significantly different from countries that upheld high-stakes assessments despite the pandemic challenges ($p = 0.008$). Conversely, countries that deferred high-stakes assessments or adapted to mitigate the lockdown's effects showed no significant deviation in scores compared to those maintaining regular assessments. These countries exhibited only marginal differences from those without high-stakes assessments altogether ($p = 0.052$).

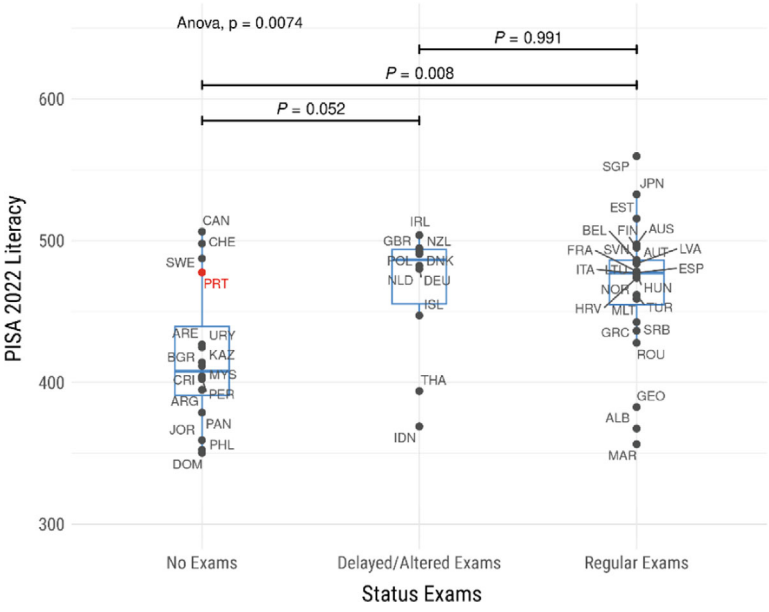

Fig. 10.3 PISA literacy scores, calculated as the mean of reading, mathematics, and science literacies, across countries categorized based on their approach to high-stakes exams at the end of lower-secondary education (grade 9). The categories include countries that maintained regular high-stakes exams, those that delayed and/or adapted exams during the pandemic, and those without national high-stakes exams or where exams were canceled due to the pandemic (such as Portugal). High-stakes exams occurrence is from UNESCO's Huong and Markus (2022) and PISA scores are from OECD(2023a)

10.4 Evaluation of Students' Learning by Teachers during the Pandemic Years

Despite the challenges posed by school lockdowns and the pedagogical and technical difficulties associated with emergency remote teaching and learning during the pandemic years, students were still assessed by their teachers across the various school years. The General Directorate of Statistics of Education and Sciences collected and summarized these data (DGEEC, 2023b). Instead of presenting scores based on students' final year averages, the information was organized by discipline. Figure 10.4 depicts the average scores allocated for Portuguese language, Mathematics, and Natural Sciences in the fourth (the corresponding grade for TIMSS and PIRLS) and ninth grade (where two-thirds of the students were positioned in the year preceding PISA) spanning from 2017/18 to 2021/22, along with the percentage of students who failed to attain a passing mark in these subjects.

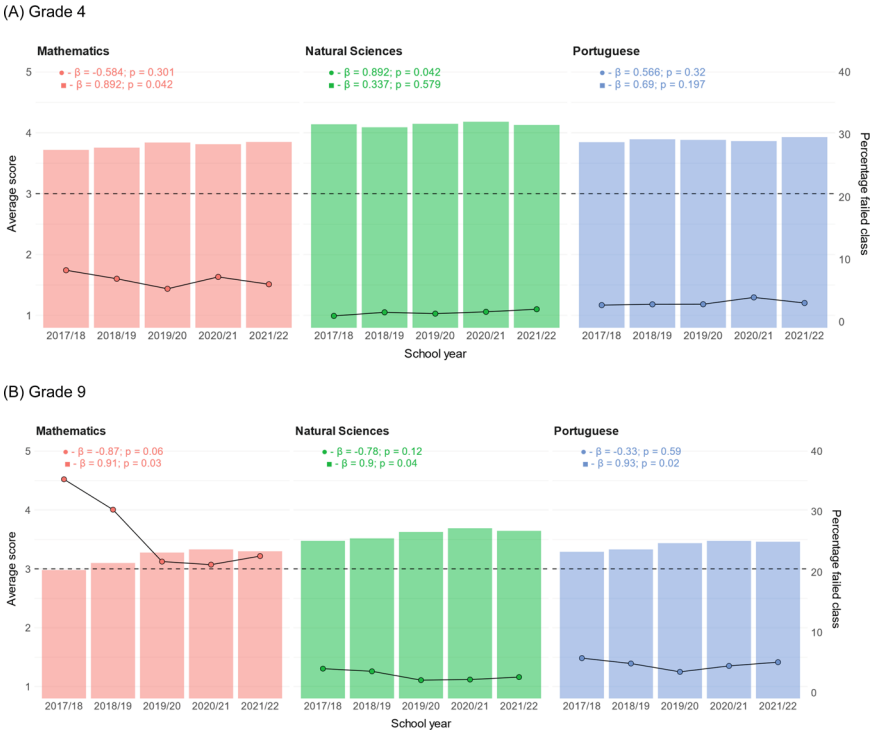

Fig. 10.4 Grade 4 **(A)** and grade 9 **(B)** average score points (represented by bars/squares) assigned by teachers at the conclusion of the school year and the corresponding percentages (depicted by circles) of failed classes in Portuguese language, Mathematics, and Natural Sciences. The information covers the school years spanning from 2017/18 to 2021/22, with the scoring system ranging from 1 to 5, where 3 is the passing mark. Data from DGEEC (2023b)

There was a general statistically significant ($p < 0.05$) increase in the average scores of the three disciplines at the national level from the 2017/2018 school year (pre-pandemic) to the 2021/2022 school year (post-pandemic) in grade nine and for mathematics at grade 4. The variation is also larger at the later grade, especially for mathematics. The most significant surge occurred in the year of the first lockdown. However, associating this improvement in students' grades with the lockdown is an overly simplistic interpretation; this was likely not the case. Grades began to improve after the 2018/2019 academic year with the publication and implementation of Decree-Law n.º 55/2018 from July 6. This decree-law established new autonomous and flexible basic and secondary curricula, along with general guiding principles for assessing students' learning. These guidelines overscored the development of student-centered competencies, placing value on collaborative and interdisciplinary work in planning, executing, and evaluating teaching and learning. There was a particular emphasis on assessment for learning (formative evaluation) and devaluation of assessment of learning (summative evaluation). Article 24.º explicitly promoted formative assessment as the primary method for obtaining privileged and systematic information in various curricular domains, involving students in the process of self-regulation of learning. Moreover, the progression of students in basic education followed a cycles logic, where individuals who successfully grasp the learning objectives for each teaching cycle advance to the subsequent cycle. In the 1st cycle (grades 1–4), the teacher in charge of the class, after consulting with other teachers, or the class council in the 2 nd(grades 5 and 6) and 3rd cycles (grades 7–9), may, under "exceptional circumstances", decide to retain the student in the same year of schooling. During the pandemic years, teachers felt difficulties promoting valid and reliable online assessments both due to lack of specific online assessment knowledge and physical infrastructures. These difficulties resulted in an overstated care for not penalizing students' grades. The improvement in student grades after 2018 may be more plausibly attributed to these factors associated with the devaluation of summative assessment and the reinforcement of anti-retention policies, in place since 2016, rather than relying on a fanciful school lockdown effect. Note that the increase in schools' internal average scores is inconsistent with TIMSS results over the same period. From 2015 to 2019 TIMSS math scores dropped from 541 to 525 points, while for science the change was from 508 to 504. The results for the internal average scores for Portuguese language are also inconsistent with the drop in PIRLS scores from 528 to 520 in the same period (2015–2021). As far as grade 9 is concerned, the inconsistency of results from the internal average classifications and PISA scores is even more striking. Results in the three domains, judging from internal school average grades and percentage failed, improved while PISA scores dropped in the same period. It is also noted that the percentage of failed in Mathematics augmented 3–4 times from grade 4 to grade 9.

10.5 Portugal's Remedial Measures and National Assessment of Learning Losses

Following the issuance of Council of Ministers Resolution Nº 53-D/2020, a computer-based assessment (CBA) diagnostic study of learning was conducted in January 2021, during the pandemic. This assessment evaluated students' reading and information retrieval, math, and science competencies in grades 3, 6, and 9. Building upon the insights from the 2021 diagnostic, Council of Ministers Resolution Nº 90/2021, dated July 7, 2021, approved the 21|23 School + Recovery Plan (PRA) (DGE, 2023). The primary objective of the PRA was to ensure that no student was left behind in the aftermath of the suspension of face-to-face teaching due to the COVID-19 pandemic. The plan centered on three primary areas: teaching and learning, supporting educational communities, and understanding and evaluating.

Specific measures within the plan included strengthening school autonomy in managing human and material resources, as well as in curricular and pedagogical organization. The plan also implemented a tutoring and mentoring program to support students facing learning difficulties or at risk of dropping out. Additionally, it facilitated the development of personal, social, and community plans to promote inclusion, citizenship, and student participation in educational, cultural, and social projects. For teachers, an online resource page was established to provide materials, projects, practices, and information related to learning recovery, with a focus on Portuguese and Mathematics (DGE, 2023). Furthermore, a monitoring and evaluation system for the plan was instituted, involving the collection and analysis of data provided by schools, assessment instruments, national exams, and conducting studies and surveys, as reported by the General Directorate of Statistics of Education and Science (DGEEC, 2023a).

One of these surveys was conducted following the 2021 Computer Based Assessment (CBA) in reading and information literacy, mathematics, and science. The 2023 CBA utilized the same non-public items as the 2021 edition, ensuring the validity of comparisons between 2021 and 2023. NUTS II stratified random samples, proportionate to the size of students in each region, were drawn in both 2021 and 2023, involving over 15,000 students at each grade. Table 10.1 summarizes the differences in the percentages of students who answered at least two-thirds of the items correctly in each of the four proficiency levels for 2023 (post-pandemic and post-PRA) and 2021 (during the pandemic) (IAVE, 2023). According to the collected data, modest to null recoveries were observed at the lowest proficiency levels for reading and information literacy. At the most cognitively demanding proficiency levels, there were even considerable negative evolutions (up to − 16 percentage points for grades 3 and 9). In contrast, for mathematics literacy, losses were more pronounced at grade 9 at the lowest cognitive proficiency levels. A similar trend was observed for science literacy, with the highest losses at grades 6 and 9 for the lowest proficiency levels (up to minus 28 percentage points at level 1 in grade 9, see Table 10.1).

It is important to acknowledge that the PRA period was also marred by teachers' strikes and peaceful protests. These actions were driven by a desire to voice discontent

Table 10.1 Percentages of students who got at least two-thirds of the items correct in each of the four proficiency levels for 2023 (after the pandemic and the PRA plan) and 2021 (during the pandemic). Data recalculated from IAVE (2023)

(A) Reading: at least 2/3 of tasks correct (%)

Proficiency Level	Year	Grade 3	Grade 6	Grade 9
1 Students can identify explicit information and determine the subject of a specific part of a text.	2021	51.4	41.9	47.1
	2023	62.2	41.4	43.9
	Dif. 23-21	10.8	-0.5	-3.2
2 Students can reconstruct/organize explicit information in a text and identify its subject.	2021	52.6	53.8	46.2
	2023	51.1	44.3	46.9
	Dif. 23-21	-1.5	-9.5	0.7
3 Students can extract implicit information from a text and recognize/reconstruct logical relationships established within it.	2021	44.9	49.7	80.2
	2023	29.3	51.3	69.5
	Dif. 23-21	-15.6	1.6	-10.7
4 Students analyze content relationships, evaluate language appropriateness, and assess logical connections for meaning construction.	2021	39.0	27.4	43.5
	2023	58.7	25.2	30.5
	Dif. 23-21	19.7	-2.2	-13.0

(B) Mathematics: at least 2/3 of tasks correct (%)

Proficiency Level	Year	Grade 3	Grade 6	Grade 9
1 Students solve basic math problems using procedures, techniques, and data interpretation.	2021	62.3	44.4	39.5
	2023	72.9	44.6	35.5
	Dif. 23-21	10.6	0.2	-4.0
2 Students solve routine math problems, apply procedures, interpret data for simple reasoning.	2021	45.3	34.0	53.8
	2023	50.5	35.9	42.5
	Dif. 23-21	5.2	1.9	-11.3
3 Students solve complex math problems, applying concepts and analyzing data.	2021	26.6	20.7	24.0
	2023	35.0	23.1	22.8
	Dif. 23-21	8.4	2.4	-1.2
4 Students solve diverse, complex math problems, applying concepts, assessing data for intricate reasoning.	2021	27.5	19.0	24.6
	2023	32.0	14.4	27.3
	Dif. 23-21	4.5	-4.6	2.7

(C) Sciences: at least 2/3 of tasks correct (%)

Proficiency Level	Year	Grade 3	Grade 6	Grade 9
1 Students use scientific knowledge to describe, classify natural phenomena. Identify scientific info, recognize basic experiments.	2021	62.3	48.7	44.1
	2023	75.5	31.5	16.5
	Dif. 23-21	13.2	-17.2	-27.6
2 Students explain natural phenomena using scientific knowledge, interpret data, and design simple experiments.	2021	46.4	25.0	48.8
	2023	55.1	17.4	49.8
	Dif. 23-21	8.7	-7.6	1.0
3 Students synthesize scientific knowledge, explain natural phenomena, draw valid conclusions from data, and design experiments discerning scientific issues.	2021	56.3	34.7	35.9
	2023	48.8	26.0	38.3
	Dif. 23-21	-7.5	-8.7	2.4
4 Students formulate hypotheses, analyze critically, design complex experiments, contributing to general scientific knowledge.	2021	49.8	28.1	21.8
	2023	37.6	16.0	23.9
	Dif. 23-21	-12.2	-12.1	2.1

and advocate for the prioritization of education amidst challenges in professional development, wages, and school curricula during the post-pandemic era. The impact of these strikes on the learning recovery process may have been significant, at least in part, owing to disruptions within the education system.

10.6 The PISA 2022 Students' Profile and the Education Policies from 2000 to 2022

Sixty-three percent of the Portuguese students who participated in the PISA test in 2022 were in grade 10. As illustrated in Fig. 10.5, these students began their educational journey in grade 1 at the age of six during the 2012/2013 school year. Eighty-seven percent of this cohort had the benefit of at least one year of preschool. They started with the curricula from 2012, which represented an upgrade from the previously implemented 2001 knowledge-based curricula (refer to Fig. 10.6). During grade five, within a new policy cycle, they encountered adjustments to the curricula with the introduction of "Curricular flexibility". In 2016, a significant shift occurred with the overturning of the national high-stakes exams for grades four and six, replaced by low-stakes tests at grades two, five, and eight, covering rotating subjects. These students were exposed to low-stakes tests for mathematics and science in grade five, the "Essential learnings" reform by grade 7, bypassing the high-stakes exams for mathematics and Portuguese in grades four and six. This cohort also faced disruptions due to the COVID-19 school lockdown in grades eight and nine, during which face-to-face school activities were canceled. Consequently, the low-stakes tests for grade eight and the end-of-lower-secondary education grade nine exam were also canceled. Except for the grade five low-stakes test, the majority of students who participated in the PISA in 2022 had no prior exposure to external assessments (see Fig. 10.5).

Portugal's education policies were strongly influenced by PISA, TIMSS, and PIRLS studies (Marôco, 2020, 2021). Starting from the first edition of PISA, where Portugal ranked at the bottom of the OECD league table, Ministries of Education have explicitly used PISA (and to a lesser extent TIMSS, and PIRLS) results to justify changes in education policies, as depicted in Fig. 10.5. These changes

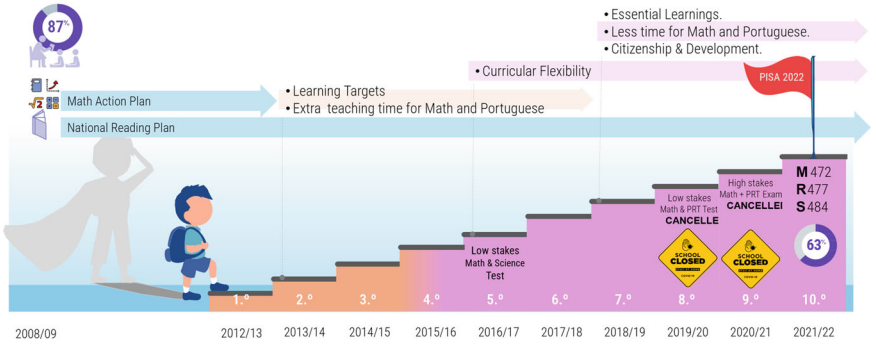

Fig. 10.5 The PISA 2022 Students' profile and the major education features in their school years. Eighty-seven percent of this student cohort attended at least one year of preschool (OECD, 2023a, 2023b) and 63% were at grade 10 when they took the PISA 2022 test (OECD, 2023a, 2023b)

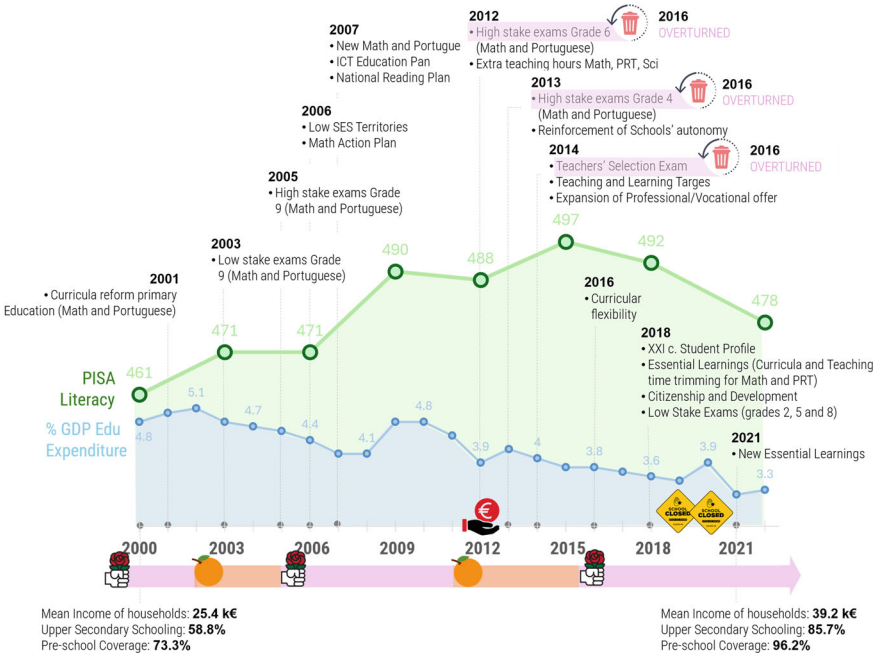

Fig. 10.6 PISA literacy scores (the mean of the mathematics, reading, and science domains) and educational expenditure (as % of GDP) on basic and secondary education (updated from Marôco, 2021 and provisional data for 2022 from the National Statistics Institute). Policies explicitly justified on PISA, TIMSS and PIRLS results are over-imposed. The rose color indicates socialist governments, while the orange indicates social democratic governments. The Euro symbol indicates the financial bailout period by a Troika of EU and financial institutions from 2011 to 2015. The yellow lozenges indicate school lockdown during 2019/20 and 2020/21 school years

aimed at reforming the mathematics, science, and Portuguese curricula, emphasizing Information and Communication technologies, increasing teaching hours and content, providing support to regions and families with lower socioeconomic status, promoting home reading, implementing learning targets and goals, enforcing students' and schools' accountability through high-stakes exams at grades four (2013), six (2012), and nine (decided in 2005, implemented in 2006), and expanding vocational training (For a more in depth description of the 2000–2015 education policies in Portugal see Marôco, 2021). Simultaneously, almost universal coverage of early childhood education was achieved by the first decade of the XXI century, in conjunction with improvements in upper secondary coverage (and mothers' education) and households' financial wealth (Marôco, 2021). By 2015, Portugal had risen from the bottom of the OECD league table to the OECD average, both in PISA and TIMSS. However, by the end of 2015, a new political cycle reversed most accountability measures addressing what was perceived by some as an overload of curricula with insufficient emphasis on citizenship and human development, and overemphasis on high stake assessments. The cancellation of high-stakes exams for grades four and

six occurred in early 2016, and the trimming of curricula to "Essential Learnings" was officially implemented in 2018, coinciding with a trend of reduced educational expenditure during the overall PISA lifecycle. As illustrated in Fig. 10.6 (see also Fig. 10.1), PISA results reached a peak in 2015 but started decreasing thereafter. There were two clear policies periods between 2000 and 2022. The first (2000–2015), especially after the stagnation of PISA results observed in 2006, promoted the establishment of measures capable of improving learning (which were continued in the following years and were gradually improved until 2015). The second period, starting on 2016, after the best results ever in 2015, gradually abandoned policies from the 2006–2015 period, and adopted new measures in the meantime, e.g., low stakes stake assessment tests; imprecise curricula; learning focused on scattered activities; limited resources to promote success-promoting measures (few credit hours for schools); textbooks without evaluation and certification. The time frame between 2000 and 2022 shows two moments with identical PISA results (2006, 2022): The first, 2006, serving as a starting point to establish measures that encouraged improvement, leading to the results of 2015; the other, deactivating those measures which, in conjunction with the COVID-19 lockdown, brought us back in 2022 to the PISA results of 2006 (see Fig. 10.5).

While PISA is a correlational study, the temporal coincidence of education policies and PISA results is evident. In 2020 and 2021, schools were locked down due to the COVID-19 pandemic, and the subsequent PISA edition witnessed the largest drop in results both in the OECD (15 points for mathematics) and in Portugal (20 points for Mathematics). However, as pointed out in the OECD report (OECD, 2023a, p. 3) the decline in OECD countries, as well as in Portugal, can only partially be attributed to the COVID-19 pandemic. Portugal's scores in reading and science for PISA and mathematics for TIMSS had already been falling since 2015, before the pandemic. Examining the average of the three PISA domains, from 2015 to 2018, Portuguese scores decreased at an average rate of 1.7 points per year. From 2018 to 2022, the rate of decrease doubled to 3.5 points per year. Although the number of data points in the period is insufficient for statistical inference, it is apparent that the COVID-19 pandemic exacerbated by a factor of two the effects of the education policies adopted post-2015.

10.7 Concluding Remarks

The impact of the suspension of face-to-face teaching in schools during the COVID-19 pandemic on students' learning was evident and varied globally, as indicated by various sources, including local studies (Bem-Haja et al., 2022; Engzell et al., 2021), regional and worldwide reports (Jakubowski et al., 2023; OECD, 2023a; Patrinos et al., 2022; The World Bank et al., 2021). Estimates of learning losses from various sources and countries ranged from minimal effects to a full year of educational setbacks. (Jakubowski et al., 2023; Patrinos et al., 2022).

The initial assessment of the impact of school lockdowns on basic and secondary student learning in Portugal appeared overly optimistic, based on internal school grades and heightened by media reports (e.g., Viana, 2023). However, when external assessment data, including national sources such as the PRA diagnostic sample-based tests in 2021 and 2023, and international sources like PISA 2022, became available, it became evident that students' learning had indeed been affected by the schools' lockdown.

In comparison to countries with similar economies and education systems, Portugal's learning losses double those of countries with equivalent durations of school lockdowns. For example, Hungary experienced a 10-point drop in mathematics, while Portugal saw a 20-point decline from the 2018 to 2022 PISA editions. Notably, Portugal's losses in student achievement, as evaluated by both PISA and TIMSS, began after the 2015 editions, a period up to when the country's continuous improvement, contrary to the OECD trend, aligned Portuguese results with the OECD average. By 2022, Portugal's scores in Mathematics, Reading, and Science had aligned with the continuous decline observed in the OECD ever since 2003. However, as emphasized in the OECD report for PISA 2022, this decline in Portugal, like in other countries, cannot be solely attributed to the COVID-19 pandemic. Most OECD countries were already witnessing significant declines in their students' PISA performance. Nonetheless, the rate of loss for Portuguese students doubled from the 2015–2018 period (before the COVID-19 pandemic) to 2018–2022 (after the pandemic).

Since 2016, Portugal has undergone a distinct shift in its previous education policies focused on strengthening curricula in Mathematics, Portuguese, and Science and enhancing students' knowledge and accountability through high-stakes exams. After 2016, there was a transition from extended curricula and ambitious learning targets with students' and schools' accountability to "curricular flexibility," featuring streamlined curricula centered on formative assessment of students' competencies. Additionally, there was a policy reinforcement against student retention, except under "exceptional circumstances". While establishing a clear cause-and-effect relationship between policies and ILSA results remains challenging due to the correlational nature of such studies, there is an undeniable temporal coincidence between the decrease in Portuguese students' ILSA results and the reversal of previous policies aligned with Portugal's improvement in these studies. The schools' lockdowns during the COVID-19 pandemic may have simply exacerbated the effects of the current education policy by a factor of two.

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Chapter 11
South Africa: COVID-19 Learning Losses and Attempts at Recovery in a Poorly Performing and Unequal Education System

Servaas van der Berg and Bianca Böhmer

Abstract The COVID-19 pandemic significantly affected education in South Africa. School closures, rotational timetabling, remote learning challenges and higher absenteeism compounded educational disparities. PIRLS 2021 results demonstrate significant learning loss in Grade 4 reading achievement, with a decline of 31 PIRLS points since 2016, equivalent to 50–60% of a year's learning. The proportion of extremely low performers doubled to over a quarter. Socio-economically disadvantaged students were disproportionately affected. Pandemic-induced curriculum adaptations and lenient promotion policies accelerated student progression but failed to address learning deficits, raising concerns about the affected cohorts' educational and labour market prospects. Insufficient funding and coordination of targeted recovery strategies hinder learning recovery.

11.1 Introduction

Globally, the COVID-19 pandemic has profoundly affected schooling and learning outcomes. In South Africa, the effects of school closures, the adoption of rotational timetabling and limited success with remote learning were compounded by pre-existing weak and greatly unequal educational performance. Some measure of how this affected schools during the pandemic can be gleaned from this message of the Department of Basic Education (DBE) to school management teams (SMTs) when they launched their post-pandemic learning recovery programme:

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> The COVID-19 pandemic was an extraordinary time for school leaders. They had to work hard to hold the school community in a time of great anxiety, manage complex emergency safety measures, and do everything in their power to protect as much learning time as possible. SMTs had to provide support to teachers trying to manage 'learning at home' and dealing with the lack of continuity in learning with rotating attendance. More 'learning' time was lost than just the days lost as teaching needed to bridge the time away from school.
>
> School Management Teams and teachers performed miracles during this time, but when we returned to full school attendance, it was not 'back to normal'. The COVID-19 school lockdowns and rotational timetables of 2020 and 2021 resulted in a significant loss of teaching time across the country. The emergency measures may be over, but significant learning losses remain which will cripple learner achievement and progression. (DBE, 2023b: 2)

Complete school shutdowns were concentrated in 2020, while rotational timetabling was applied in many schools on reopening and throughout 2021. This approach, whereby students attended on alternating days or weeks, was considered necessary to adhere to the social distancing rules, severely reducing instructional time over the two years. Altogether, most schools lost between three quarters and a full year of teaching and learning time, with an average of 54%[1] of a year of teaching and learning time lost in 2020 and another quarter to a half a year due to rotational timetabling in 2021 (DBE, 2022a; Van der Berg et al., 2022).

In response to the learning time lost, the authorities implemented more lenient promotion rules and adaptations to the curriculum. These policies drastically reduced the traditionally high repetition rates, especially in upper-secondary schools. Consequently, school drop-out decreased sharply and students' progression accelerated to grade 12, the final school year known as matric. This posed significant challenges for the matric examination, the school exit exam officially called the National Senior Certificate (NSC) examination.

This chapter explores the impact of the pandemic on learning, policy responses and subsequent attempts at recovery. We begin by outlining a few key aspects of the South African education system pre-pandemic. We then describe education-related policies introduced in response to COVID-19 and examine their impact on children's opportunities to learn before discussing the leniency measures to accommodate lower levels of learning. Following this, we explore how these measures influenced student progression through the school system and analyse data on learning losses. Our primary focus is the 2021 Progress in International Reading Literacy Study (PIRLS) results, the only nationally representative data source containing pre-pandemic and post-pandemic results. Before concluding, we also discuss curriculum and other policy measures to mitigate the impact of learning losses on students still in the system.

[1] This differed by grade as a phased reopening approach was adopted. Grades 7 and 12 returned first.

11.2 Background

To grasp the pandemic's effect on learning, it is critical to note some significant pre-pandemic features of the education system: Weak cognitive outcomes but also consistent improvements in the two decades before the pandemic, high levels of educational inequalities and high enrolment rates coupled with extremely high repetition rates and a correspondingly high rate of drop-out, particularly in the higher grades.

11.2.1 Weak Educational Outcomes

Education outcomes in South Africa are much lower than in other countries at similar income levels. Pritchett (2019) shows that South Africa's harmonised test score of 343 on a PISA-equivalent scale is a negative outlier, a full standard deviation lower than the expected test score given the country's per capita income. In comparison, Vietnam, with less than half South Africa's per capita income, scored almost two standard deviations higher.

11.2.2 Steadily Improving Learning Outcomes in the Decade and a Half Preceding the Pandemic

Since the turn of the century until the onset of the COVID-19 pandemic, South Africa's education system experienced improvements in all international assessments—SACMEQ, TIMSS and PIRLS—the country participated in, except for the 2019 TIMSS grade 5 (see Fig. 11.1).[2] All cohorts that entered grade 1 after the political transition in 1994 benefited from improved learning outcomes (Spaull et al., 2022). This rate of progress is quite rapid from an international perspective (Gustafsson & Taylor, 2022a). Some concerns have been raised around the validity of the SACMEQ IV results, given the large improvements across all participating countries from 2007 to 2013 (Spaull & Pretorius, 2019). However, they remain included here for completeness, and the other tests clearly show strong improvements in test scores.

[2] The scale center points of most international assessments were set to 500 in the original sample and the standard deviations at 100. As SACMEQ scores are much higher, they are measured on the y-axis on the right and TIMSS and PIRLS scores on the y-axis on the left.

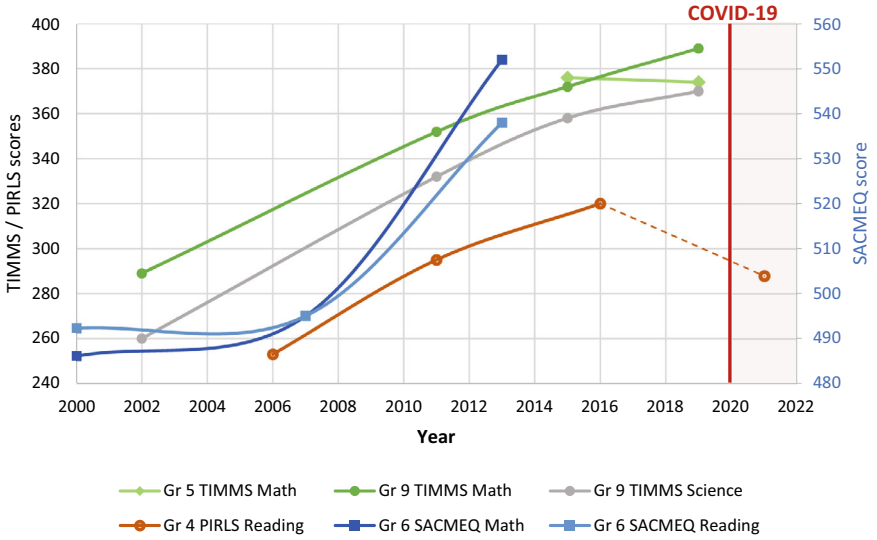

Fig. 11.1 Results from International assessments of achievement in South Africa, 2000 to 2021. *Source* Original graph from Gustafsson (2022). Updated to include PIRLS 2021 outcomes

11.2.3 Persistent and Large Inequalities in Cognitive Outcomes

Performance disparities along socio-economic, racial, language and regional lines were pronounced before COVID-19. Figure 11.2 shows the massive performance advantage of quintile 5[3] (most affluent) schools in PIRLS grade 4 reading in 2016. School socio-economic status (SES) quintiles are based on parental education, occupation and book ownership. This large learning gap derived from apartheid-era inequalities, even though historically white schools now serve a mixed population. Large spatial performance differences exist between urban and rural areas and among provinces. Exceedingly large intra-class correlation coefficients indicate that inequality can be ascribed more to performance differences between schools than to student-level differences within schools. However, the high between-school inequality in reading and mathematics outcomes declined somewhat between 2011 and 2019 (Gustafsson & Taylor, 2022b).

[3] South African public schools are grouped into five groups of different size, referred to as 'Quintiles', based on the affluence of the communities they serve. In contrast, the 'quintiles' used in analysing international assessments such as PIRLS are equal-sized and based on an asset index derived from home possessions and parental education.

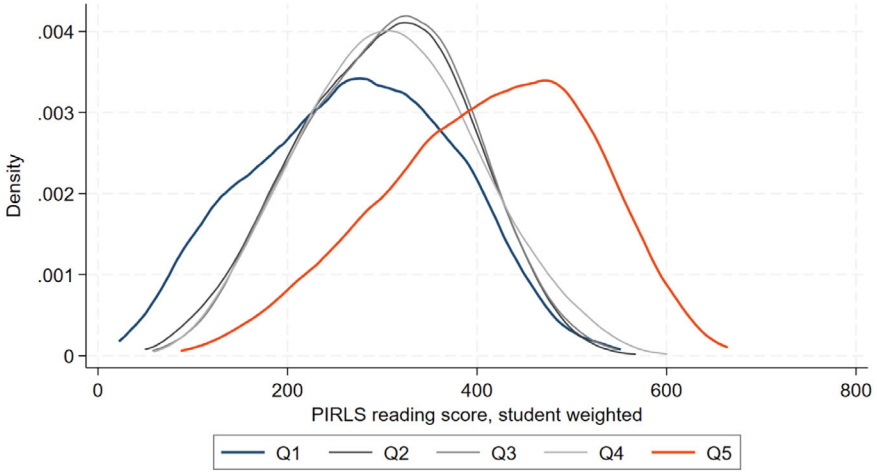

Fig. 11.2 Distribution of PIRLS reading achievement by school SES in grade 4 in 2016. *Source* Derived from the PIRLS 2016 South Africa dataset, using average plausible values. Densities are student-weighted. A school-level socio-economic status index was calculated using the number of books and kids' books in the home, parents' employment and level of education. The graph excludes schools where fewer than three parents responded to the questionnaire

11.2.4 Almost Universal Access Rates Combined with High Rates of Repetition

South Africa has achieved high levels of primary and secondary school enrolment. Yet repetition rates are also extremely high. The repetition policy prescribes that a child cannot be held back more than once in a three-year school phase, resulting in high repetition rates at the beginning of each phase. The repetition policy was less strictly applied in the last phase, so repetition rates were extremely high in grades 10 and 11, encouraging drop-out, especially of over-aged students.

11.3 COVID-19 and Policy Responses to the Pandemic

The outbreak of COVID-19 and rapidly rising infections prompted the declaration of a national lockdown in March 2020. School closures and phased re-opening in 2020, followed by rotational timetabling in 2021 to enforce social distancing, reduced instructional time dramatically (DBE, 2022a, b; Gustafsson, 2022).

The most immediate policy response was the shift to remote learning, which exacerbated existing inequalities. Despite efforts to provide accessible learning materials through radio, television and WhatsApp, the take-up was low, largely due to inadequate internet connectivity. Only 11.7% of individuals aged 5–24 in educational institutions were offered the option of remote learning, and only 6.1% participated

in it (StatsSA, 2021). As the pandemic evolved, a phased approach to reopening was adopted, with strict health and safety protocols, to balance the need for educational continuity with the safety and well-being of students and teachers.

To counteract the disruptions, education authorities gave teachers discretion on what parts of the curriculum to skip and introduced more lenient policies for student promotion. Lowered pass requirements were meant to ensure that students were not unfairly disadvantaged due to learning losses that were no fault of their own. As part of this leniency, students were only tested on work covered in class, thus reducing the tested curriculum significantly (Hoadley, 2020, 2023). This raised concerns about the quality and equity of learning outcomes. Provinces, not the national department, implement policy decisions made centrally. This means that implementation can vary substantially across provinces.

11.3.1 Accelerated Student Flows Through Grades

The more lenient promotion policy introduced in 2020 significantly changed repetition and dropout rates, thus accelerating student progression through grades. In the high-repetition grades, grades 10 and 11, repetition almost halved in 2020 (Fig. 11.3). More recent national repetition rates are not available, but data for three provinces show that repetition rates in grades 10 and 11 have increased from their 2020 low point but stayed substantially below 2019 levels (Van der Berg et al., 2023). The effect on flows between grade 10 and grade 12 (matric) was stark. Flow-through (the share of grade 10 s that reach grade 12 without further repetition) improved from 38 to 52% in the Eastern Cape, 40 to 57% in Gauteng, and 31 to 52% in Limpopo.

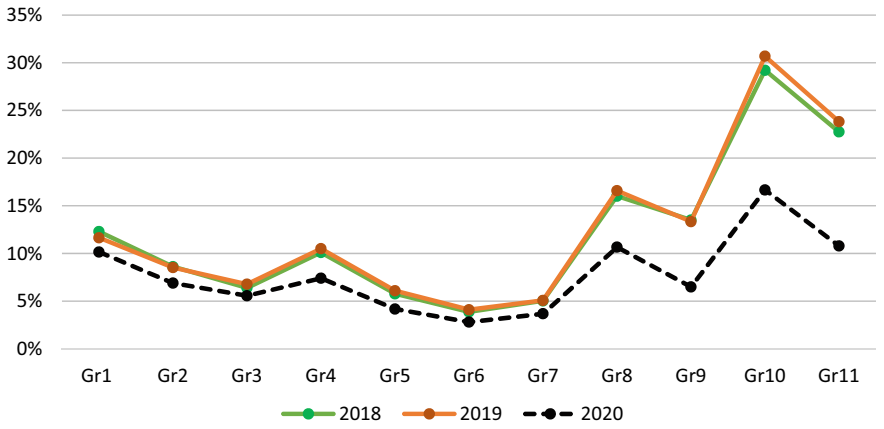

Fig. 11.3 Repetition rates by grade, 2018, 2019 and 2021. *Source* Own calculations from LURITS data

As mentioned, increased leniency also raised concerns about the quality of education and students' readiness for subsequent educational challenges. Studies highlight the complexities and challenges of accelerated student progression (Van der Berg et al., 2023; Wills & Qvist, 2023). Key concerns include students' readiness for higher-level academic work, the potential dilution of academic standards and the long-term implications for students' educational trajectories. The policy response reflected a delicate balancing act: ensuring that students do not lose out on educational opportunities due to the pandemic while trying to maintain the integrity of educational standards.

Accelerated student flows considerably increased flows to matric. In public schools (around 95% of enrolment), matric candidates increased by 40% between 2019 and 2021, with larger increases in poorer schools. Despite learning losses, the large increases in the number of matric candidates and a compositional effect whereby more over-age and weaker students reached matric, the numbers passing matric or qualifying for university entry increased sharply. This raised questions about the integrity of certification and assessment processes and the comparability of standards before and after 2020. It also increases the risk that students will be underprepared for university. Clearly, the long-term policy implications of accelerated progression need to be balanced with the maintenance of quality and equity in the education system.

11.4 Learning Losses

All studies comparing the academic performance of students before 2020 and after the onset of the pandemic in South Africa found large and significant learning losses across grades and subjects, often combined with increased inequality, where 'learning losses' include both learning foregone due to interruptions in regular education as well as the deterioration in academic skills and knowledge that students had already acquired (Angrist et al., 2021).

11.4.1 Evidence on Learning Losses

The DBE's Early Grade Reading Study and a Funda Wande[4] evaluation (Ardington et al., 2021) found that, after one year of the pandemic, grade 2 s and 4 s in a sample of non-fee-paying schools[5] in the Eastern Cape, KwaZulu-Natal and Mpumalanga learned between 57 and 70% of a year less in home language reading and between 62 and 81% in English reading relative to the 2019 cohort. In grade 4, girls and those

[4] Funda Wande is an NGO focusing on foundational literacy and numeracy.

[5] Poor schools may not impose school fees on parents. Non-fee-paying schools largely serve the bottom two-thirds of students.

with the highest initial reading proficiency experienced the largest declines in reading performance, implying greater convergence in outcomes. The authors hypothesise that students who benefit the most from being at school were most affected by the pandemic disruptions (Ardington et al., 2021). After two years of these disruptions, at the end of 2021, the home language reading development of grade 4 s in a group of no-fee schools in the Northwest was 54–118% of a year of learning behind the 2018 grade 4 cohorts (Wills & Van der Berg, 2024). This suggests that continued disruptions and rotational timetabling in 2021 entrenched and deepened the learning losses of 2020.

A study using the Western Cape Systemic Test data found substantial declines in academic performance in this province across grades 3, 6, and 9 in language and mathematics when comparing 2021 and 2019 cohorts on the same test questions (Van der Berg et al., 2022). The 2021 cohort was about 40–70% of a typical school year behind in language proficiency and about 90–106% in mathematics relative to the 2019 cohort. Students attending Quintile 5 (most affluent) schools experienced relatively smaller learning losses than their counterparts in poorer schools, intensifying pre-existing educational inequalities. The greater learning losses experienced among grade 6 students in schools that underwent a transition in grade 4 from isiXhosa to English as the Language of Learning and Teaching (LoLT) suggest that the pandemic compounded the challenges of the language transition.

11.4.2 Evidence from PIRLS 2016 and 2021

The PIRLS 2021 dataset is the first nationally representative dataset documenting learning outcomes in the aftermath of the pandemic. The 2016 and 2021 PIRLS assessments span the pandemic period but also include three years without pandemic disruption. The 31-point decline in reading achievement between 2016 and 2021[6] equates to approximately 50 to 60% of a year of learning or about 0.29 of a standard deviation. The share of South African grade 4 students meeting the low international benchmark of 400 points declined from an already low 22% in 2016 to a mere 19% in 2021, signifying a further deterioration in reading proficiency (Mullis et al., 2023; DBE, 2023a; Böhmer & Wills, 2023). It represents a return to the average reading achievement level of about a decade earlier, for this cohort.

Furthermore, inequality in grade 4 reading outcomes increased (Böhmer & Wills, 2023). Severe underperformance increased the most: the percentage scoring below 200 PIRLS points doubled from 13.4 to 26.5% (Fig. 11.4). Simultaneously, there was a small increase, from 2 to 3%, of students reaching the high benchmark of 550 PIRLS points.

[6] One should be cautious with direct comparisons of the 2016 and 2021 assessments. The average age dropped from 10.65 to 10.25 due to a longer assessment period during COVID, leading to earlier assessment of a portion of the sample, lower levels of retention that reduced the number of

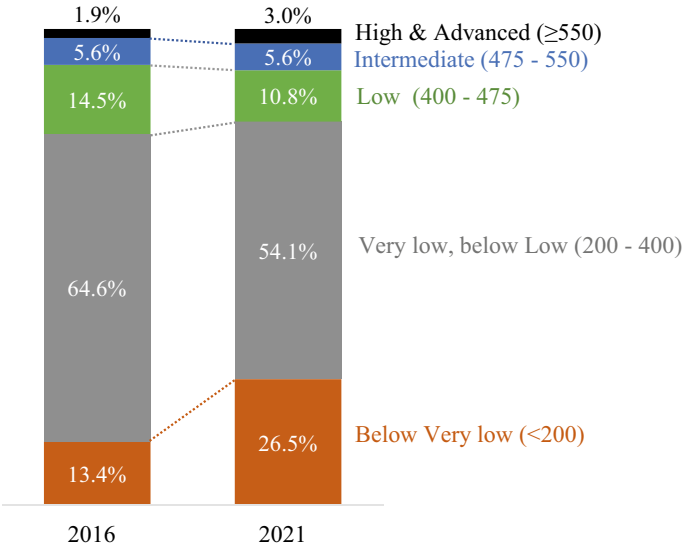

Fig. 11.4 PIRLS reading achievement benchmarks and thresholds reached in 2016 and 2021. *Source* South African grade 4 PIRLS Literacy 2016 and PIRLS 2021 datasets, showing the proportion of students achieving the High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400). The "Very low" threshold at 200 points is not an official benchmark; it is simply a chosen threshold. Students in the bottom two groups don't meet the Low International Benchmark

Pre-pandemic differences in reading outcomes across demographic and socio-economic groups were accentuated (Table 11.1). Critically, the gap between students at affluent and less affluent schools grew. Reading achievement for children in the top quintile of schools by SES increased, although not significantly, whilst it dropped precipitously by about 42 PIRLS points (75–82% of a year of learning) for students from the lower four quintiles.[7] Across language groups, there was a similar increase in pre-pandemic disparities. Students at schools where the language of instruction was either English or Afrikaans[8] showed a small increase in scores, whilst students at schools where the language of instruction in grades 1 to 3 was an African language registered a 49 PIRLS points decline.

South Africa has one of the largest pro-girl gaps in learning outcomes globally in both mathematics and reading (Mullis et al., 2017, 2020). The increase in the overall

overage students in grade 4 and higher levels of absenteeism in 2021 compared to 2016 (Böhmer & Wills, 2023).

[7] This excludes about 12% of the pooled sample for which there was insufficient information to calculate the socio-economic status and hence the schools' SES quintile.

[8] Schools with English and Afrikaans as the Language of instruction in grades 1–3 tend to have a higher socio-economic status. In PIRLS 2016, 70% of students from English LoTL and 53% from Afrikaans LoLT schools are attending a school in one of the top 3 school SES deciles. Additionally, the top-income decile consists only of English and Afrikaans schools.

Table 11.1 Reading achievement scores and differentials, 2016 and 2021

	Girls			Boys			All			Pro-girl gap	
	2016	2021	Diff.	2016	2021	Diff.	2016	2021	Diff.	2016	2021
Language											
English and Afrikaans	397	404	7	346	363	17	371	384	12	51	41
9 African Languages	322	277	− 44	271	217	− 54	295	247	− 49	51	60
School SES deciles											
9 and 10	432	450	18	389	419	30	410	435	25	42	31
1 to 8*	329	287	− 42	276	227	− 49	301	256	− 45	53	60
Total	347	317	− 30	295	260	− 34	320	288	− 31	52	57

Source Böhmer and Wills (2023, Table A5). * Includes students with missing school SES

gender gap in 2021 was only weakly significant, but in poorer schools (quintiles 1–4), the already large pro-girl gender gap of 53 PIRLS points in 2016 increased to 60 points in 2021.

Achievement gaps within schools also grew. Heterogeneity in reading ability within a school was already large in 2016, with reading abilities in the average class spanning about three and a half grade levels.[9] By 2021, this had crept closer to four grade levels (3.8 years). This has significant implications for teachers in pitching and delivering lessons, classroom management and supporting struggling students.

The most vulnerable students before the pandemic were the worst affected, perhaps because of their limited resources to adapt to learning under pandemic conditions. This also suggests that outside intervention may be essential for learning recovery among the poor.

Lastly, the sample of grade 4 students tested in 2016 and 2021 differed significantly along several demographic markers, including age, gender and language (the variable of stratification). The regressions in Table 11.2 show how these sample differences may have influenced the measured difference in reading achievement between 2016 and 2021.

The first regression shows an aggregate reading score decline of 31 PIRLS points between 2016 and 2021. Adding controls for the language of the test reduces the COVID coefficient declines by two percentage points (Regression 2), suggesting slight differences in language composition over the two years. Adding gender into the specification (Regression 3) has a slight negative effect. Regression (4) introduces age as a control, and the COVID coefficient increases sharply to almost 37 points. Including school SES in Regression 5 results in a slightly more negative coefficient, whilst introducing absenteeism as a control reduces the gap explained by COVID to about 34 points. Thus, one may conclude that changes to the sample concerning age,

[9] The range used was the difference in achievement between a student at the 90th and the 10th percentile within a school.

Table 11.2 Regression showing the change in Gr 4 reading scores due to COVID-19

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Reading score	Reading score	Reading score	Reading score	Reading score	Reading score
COVID	− 31.41***	− 29.33***	− 29.98***	− 36.60***	− 38.83***	− 33.91***
	(6.04)	(6.09)	(5.93)	(5.75)	(4.86)	(5.85)
Constant	319.63***	392.58***	365.87***	− 264.08***	− 213.03**	− 201.12**
	(4.42)	(10.34)	(10.78)	(99.33)	(91.75)	(93.45)
Observations	25,232	25,232	25,216	25,051	25,051	25,051
Language controls		Y	Y	Y	Y	Y
Gender controls			Y	Y	Y	Y
Age controls				Y	Y	Y
School SES controls					Y	Y
Absenteeism controls						Y

Source South African grade 4 PIRLS Literacy 2016 and PIRLS 2021 datasets
Notes Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Regressions use plausible values for the reading score. Standard errors are calculated using jack-knifing performed at up to 250 sample schools with 125 zones. Language controls are dummy variables for each of the 11 test languages. Gender control is a female dummy. Age controls include age and an age-squared term. School SES controls use quintile dummies derived from school deciles, e.g. Deciles 1 and 2 are quintile 1. Included a "missing SES dummy" for schools with insufficient information to calculate an SES score. Absenteeism control is the proportion of the class absent on test day

gender and school SES contribute to slightly underestimating COVID-19 learning losses in terms of the average points difference.

However, in 2021, the assessment was carried out over a longer period than in 2016 to accommodate COVID-related challenges, which may have reduced instructional time before the test for students, leading to a slight overestimation of learning losses. In combination, the effect of the changes in the demographics of the sample changes in the testing period most likely cancel each other out.

As shown in Fig. 11.1, PIRLS results rose significantly up to 2016. If this trend had continued until the pandemic, this would imply a greater pandemic-related learning loss than the 31 PIRLS points reduction observed between 2016 and 2021.

11.5 Catch Up: Curriculum Policy Responses and Other Interventions

The DBE attempted various recovery strategies. The 2020 Annual Teaching Plan (ATP), a streamlined adaptation of the National Curriculum and Assessment Policy Statement (CAPS), aimed to distil essential curriculum elements across grades (Hoadley, 2023: 5). The 2021 ATP iteration was intended as a temporary deviation from CAPS and optimistically assumed a full return to classroom teaching (DBE, 2023c: 5). However, the differential pandemic impact across schools and the lack of additional curriculum directives regarding ATPs left teachers having to navigate persistent learning backlogs, high absenteeism, increased heterogeneity in student preparedness and adjusted promotion criteria with very little support or direction (Hoadley, 2023: 5).

In early 2023, new recovery ATPs were unveiled, intended to replace CAPS for the next 'several years'. In May 2023, the DBE also published a Learner Recovery Programme, providing guidelines for teachers, school management and subject advisors (district officials who visit schools) and limited central training for provincial core training teams (DBE, 2023c, d). This recovery programme utilised existing time and human resources, with no additional budget allocated for this at any level. Subject advisors are already under-capacitated, and the regions that most require support for learning recovery are least likely to receive it through this channel (Spaull & Taylor, 2022). Thus, the lack of systematic provincial-level implementation, coupled with insufficient resources has hampered the effective mitigation of learning losses, and no measures were put in place to measure either learning losses or recovery. Thus, despite the national scope of the problem, there has been no coordinated national response.

At a provincial level, the Western Cape's "BackOnTrack" (BoT) initiative stands out as a proactive response. It was introduced in March 2023 as a three-year programme, with ZAR 1.2 billion (~65 million USD) allocated, offering focused mathematics and language support to teachers and students in grades 4, 7 and 8 in

333 schools. Students participate inter alia on Saturdays and during holiday bootcamps. A novel '1 + 9' training model for selected teachers takes them out of the classroom for a day of training and coaching on the next two weeks' work (WCED, 2023a, b). Despite no formal evaluation of the BoT initiative, early Systemic Test results for over 90,000 students in grades 3 and 6 and more than 70,000 in grade 9 suggest a nascent recovery by 2023 (see Table 11.3). However, scores remain significantly below pre-pandemic levels across subjects and grades. In 2022 there was a further deterioration in grade 6 language scores, perhaps due to the disruption of the critical language transition years. Similarly, a decline in 2022 grade 9 math scores may reflect the compounded challenges of recovering from earlier losses, considering the scaffolded nature of learning in mathematics.

The Western Cape also allocated additional time to mathematics and reading in the Foundation Phase (grades 1 to 3) during normal school hours while reducing time spent on other subjects (WCED, 2023a). This initiative was encouraged at the national level but was not widely implemented. No other provinces have announced a budget specifically for COVID-19 learning recovery, apart from increases in spending on health and sanitation-related consumables and transfers to fee-paying schools in the immediate aftermath of the pandemic in 2020 and 2021. In 2023, the National Treasury announced fiscal consolidation measures, making future allocation to such a recovery programme less likely.

There has been one targeted mid-sized reading recovery programme, *Reading and Leadership Strengthening in South Africa* (REALS SA), implemented by the National Education Collaboration Trust (NECT) in partnership with the DBE and funded by the European Union and UNICEF. It was rolled out in 2021 in 650 schools to 292,000 learners and 4600 teachers in three provinces: Limpopo, KwaZulu-Natal and the Eastern Cape. They distributed reading materials and provided training to subject advisors and school management teams (LDE, 2022; UNICEF, 2021). There is no known evaluation or implementation report on this programme to date.

A three-year Funda Wande randomised controlled trial in Limpopo province in grades 1–3 was not designed to respond to COVID-19, but its roll-out coincided with pandemic timelines. It found a 0.22 standard deviation improvement in home language reading outcomes and a 0.26 gain in mathematics after one-and-a-half years for the treatment arm that provided Funda Wande workbooks plus teacher training. Even more salient improvements were obtained for a group that also had

Table 11.3 Average mathematics and language percent scores in the Western Cape Systemic Tests, 2019–2023

	Mathematics				Language			
	2019	2021	2022	2023	2019	2021	2022	2023
Gr3	58.1	44.3	47.3	51.6	44.9	36.9	38.5	42.5
Gr6	44.4	37.3	39.4	40.4	42.8	39.4	36.1	37.5
Gr9	22.7	21.6	18.8	20.5	53.6	50.1	50.2	51.6

Source WCED (2024). The Systems tests were not held in 2020 due to pandemic-related disruptions

teachers' assistants, with effect sizes for reading and mathematics of 0.51 and 0.50 of a standard deviation, respectively (Ardington, 2023). This suggests that, if utilised well, classroom assistants may raise students' learning outcomes in under-resourced and overcrowded classrooms by providing additional remediation and support for struggling students.

The Presidential Youth Employment Initiative's (PYEI) Basic Education Employment Intervention (BEEI), created in response to rising youth unemployment, placed 245,489 young people as school assistants in over 23,000 schools in 2023. A tight fiscal environment makes future funding uncertain; however, it provides a potential route to scale a teaching assistant programme. A short but promising pilot was run late in 2023. Youth employed in 25 schools on the PYEI-BEEI were trained to teach letter recognition using a structured, play-based approach. The pilot did not have a control group, but the rate of improvement in letter recognition in the 6–8 weeks was much higher than during the previous months, so the programme will enter the next testing phase (Fleish et al., 2024).

These curriculum policy responses and interventions paint a picture of an education system still searching for appropriate responses to navigate the aftermath of an unprecedented crisis. The absence of a coordinated national catch-up strategy and consistent provincial execution underscore the critical need for an integrated, evidence-based approach to learning recovery.

11.6 Conclusion

This chapter has outlined the magnitude of learning losses in South Africa, the implications of accelerated student progression, and the uneven efficacy and implementation of educational policy responses to COVID-19. The pandemic has also exacerbated pre-existing educational disparities. This amplification of disparities requires a multifaceted and targeted recovery approach, blending learning recovery with systemic reforms that the system has long needed. Policymakers and educational stakeholders will need to consider new strategies and approaches to address the aftermath of the pandemic and the longer-term needs of the education system, including using existing resources and instructional time more efficiently and building key partnerships with relevant government and private stakeholders.

While initiatives like the "BackOnTrack" program in the Western Cape, streamlined Annual Teaching Plans (ATP) and the Presidential Youth Employment Initiative (PYEI) represent important steps towards recovery, a lack of a cohesive national strategy and inadequate resources allocated to recovery signal a fragmented approach to mitigating learning losses. Looking forward, South Africa must harness these insights into a unified, evidence-based strategy for educational recovery. This includes prioritizing equitable access to quality education, enhancing teacher training and support and putting robust evaluation mechanisms in place to assess the effectiveness of interventions.

The cohorts of students who were at school in 2020 and 2021 will continue to bear the long-term consequences of the pandemic. It is less clear how the cohorts that started formal schooling after the pandemic years will be affected. In the absence of other shocks, these new cohorts may even return to the country's improvement trajectory before 2020.

Addressing the deficits faced by the cohorts affected by the pandemic may also offer lessons for dealing with an older and continuing problem, namely how to provide support for the many children falling behind in the education system, as evidenced by the remarkably high repetition rates. It presents an opportunity to work toward rectifying historical learning inequities and preparing future generations for the evolving labour market. This remains essential for the educational and socio-economic development of the country.

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Chapter 12
Spain: The Response of the Education System to the COVID-19 Pandemic: How LNOB (Leaving No-One Behind) Got Lost in Translation

Montse Gomendio

Abstract Historically the evidence from international surveys shows that Spanish students have levels of performance below the OECD average, particularly in maths, which have followed a flat line for over a decade (from 2000 onwards) showing a complete lack of progress until some improvements took place around 2015. When compared to other countries, Spain has very few excellent students. This flatness has been wrongly interpreted as a signal that the Spanish education system has sacrificed quality for the sake of equity. Nothing could be further from the truth. The most distinctive feature is the high rate of early school leaving, which represents the worst kind of inequity. During and after Covid-19 student performance declined despite short school closures. The policy response to the pandemic was to lower standards, leading to negative consequences. During the state of alarm, central government decreed that grade repetition was forbidden, all students should promote to the next grade and teachers should give their students higher grades. These apparently temporary measures became the new normal after the latest reform was approved. The result was grade inflation on a major scale. Thus, over the last years teachers' grades have become higher, while international surveys clearly show declines in levels of performance. Such complacency at the national level will prevent any improvements. These changes have had a greater impact among secondary students since it is at this stage that grade repetition used to be most common and students who failed several subjects could not promote or obtain degrees. The new model has created a mirage in which teachers' grades have become disentangled from true levels of performance. The idea that this would help students who suffered the greatest learning losses is just plain wrong, since those students will not be correctly identified and will not receive the support they need. In addition, the illusion created by the levels of grade inflation achieved, generate the false impression that levels of performance are improving, and therefore policies are having a positive impact, when ILSAs tell us the opposite.Finally, there are two rich regions which in the last cycles have

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experienced the steepest declines. Catalonia and the Basque Country have strong pro-independence movements which have identified education as a great lever to strengthen national identities. As part of these nationalistic politics, schools teach in the co-official languages exclusively, treating Spanish as a foreign language. In such cases the proportion of students who take the test (PISA, PIRLS and TIMSS) in a language different from that spoken at home is over half of the student population, most of them Spanish students who speak Spanish at home. Clearly such policies harm the ability of students to learn.

12.1 The Spanish Education System: A Brief Historical Perspective

From a historical perspective, Spain has lagged behind most European countries regarding the rate at which access to education has been granted to a larger proportion of the population, more years of schooling have been achieved and higher levels of educational attainment reached over time (de la Fuente & Domenech, 2014, 2016, 2021a, b). Only Portugal has shown even slower rates of progress in terms of access to education. Despite falling behind for most of the 1900s, during the last decades Spain undertook a major effort to expand access until it eventually reached convergence. Once universal access to compulsory education was achieved and the duration of compulsory education extended, the focus on increasing enrolment to other levels of educational attainment became the prime goal. The effort has been of such a magnitude that the rate of access to non-compulsory levels such as tertiary education and pre-school continued to grow so fast that today it exceeds that of other European countries and is well beyond the targets set by Europe for 2030 (European Commission, 2022). Unfortunately, the almost exclusive focus on inputs (i.e. number of students enrolled at different levels of educational attainment) has taken place to the detriment of outcomes, assuming an unnecessary trade-off between quantity and quality. In addition, Spain suffers an endemic problem with rates of early school leaving which are among the highest within Europe (European Commission, 2022; Gomendio & Wert, 2023; Gomendio, 2023). Thus, the education system resembles a leaky pipeline, with large inputs, but great losses towards the end of lower secondary.

As in many other countries, in Spain the education system experienced a process of decentralization from 1980 until 1999. After the transition from the Franco dictatorship to democracy a constitution was approved in 1978 which defined asymmetric governance arrangements, granting special treatment to regions with strong nationalistic movements (such as the Basque Country and Catalonia), that included the upfront transfer of the management of education, health and social affairs. This differential treatment of a few regions was regarded as unfair by the rest and soon created political tensions, eventually leading to the transfer of education to all seventeen regions. Thus, the main reason for transferring decision-making power and funds to regions was a vain political attempt to appease the centrifugal forces of nationalist

movements. Since the main objective of decentralisation was not to improve efficacy nor outcomes, central government agreed not to implement accountability mechanisms (i.e. national assessments) and accepted the role of raising most of the funds through taxes before transferring them to regions as a lump sum. Despite this, the process of decentralisation ensured that the central government retained a major role in education: through what is called "basic law" the national government designs the architecture of the system, defines the duration of different stages, whether there are student evaluations or not, the training and selective procedures for teachers, and so on. The responsibility of defining the curricular contents is shared by national and regional governments (Gomendio & Wert, 2023).

12.2 Why Are International Large-Scale Assessments so Important for Spain

For countries and governments, the value of ILSAs lies in providing international benchmarks (Crato, 2021a, b; Gomendio, 2021; Gomendio & Wert, 2023; Hanushek & Woessmann, 2011, 2015; Nilsen et al., 2022; Reimers, 2020; Strietholt et al., 2014). This comparative perspective allows countries to become aware of their position relative to others and, therefore, provides information on the extent to which their own national assessments are aligned with international standards or not.

None of this applies to Spain. The reason is that, perhaps the most unique feature of its education system, is the absence of student assessments according to national standards (Gomendio, 2021, 2023; Gomendio & Wert, 2023; Wert, 2019). There are no external national evaluations and there are no evaluations at the regional level which follow agreed national standards, even though the lower and upper-secondary degrees are national and awarded by the Ministry of Education. Conventional wisdom has it that national evaluations were implemented during the Franco regime in order to limit access to university and eliminated during democracy to broaden access to all. According to this widespread view, the main goal of evaluations is to act as bottlenecks that exclude underprivileged students and, therefore, represent a danger to equity. None of this stands up to scrutiny. In fact, student evaluations were first introduced in 1857 by the Law of Public Instruction, which remained in place for over a century, and during this long period national evaluations were required to obtain national degrees at different stages. This system of national evaluations was dismantled towards the end of the Franco regime when the Law of General Education was approved in 1970 and national evaluations were replaced by continuous evaluation by teachers, a decision which in hindsight could be seen as a misguided attempt to combat the high rates of school failure which were prevalent at the time. Few efforts have been made to implement national evaluations since then (the exception being the Law to Improve the Quality of Education—LOMCE—in 2013) and they have been fiercely opposed on many counts: political parties on the left of the spectrum fear that they harm equity, unions fear that student evaluations may be used

to indirectly evaluate teachers, families fear that they may be too demanding for their children and, after education became de-centralised, regions fear that it would be a means to achieve re-centralisation.

The lack of national metrics makes ILSAs even more relevant because they are the only reliable source of information on levels of student performance, trends over time and differences between regions. The fact that Spain needs very granular information from ILSAs requires large sample sizes: in PISA all 17 regions have an enlarged sample which, in the case of some regions, is equivalent to the sample size of many other participating countries. To comprehend the magnitude of the effort, suffice it to say that Spain is the participating country with the largest sample of students in PISA, even though the size of its 15-year-old cohort is by no means one of the largest (OECD, 2019).

It may seem contradictory that Spain has chosen not to have national evaluations and still seems to care deeply about the information provided by ILSAs. The reason is that the latter avoid all the fears mentioned above: they have no academic consequences for students, teachers or schools (which cannot be publicly identified) and, since they are not designed, run or "owned" by central government, regions do not feel that they are transferring power back. In some way, they are seen as informative but inoffensive. In this context, the information provided by ILSAs is essential to understand the quality of the education system in Spain, as well as its strengths and weaknesses.

12.3 Student Outcomes Among Primary Students: PIRLS 2021

Spain has only participated in the PIRLS and TIMSS surveys for students in 4th grade thus providing useful information on the performance primary students (Martin et al., 2017; Mullis et al., 2016, 2017, 2020, 2023).

Spain joined PIRLS in 2006 showing levels of performance in reading substantially below the OECD average. This difference became even greater in the next cycle (2011) since Spain did not improve, but the OECD did. It is worth noting that in 2011 Spain also had low levels of performance in science and particularly poor performance in maths compared to the OECD average (TIMSS 2011). In 2016 a pattern of convergence emerged when student performance improved to such an extent that the gap with the OECD reached its minimum value (again, as it happened in TIMSS 2015). This was due mainly to a decrease in the proportion of low performing students (from 28% down to 20%). In contrast, the OECD showed only marginal improvements. The last data available before Covid-19 come from TIMSS 2019 and they show that the positive trend came to a halt: no changes in student performance in maths and a slight decline in science. Before Covid-19 struck, if we take into account the data from PIRLS and TIMSS together the pattern is similar: low levels of performance

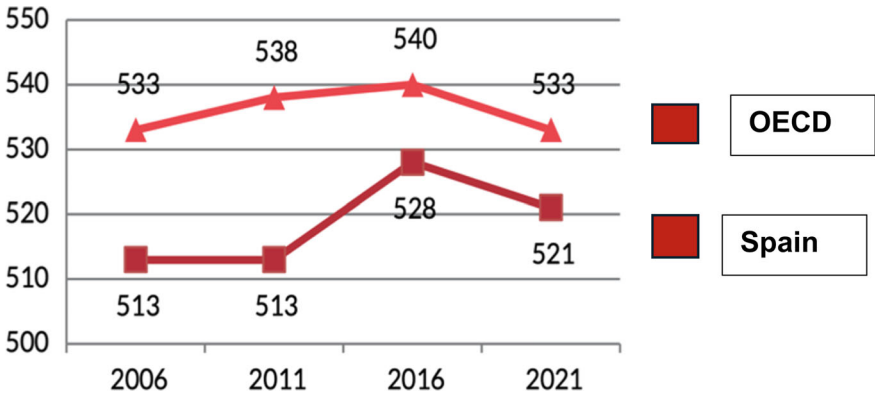

Fig. 12.1 Levels of student performance in reading according to PIRLS: Spain *vs* OCDE (from Ministerio de Educación y Formación Profesional, 2023a)

and stagnation until 2011, improvements in 2015/2016 when the reform approved in 2013 (LOMCE) was being implemented, and the first decreases detected in 2019.

The first cycle after Covid (PIRLS 2021) showed that levels of student performance in reading experienced a decline in Spain similar to that of the OECD average, but since this decline was smaller than the improvement experienced in 2016, levels of student performance remained higher than those reached during the first two cycles (Fig. 12.1).

Furthermore, since the magnitude of the declines before (TIMSS 2019) and after (PIRLS 2021) Covid-19 are similar in Spain, this raises the question as to whether the declines in reading (PIRLS 2021) can be attributed to the impact of Covid and school closures, or to other causes that were present before the pandemic. I will come back to this issue later.

If we look at the distribution of students with different levels of performance we find that Spain's major deficiency is that it has a low proportion of excellent students (6%) compared to the OECD average (11%) and much lower than top performing countries in PIRLS (2021) such as Ireland (27%), England (18%), or the United States (18%). In contrast, Spain has a slightly higher proportion of low performing students (25%) to the OECD average (22%), although it is considerably higher than countries such as Ireland (9%), England (14%) or Finland (16%).

12.4 Student Outcomes Among Secondary Students: PISA 2022

Spain joined PISA earlier than other ILSAs and has participated in every cycle from its inception, so the strongest body of evidence about student outcomes comes from this survey (OECD, 2001, 2013, 2016a, b, 2023). Unfortunately, the OECD

withdrew the results for Spain in the 2018 cycle (OECD, 2019, 2020), because they were deemed unreliable due to inconsistencies detected by the regional governments (Gomendio, 2021); thus, analyses of trends over time published by the OECD in the next PISA cycle (2022) do not include data for Spain in 2018 since they have been considered non-comparable. It is likely that changes in PISA's methodology played a major role in generating such inconsistencies (for a detailed explanation see Gomendio, 2021).

Until 2015 in most PISA cycles the performance of Spanish students has been lower than the OECD average, below around twenty OECD countries and substantially below top performers such as Singapore. Thus, there seems to be ample room for improvement. Student outcomes are particularly poor in maths. The main reason why Spain tends to perform worse in maths is because so few students become top performers (Fig. 12.2).

Trends over time follow different patterns for each domain, but the main finding is that in all three domains levels of performance in 2015 were similar to those in the first cycle (2000). Thus, for 15 years student performance remained low and with no significant changes. The dramatic decline experienced in 2022 was of such magnitude that Spain had the worst PISA scores in all three domains than in any previous cycle (including the first one). Levels of student performance declined in many countries and plummeted in some and, as a result, Spain had scores in 2022 which were close to the OECD average, a result that was widely praised as a sign that Spain had dealt with the Covid-pandemic more successfully. When compared to 2012 (the previous cycle with the same main domain) the share of low performing students increased in all three subjects, while the share of top performers decreased in maths.

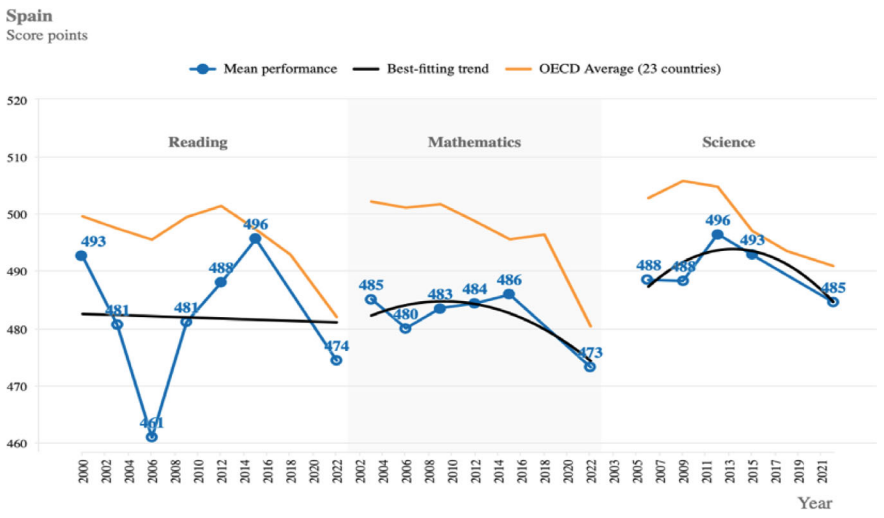

Fig. 12.2 Levels of student performance in reading, maths and science according to PISA: Spain versus OCDE (from OECD, 2023)

It is important to take into account the fact that grade repetition is much higher in Spain than in other countries (2015: 36.1% in Spain versus 13% OECD average). While this feature is unlikely to have a major impact on the results of PIRLS and TIMSS because these surveys target students in the same grade and in primary grade repetition is rare, it has a major impact on PISA results which has been largely overlooked. In Spain the PISA sample includes 67.9% of 15-year-olds in Spain in 10th grade (the modal grade), 23.4% one year behind and 8.6% two years behind (OECD, 2016a, b). Thus, PISA scores will be weighed down by high rates of grade repetition among secondary students in countries like Spain.

Clearly the main question that needs to be addressed is what was the role of school closures during Covid, when compared to other factors, in generating the unprecedented declines in levels of student performance among secondary students.

12.5 Covid-19 Pandemic: Why Lowering Standards Did Not Work

In response to the Covid-19 pandemic governments worldwide imposed measures that restricted social interactions in order to slow down the spread of the virus, which in most countries included school closures. In the case of Spain school closures were short compared to other countries (OECD, 2022) but, despite this fact, Spain experienced declines in levels of student performance both in PIRLS 2021 and, even more pronounced, in PISA 2022 (Fig. 12.3).

According to PIRLS (2021) Spain belongs to the group of countries where levels of student performance declined, although not to the same extent as in other countries. The fact that two-thirds of the PIRLS 2021 countries suffered a decline in levels of reading performance between 2016 and 2021 (Mullis et al., 2023) suggests a widespread negative impact from the pandemic among primary students who were probably more affected by the lack of direct contact with their teachers and classmates, less able to use technology in an autonomous way to continue learning, less capable of keeping their motivation going and to organize their work on their own.

However, the relationship between the duration of school closures and the magnitude of the changes on average student reading performance between 2016 and 2021 in PIRLS is only moderate (Kennedy & Strietholt, 2023), suggesting that other factors contributed either to magnify or minimize the impact of such closures. Spain belongs to the group of countries which closed schools for less than 50 days and, within this group, it is the country which suffered the greatest drop in performance, with the exception of Finland (Ministerio de Educación y Formación Profesional, 2023a). In addition, the magnitude of the decline is similar to that of countries which closed schools for much longer.

Worldwide the results from PISA 2022 seem to show a lesser impact of Covid-19 and school closures, since student performance between 2018 and 2022 declined in around half of the participating countries if we consider the main domain (maths)

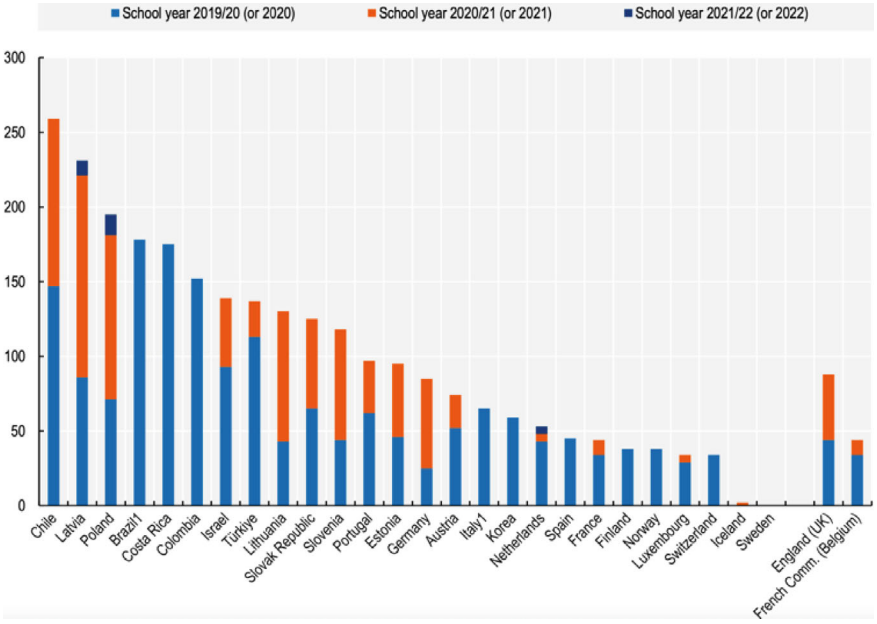

Fig. 12.3 School closures (in days) due to Covid-19 (2020, 2021 and the first quarter of 2022) (From Education at a Glance 2022)

and reading, but science performance did not experience generalized declines of the same magnitude (Jakubowski et al., 2023, 2024). It is likely that fifteen-year-olds had less difficulties dealing with the lack of contact with teachers, greater skills in the use of technology and their age implied more maturity to organize work.

In the case of Spain, if we compare levels of performance in PISA 2022 with the previous cycle in which maths was the main domain (2012) we find a similar overall pattern than for PIRLS 2021: student performance declined but not to the same extent as in other OECD and European countries (Fig. 12.4).

As already mentioned, during and after Covid the impact on student performance among fifteen-year-olds (PISA 2022) seems to have been smaller than among primary students (PIRLS 2021). In Spain the opposite is true: PISA results are the worst in history, while the results for PIRLS show a moderate decline so levels of student performance remain above those obtained in 2006. This suggests the possibility that the relatively short school closures were not the main (or the only) cause of the declines, but other factors which affected secondary students to a larger extent could have played a major role. Thus, the issue deserves to be investigated further. I will examine the evidence concerning the degree of preparedness, i.e. the extent to which Spain had developed and implemented online tools and trained teachers to make an effective use of them, the efforts undertaken to identify students who had suffered greater delays due lack of access to computers and internet, and the extent

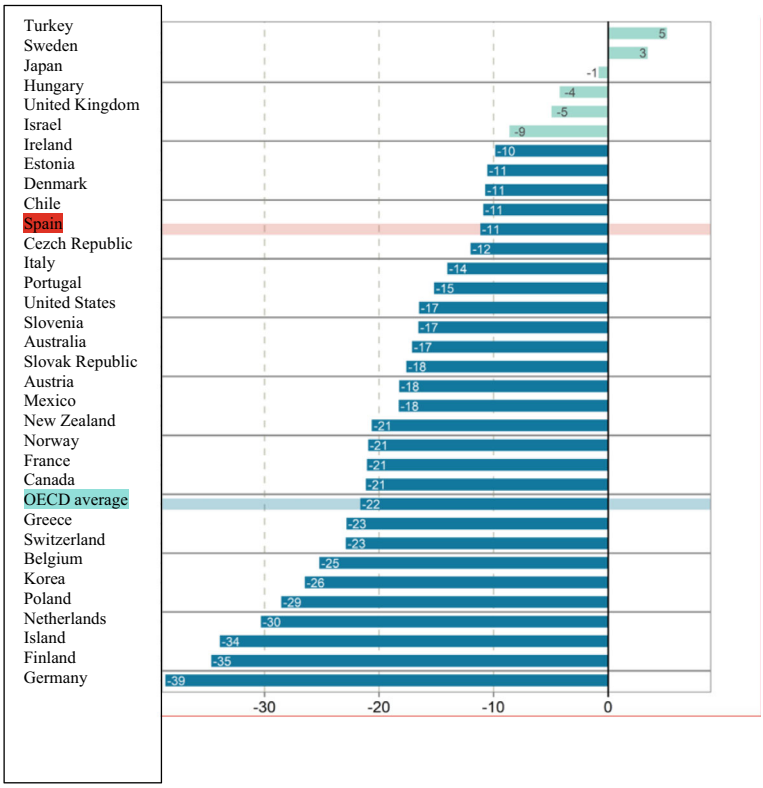

Fig. 12.4 PISA: differences in maths scores between 2012 and 2022 for OECD and EU countries (From Ministerio de Educación, Formación Profesional y Deportes, 2023b)

to which compensatory measures were implemented to close the learning gaps that had emerged.

The questionnaires from PISA 2022 provide information concerning the perception of both the availability of teachers and the level of training received to deal with remote learning. In both measures, Spain is one of the countries with the lowest levels (Ministerio de Educación y Formación Profesional, 2023b; OECD, 2023). This comes as no surprise since efforts by successive governments to integrate the use of technology in the classroom have involved providing tablets to schools, but no systemic efforts to train teachers to use the technology effectively have been made.

In order to explore the efforts made in Spain to identify students who had suffered the greatest learning losses, it is important to remember that there are no evaluations with similar standards at the national level. In most countries, school closures led to national exams being cancelled and substituted by teacher grades, which led to grade inflation. As schools re-opened and national evaluations were implemented again, efforts were made to reduce levels of grade inflation by setting increasingly demanding targets until pre-Covid standards were achieved.

The opposite happened in Spain. In Spain the national government implemented a "state of alarm" twice: from 14th March until the 21st June 2020 and from the 25th October 2020 until 9th May 2021; in practice it consisted of a massive transfer of responsibilities from regional to central government. This exceptional situation allowed central government to implement restrictive measures during the Covid pandemic and to determine when schools closed and reopened in the whole country. Within this framework central government also assumed greater responsibilities on education which included the decision to "prevent any harm" and prioritise the wellbeing of students. The measures implemented to achieve this goal focused on lowering the standards for all, rather than on providing support for struggling students. Thus, grade repetition was forbidden, students could promote to the next grade even if their teachers' grades were unsatisfactory, and students who failed several subjects could obtain the national education degree at the end of lower and upper secondary. What was meant to be a temporary measure turned into a permanent change with the approval at the end of 2020 of a new education reform (LOMLOE 2020) which made grade repetition exceptional, not because measures were taken to ensure that all students reached certain standards, but rather because students who failed several subjects (according to their teachers' criteria) could move on to the next grade and eventually obtain the national degree. Obviously, the result of such measures was grade inflation on a major scale.

The lowering of the standards promoted by the response to school closures and the latest education reform (LOMLOE 2020) had important consequences. It seems to have affected the ability of teachers to assess in an objective way the level of performance of their students. Thus, the comparative disadvantage that Spanish students have in primary does not seem to be perceived by their teachers. If we compare three top performing countries (Singapore, England and Finland) with three lower performing ones (Spain, Portugal and Turkey) according to PIRLS (2021) we find that principals in Spain believe that the proportion of students who attend schools where most children start primary with literacy skills is similar in Spain to that of two of the highest performing countries (Singapore: 90%, England: 80%, Spain: 80%) and much higher than countries that share with Spain lower levels of reading performance in primary (Portugal: 20%, Turkey: 21%) (Fig. 12.5).

The new rules facilitating promotion and lowering the standards required to obtain good grades had a greater impact among secondary students, because it is during this stage that grade repetition used to be most common, higher levels of performance required to obtain good grades, and more strigent criteria were used to decide whether levels of performance were enough to promote to the next grade and obtain national degrees at the end of lower and upper secondary. This maybe the reason why levels of performance among fifteen-year olds have fallen to the worst on record (PISA 2022), while the decline among primary students does not go that far (PIRLS 2021).

During the years in which levels of student performance declined according to international metrics (PIRLS 2021 and PISA 2022) Spanish students obtained increasingly better grades according to their teachers' new criteria. While in 2016 the proportion of students who obtained low grades was 16.23%, it gradually decreased over the next years until it reached its lowest level so far in 2022 (6.45%). In contrast,

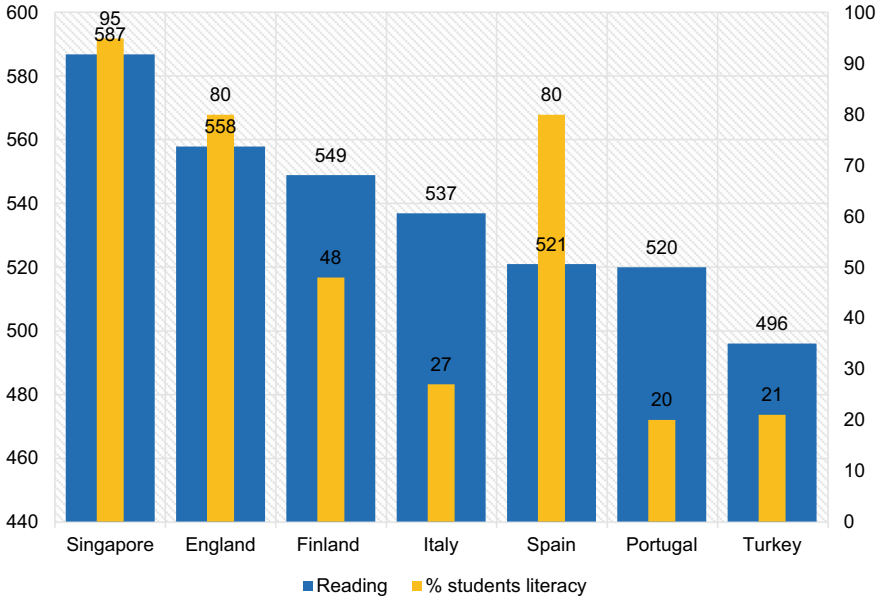

Fig. 12.5 Percentage of primary students who attend schools where, according to principals, most students begin primary with literacy skills *vs* reading achievement in 4th grade (PIRLS 2021)

the proportion of students with the highest grades increased from 12.06% in 2016 up to 20.55 in 2022. Thus, a normal distribution in which the most frequent grades were slightly skewed towards the left (low-medium and medium) gradually became increasingly skewed towards the highest values (medium to high). This change has been of such magnitude that in 2022 over 40% of secondary students obtained the highest grades (medium–high and high). On that same year Spanish students had the lowest levels of performance since joining PISA in 2000 (Fig. 12.6).

Clearly the positive trends experienced by the grades obtained by Spanish students from their teachers, are the opposite of the negative trends shown by international metrics over the same years (PIRLS and PISA). Furthermore, according to the new criteria implemented in Spain the proportion of high performing students has increased dramatically, while international surveys show that they it has always been low and has decreased over time. Perhaps one of the most important conclusions is that the gap between teachers' assessments under the new rules and how Spanish students perform when international metrics are used, has diverged to a much larger extent than ever before. Thus, the new rules have created a mirage which will harm students who in reality underperform and would require support to catch up. The denial of underperformance prevents the implementation of policies to address this problem and it applies to individual students and to the education system on the whole.

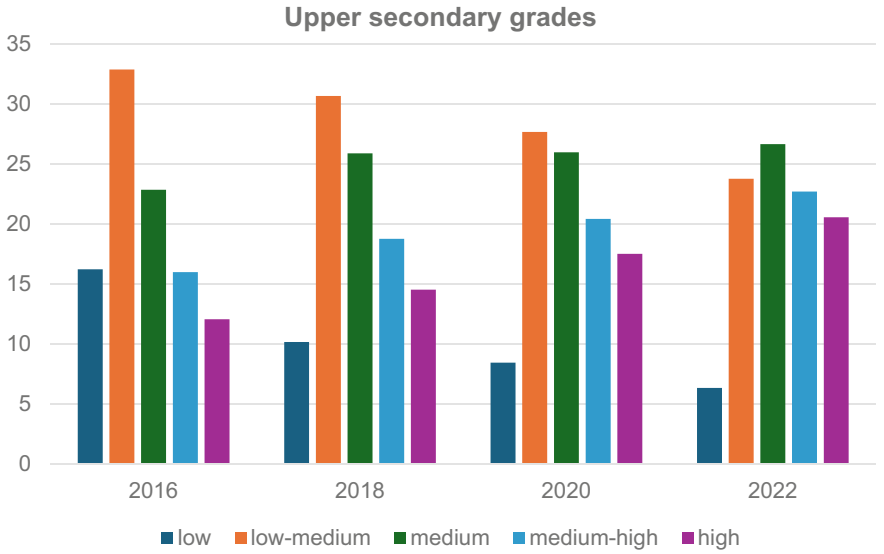

Fig. 12.6 Spain: trends over time of upper secondary grades

12.6 Differences Between Regions

During the state of alarm central government implemented decisions on the whole of the country, such as the closure and reopening of schools, irrespective of the fact that the impact of Covid-19 varied enormously between regions depending on factors such as population density. School closures were implemented at a national level from the very beginning (14th March 2020), but schools reopened at the beginning of the next academic year (September 2020). Since all seventeen regions closed schools for the same period of time, by analysing differences between them we can try to understand which other factors may have played a role in the decline in levels of student performance.

Only seven out of seventeen regions, plus two autonomous cities, participated in PIRLS 2021 with an extended sample. The results show that the average for Spain consists of three regions which perform above the OECD and EU averages, two around the average and four below (Ministerio de Educación y Formación Profesional, 2023a). Thus, the average for Spain should be interpreted with caution since it combines top, middle and low performing regions. Although differences in socioeconomic levels between regions explain to a large extent the variation in levels of student performance, some score above what would be expected (such as Asturias and Castilla y León), and some below. The main outlier is Catalonia a rich region which showed unexpectedly low levels of performance in 2021 (Fig. 12.7).

PISA provides information on all seventeen regions (plus two autonomous cities) since they all had extended samples in the last cycles. The results for the 2022 cycle show major differences between regions which, according to PISA estimates, are

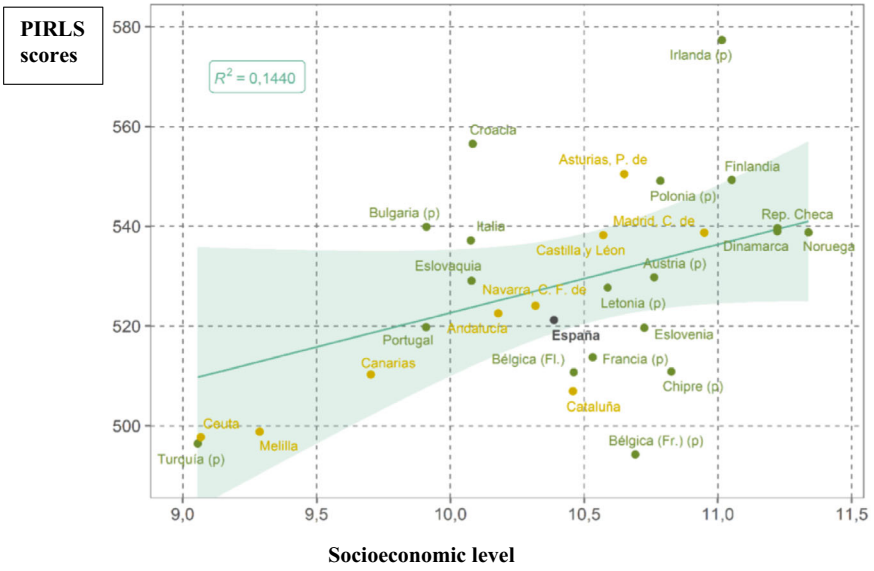

Fig. 12.7 Regional differences in reading according to PIRLS (2021) and socioeconomic levels

equivalent to over two years of schooling. The performance of 9 regions is above the OECD and EU averages, two are similar to these averages, and six (plus two autonomous cities) are below (Ministerio de Educación, Formación Profesional y Deportes, 2023b).

In order to examine trends over time, if we compare regions with an extended sample in 2016 and 2021 in PIRLS three did not show any significant changes and two experienced declines with Catalonia suffering the greatest losses. It is worth noting that in 2016 the Basque Country also suffered a major decline and decided not to participate in the next cycle. In the case of PISA, if we compare the results in 2022 with the previous cycle in which maths was the main domain (2012) the results show that eight regions did not experience any significant changes, while eight experienced significant declines. It is worth noting that the Basque Country and Catalonia also experience the greatest declines (Fig. 12.8).

There seem to be two distinct groups of low performing regions. The first group includes regions in the South of Spain which have shown consistently low levels of performance over successive cycles associated with their low socioeconomic level, such as the two autonomous cities (Ceuta and Melilla), the Canary Islands, Murcia, Extremadura and Andalucía. It is worth nothing that in these regions levels of grade inflation are huge (over 25% of students obtain top grades from their teachers in upper secondary, compared to 15% in top performing regions—according to PISA criteria).

The second group shows a completely different pattern since it includes rich regions which used to be top performers and have experienced a sharp decline in the

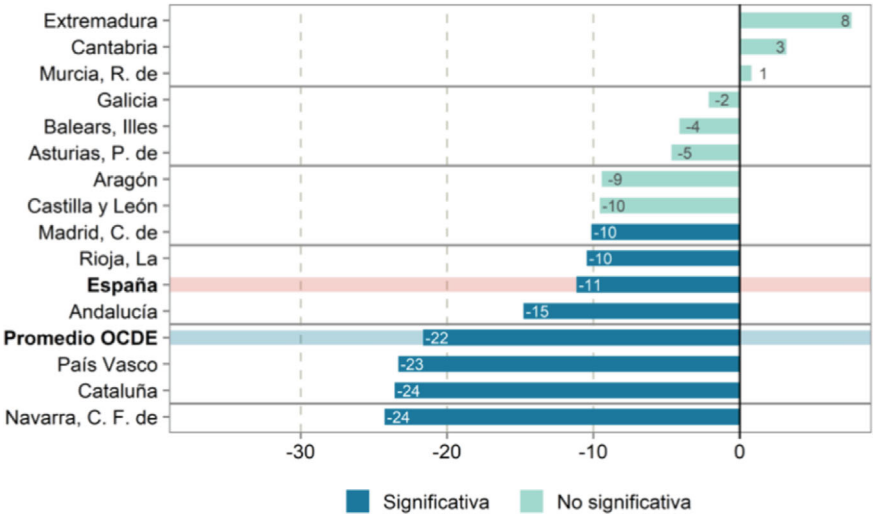

Fig. 12.8 Regional differences in maths: changes in performance levels between 2012 and 2022 (PISA 2022)

last cycles. This group includes the Basque Country and Catalonia, two regions with strong pro-independence movements which have identified education as a means to strengthen their national identities. As part of this strategy, in recent years policies have been implemented in schools to teach exclusively in Catalan and Basque languages, while Spanish is treated as a foreign language. The consequence of these policies is that both regions have the greatest proportion of students who speak at home a language which is different from the test language (according to PISA 2022: in Catalonia 55.5% of students and 45.1% of non-immigrant students, i.e. Spanish students who speak Spanish at home) (PISA 2022 data). Thus, nationalistic politics seems to have damaged students' levels of performance.

12.7 Conclusions

Since industrialization took place later in Spain than in other European countries, the demand for higher levels of education was delayed for decades. Thus, the rate of access to higher levels of education was much slower. This historic delay has been widely used to justify the low levels of performance that Spanish students have when compared to their European or OECD counterparts. Conventional wisdom has it that Spain is still in a process of catching up. However, the findings from all ILSAs show that for almost two decades levels of student performance have remained stagnated, suggesting that the quality of the education system is low and prevents any improvements (Gomendio & Wert, 2023; Gomendio, 2021, 2023).

Since one of the reasons why Spain performs poorly is that the proportion of excellent students is very low, the other myth elaborated to account for the mediocre outcomes is that policy makers have prioritised equity over quality. This represents another widespread misinterpretation since the idea that equity should be achieved by lowering the standards for all is profoundly misleading. In addition, the fact that the Spanish education system has an endemic problem with high rates of early school leaving, shows that the system has failed around 30% of students for decades. This is clearly the worst kind of inequity.

During and after the Covid-19 pandemic Spain seems to have suffered smaller declines than the OECD average, a finding which is consistent with the fact that in Spain schools closed for a shorter period of time than other countries. However, if we look at the group of countries where schools closed for less than 50 days, Spain experiences a steeper decline than most. This suggests that other factors may have played a role.

If we compare the pattern worldwide with the one in Spain, other differences stand out. At a global level the impact of the Covid-19 pandemic was greater among primary students (PIRLS 2021) than among secondary students (fifteen-year-olds, PISA 2022). In contrast, in Spain secondary students experienced a greater decline than did primary students, to the extent that fifteen year-olds had the worst scores of all cycles. An in depth analysis is required to understand in which way did policies implemented to deal with the pandemic affect secondary students differently.

In Spain the response to school closures was to lower standards, a policy which was guided by the good intentions of protecting students' wellbeing, but which had serious unintended consequences. During the state of alarm, central government decreed that grade repetition was forbidden, all students should promote to the next grade and teachers should give their students higher grades. These apparently temporary measures became the new normal after the latest reform was approved (LOMLOE 2020). The result was grade inflation on a major scale. Thus, over the last years teachers' grades have become higher, while international surveys clearly show declines in levels of performance. This divergence should be a matter of concern since such complacency at the national level will prevent any improvements. These changes have had a greater impact among secondary students since it is at this stage that grade repetition used to be most common since students who failed several subjects could not promote or obtain the degrees. The new model has created a mirage in which teachers' grades have become disentangled from true levels of performance. The idea that this would help students who suffered the greatest learning losses is just plain wrong, since those students will not be correctly identified and will not receive the support they need. In addition, the illusion created by the levels of grade inflation achieved, generate the false impression that levels of performance are improving, and therefore policies are having a positive impact, when ILSAs tell us the opposite.

The lack of national assessments (or regional assessments with national standards) magnifies this problem since some regions, which according to ILSAs are underperforming, have the greatest levels of grade inflation. These are regions from the South of Spain which have lower socio-economic levels and have traditionally suffered from poor student outcomes. The lack of common standards has led to

such a degree of divergence between regions that, according to PISA estimates, the gap is equivalent to over two years of schooling. Despite such major differences, all students obtain the same national degree. The prevalence of different standards harms those who they are meant to protect: students from poor regions, or low socio-economic family backgrounds, will not achieve high levels of performance when the expectations are lowered.

Education systems cannot improve if they avoid implementing student assessments because they lack objective measures to identify struggling students in order to provide support and to evaluate the impact of different policies. A blind system cannot detect problems and act upon them. The logic that not measuring levels of performance with objective and standardized metrics will make differences disappear is perverse. This is precisely what Spain has done since 1970 and it has not prevented disadvantaged students from performing worse (according to data from ILSAs) and dropping out of school at high rates; it has also created abysmal differences between regions in levels of student performance which are the source of major inequities.

Finally, there are two rich regions which in the last cycles have experienced the steepest declines. Catalonia and the Basque Country have strong pro-independence movements which have identified education as a great lever to strengthen national identities. As part of these nationalistic politics, schools teach in the co-official languages exclusively, treating Spanish as a foreign language. In such cases the proportion of students who take the test (PISA, PIRLS and TIMSS) in a language different from that spoken at home is over half of the student population, most of them Spanish students who speak Spanish at home. Clearly such policies harm the ability of students to learn.

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Chapter 13
United States: The Size and Variation of the Pandemic Learning Losses

Eric A. Hanushek and Bradley Strauss

Abstract Recent international and national assessments point to the substantial learning losses that resulted from school disruptions during the pandemic. The United States, which entered the pandemic with achievement near the OECD average, had rather average pandemic learning losses and came out of the pandemic at roughly the same international ranking as before the pandemic. The learning losses from the pandemic foretell substantial economic costs related to the lower skills of those in the COVID-19 cohort. At the same time, there was substantial heterogeneity in achievement losses across states and across individuals, leading to disproportionate economic impacts on some individuals and states. Unlike the other economic costs of the pandemic, those from learning losses are future costs that are yet to accrue and that can be ameliorated by public action—but the time for feasibly addressing them is quickly running out.

13.1 Introduction and Overview

As concerns about the health aspects of the COVID-19 pandemic have receded, more of the public discussion has turned to the learning losses that resulted from school closures and erratic reopening. We now have both national and international data that permit more rigorous discussions of the losses, of their sources, and of their costs. While these data will be analyzed for years to come, we can begin to put the

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impact the pandemic had on education into the perspective of the economic impact on individuals and on the nation. Unfortunately, policy responses to the learning losses do not appear to be commensurate with the magnitude of the future economic impact.

Recent international assessments of the Programme for International Student Assessment (PISA) and of the National Assessment of Educational Progress (NAEP) provide data on student performances that bracket the pandemic. By harmonizing these assessments, it is possible to place both the nation and the individual states in the world achievement distribution. It is also possible to translate the learning losses resulting from the school disruptions during the pandemic into economic implications.

Most, but not all, nations saw the achievement of their students fall below that prior to the pandemic. These falls proved to be very uneven around the world. Because higher performing countries tended to suffer greater losses than lower performing countries, there was some compression in the variations across countries. Unfortunately, the United States continued to rank closer to lower income countries than to more developed countries that are direct economic competitors.

Within the United States, there was also significant heterogeneity at the state level. Some states clearly came through the pandemic substantially better than others. While still not competitive with top-performing countries, the students in low-loss states became more competitive with students from abroad, while other states moved down in the international rankings.

From the available evidence it is difficult to identify the specific reactions to the pandemic that led to better outcomes. Countries clearly responded to the challenges in very different ways, from essentially no closures (Sweden) to multiple years of closures (Uganda, Indonesia). But simple statistics such as the length of school closures or overall health policies cannot explain much of the variance in outcomes. And, like many other countries, America saw widely varying reactions across the states and local districts.

In the 2022 edition of PISA, the United States ranks thirty-fourth in math among the participating countries and territories, thus reinforcing the challenges facing US students both before and after the pandemic.[1] Comparing the 2022 scores to those for the similar cohort tested in 2018 (i.e., pre-COVID cohort), we then get a rough estimate of the overall impact of the pandemic on learning. While subject both to influences other than the pandemic and to nonschool factors, this comparison provides a direct estimate of losses in human capital. Thirteen countries actually gain in math scores over the period. The United States was not one of the countries improving, but in fact it saw losses in the mid-range for the world.

Different American states and localities show large differences in learning losses. Using performance on NAEP, it is possible to put each of the states into the world distribution of math performance. The best performing state (Massachusetts) would rank sixteenth in the world, placing student performance just ahead of the average

[1] These data provide the most recent worldwide picture. Earlier world estimates can be found in Patrinos et al. (2022).

student in Austria and just behind the average student in the United Kingdom. The next best state was Utah, ranking twenty-first in the combined state and national rankings for the participating countries, placing it ahead of Finland but behind Slovenia. At the other end, thirteen states produced students whose math achievement fell behind the average student in Turkey.

These declines in learning imply a future labor force that is less well-prepared than it would have been without the pandemic. If not corrected, the learning losses imply significant economic losses both for individuals in school during the pandemic and for the nation. Throughout the pandemic, continuous public consideration has been given to the economic impact of business closures and business cycle losses. In reality, the economic consequences of learning losses will dwarf these other economic costs without substantial changes in the schools. Importantly, unlike the business cycle costs, the losses in human capital can still be addressed, although the time to do this feasibly is running out as the affected cohort exits from the schools.

Based on the available research on the lifetime earnings associated with more skills, the average student in school during the pandemic will lose 5–6% of lifetime earnings. Because a lower-skilled workforce leads to lower economic growth, the nation will lose some $31 trillion (in present value terms) during the twenty-first century. This aggregate economic loss is above the US GDP for one year. These losses dwarf the total economic losses from either the slowdown of the economy during the pandemic or the recessionary losses in 2008.

Students from different states can expect to lose wildly different proportions of their future earnings. While the students from Utah, who on average suffered the lowest learning losses in the nation, can expect 2% lower lifetime earnings, this economic loss climbs to 9% for the students in Delaware and Oklahoma.

State economic growth, like national economic growth, is directly related to the skills of the state labor force. In percentage terms the state losses mirror the losses to individuals. Utah can expect to lose slightly more than one-half percent of future state GDP, while Delaware and Oklahoma can expect to lose almost 3% of future state GDP. California, the state with the largest economy, is estimated to lose far more in total GDP than all other states even though its average learning loss was less than that in 39 states. The present value of total loss in California is estimated to be $1.3 trillion. In fact, five states show losses greater than $500 billion, but of those only Pennsylvania also had learning losses above average for the nation.

History suggests that the losses from the pandemic are likely to be permanent unless the schools become better than they were before the pandemic. Since the end of the pandemic, states and localities have made varying attempts to ameliorate the losses from the pandemic, including prominently extending school days and school years, providing varying amounts of tutoring, and establishing both voluntary and involuntary summer school. To date, however, they have not on average been very successful. In fact, there are some schools that have struggled just to return to their

pre-pandemic level of operations, and a portion of the school population has even disappeared.[2]

The federal government provided $190 billion in extra school funding to deal with the problems of the pandemic. Much of this money was directed at individual districts, although a relatively small portion of these funds had to be directed specifically at student learning loss.[3]

Unfortunately, any ability to deal with the learning losses is largely limited to the time that the affected students are enrolled in K-12 schools. Over seventeen million students have already completed their K-12 schooling without being substantially brought up to the learning levels of the school as seen before the pandemic.

13.2 US Results in World Perspective

The PISA testing program, like the schools themselves, faced challenges during 2022. The OECD has strong requirements for the sampling and testing in each country, and a number of countries—including the United States—did not meet the cutoffs for school and student participation. Thirteen countries failed to meet one or more of the sampling criteria during the 2022 assessment (OECD, 2023b).[4]

For the United States, sampling problems occurred in terms of both the exclusion of selected students within the participating schools and the overall school response rates. The PISA standard calls for 95% or more of the targeted students to participate, but 6.1% were excluded in 2022—a significantly greater rate than for 2018.[5] Additionally, the school response rates of 51% before replacement and 63% after replacement fell below the goals of 85% for each.[6]

As with the other countries failing to meet the sampling standards, the US results are reported for the tested students. After analysis, OECD (2023b) concludes for the United States: "Based on the available information, it is not possible to exclude the possibility of bias, nor to determine its most likely direction." We take the sampled

[2] Dee (2023) observes, "More than a third of the loss in public school enrollment cannot be explained by corresponding gains in private school and homeschool enrollment and by demographic change.".

[3] The federal funds were disbursed in three waves. The early funds went largely for health and safety uses that included buildings, capital expenditures, and equipment. This moved somewhat to professional development and to maintaining personnel in the schools, but throughout this period, limited amounts were specifically directed at ameliorating learning losses (see Stadler, 2023).

[4] The countries falling below the sampling requirements were Canada, Ireland, New Zealand, the United Kingdom, and Scotland, where more than minimal bias was most likely introduced; and Australia, Denmark, Hong Kong (China), Jamaica, Latvia, the Netherlands, Panama, and the United States, where the possibility of more than minimal bias could not be excluded (OECD, 2023b).

[5] The top three reasons for exclusion in the United States were intellectual disability, functional disability, and language.

[6] The sampling identified a primary set of sampled schools and another set of schools that could replace primary schools that did not participate. The United States had the lowest participation rate after replacement of the seven countries that failed to reach the 85% goal after replacement.

scores at face value with the caveat that some of the following analysis might be affected by obtained sampling.

13.2.1 Aggregate Performance Levels in 2022

At the end of the pandemic, the United States was not doing well in an absolute sense. The United States falls slightly below the OECD mean score and is competing with Malta and the Slovak Republic. This places the US a full three-quarters of a standard deviation behind students in Singapore and half of a standard deviation behind Macao and Taiwan.

This level of performance is concerning because it has significant economic implications. At the individual level, skills are rewarded in the labor market. In fact, the United States rewards skills more than most OECD countries.[7] The high return to skills reflects the fact that America has a very dynamic economy, and people with higher skills are rewarded for being generally more able to adjust to change.[8] The rewards to skills also come into play in terms of the overall national economy. Countries with a more skilled workforce also tend to grow faster. Long term annual growth rates are the closely related to the skills of the population as measured by international test scores.[9]

13.2.2 International Learning Losses with the Pandemic

The pandemic was a worldwide phenomenon that had varying impacts across countries and, as will be seen in the next section, within the United States. It is useful to look directly at the changes in performance over the pandemic.

Thirteen of the countries with scores available for 2018 and 2022 actually showed gains in the math assessment over the pandemic.[10] This finding underscores a key element of interpretation: the differences in scores between the two cohorts of fifteen-year-olds include not just the school factors but also nonschool factors such as family and peer inputs. Further, because they are different cohorts of students, they may

[7] These estimates rely on data from the OECD Program on International Assessment of Adult Competencies (PIAAC). In different waves beginning in 2011, a random sample of adults ages 16–65 was surveyed about demographics and employment and, importantly, was given a bank of achievement tests including math and reading assessments. The estimates come from a separate regression in each country of log income on potential experience and experience squared, years of schooling, and the math test score in standard deviation units (see Hanushek et al.,2017c).

[8] For background on the value of skills, see Nelson and Phelps (1966), Welch (1970), and Schultz (1975).

[9] The details of this relationship along with a discussion of causation can be found in Hanushek and Woessmann (2015).

[10] For details, see Hanushek and Strauss (2024).

have entered the pandemic at a different level, perhaps reflecting earlier changes in the schools. Given the disruption of the pandemic, it is doubtful that the average student enrolled in school during the pandemic did better than would have occurred without the pandemic. While we interpret the changes in scores between cohorts as an estimate of how much less learning was accomplished by the average student during the cohort, it must be recognized that this is a rough estimate. Nonetheless, there is no reason to expect this estimate to be biased positively or negatively.

The United States did not do well during the pandemic. Among the countries with estimated losses in math scores, the US ranked thirty-first in losses. This loss is slightly better than seen for all OECD countries.

The losses tended to be larger in countries with higher achievement before the pandemic (see Hanushek and Strauss, 2024). This perhaps reflects the fact that the lower rate of learning in schools for low-achieving countries means that school closures had relatively less impact on overall achievement. But the fact that Taiwan, Japan, Singapore, and South Korea all show gains over the pandemic suggests that families there stepped in to offset any potential losses from school closures and the pandemic.

13.3 Heterogeneity in the United States

Just as seen internationally, American states had very heterogeneous performance, both in absolute terms and in response to the pandemic. This heterogeneous performance has obvious implications for the long-run economic costs that students from different states absorb.

The range of performance across states is perhaps best seen by placing the individual states into the world distribution of achievement as seen in PISA 2022. The NAEP testing of mathematics in 2022 for eighth-graders provides a parallel assessment that can be related directly to the PISA scores and that makes it possible to judge where individual states fall in the international distribution.[11] Overall, the learning losses highlighted by the PISA score changes are very similar to the learning losses found in the NAEP test.[12] Because of the similarity in math tests for these comparable age groups, we treat PISA and NAEP testing as complementary, providing details about the heterogeneity of skills that are measured for a common underlying distribution.

[11] For this, we rely on the Main NAEP assessments of eighth-grade math in 2022. We put the NAEP scores on the same scale as the PISA scores by transforming the mean and standard deviation of NAEP data to that of PISA. This is an exact equating if the distributions are normal and are measuring the same skills. Of course, the NAEP and PISA tests are given at different ages and grades and are constructed with different philosophies, possibly introducing some errors in the equating.

[12] The change in math scores with PISA amounted to − 0.13 standard deviations for fifteen-year-olds between 2018 and 2022; the change for the NAEP math scores was − 0.23 standard deviations for thirteen-year-olds between 2020 and 2023 on LTT NAEP; and − 0.20 for eighth-graders between 2019 and 2022 on Main NAEP.

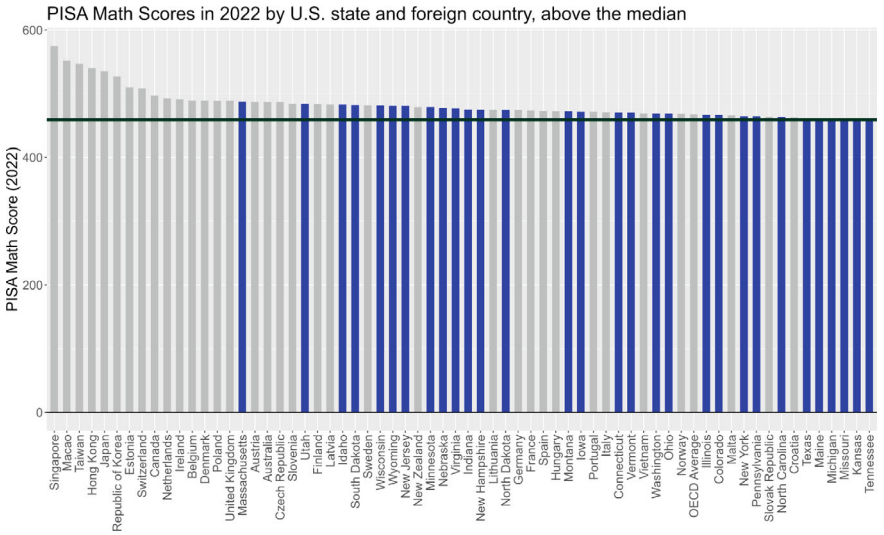

Fig. 13.1 Math Achievement in 2022 for US States and Countries above International Median. *Note* State scores on NAEP 2022 are transformed onto the PISA 2022 scale. *Source* Author calculations from *Source* Organization for Economic Cooperation and Development, *Pisa 2022 Results,* Vol. 1, *The State of Learning and Equity in Education* and https://www.nationsreportcard.gov/ndecore/xplore/nde

Calibrating the state distribution to the international distribution shows that the highest achieving state—Massachusetts—would place sixteenth in the world distribution (Fig. 13.1 for states and countries above the median; Fig. 13.2 for those below the median). Utah would place twenty-first. A total of thirty states placed in the top half of the participating countries and states. The majority of states are bunched just above or just below the international median, but that does not have them competing with the most vibrant countries economically. The lowest ranking state (New Mexico) is competing with Romania and Kazakhstan.

The simple summary of these comparisons is that even the best performing of American states is not doing well when compared to what is possible. The large number of countries where the average student performs better than the average student in the best states raises concerns about the economic future of the US.[13]

As with the range of outcomes over the pandemic that was seen internationally, the states differed dramatically in how they dealt with closures and learning losses. Utah lost very little during the pandemic (again, as measured by score comparisons for those eighth graders preceding the pandemic in 2019 with those in 2022). But, as seen in Fig. 13.3, Oklahoma and Delaware at the other end of the spectrum suffered huge losses.

[13] See the implications of current skills for future economic well-being in Hanushek et al. (2013).

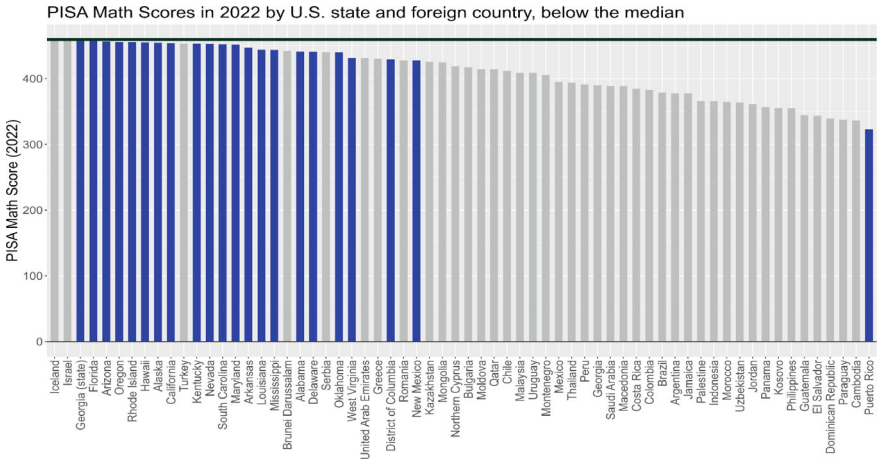

Fig. 13.2 Math Achievement in 2022 for US States and Countries below International Median. *Note* State scores on NAEP 2022 are transformed onto the PISA 2022 scale. *Source* Author calculations from Source: Organization for Economic Cooperation and Development, *Pisa 2022 Results,* Vol. 1, *The State of Learning and Equity in Education* and https://www.nationsreportcard.gov/ndecore/xplore/nde

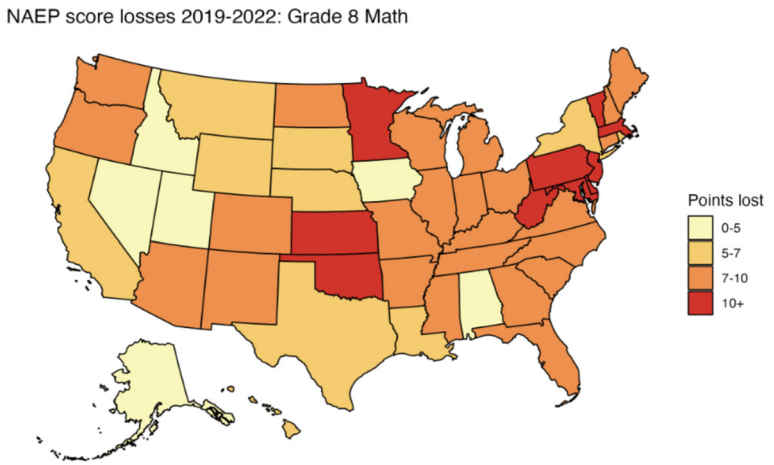

Fig. 13.3 NAEP Score Declines by State, 2019–2022. *Source* Author calculations from https://www.nationsreportcard.gov/ndecore/xplore/nde

13.4 The Economic Costs of the Pandemic

The results on both the NAEP and PISA assessments are measured in arbitrarily chosen scale scores that have no natural meaning. Saying that a state lost six points on the NAEP scale or that a country lost eight points on the PISA scale provides little

indication of the severity of any lowered achievement. To provide a more precise and understandable measure of these losses, we translate such test score losses into their economic implications.

The significance of the skills measured by the standardized PISA and NAEP tests is readily apparent in the economic realm. Students who know more tend to earn more, and countries with more skilled labor forces grow faster. Two things are important for understanding the pandemic losses. First, these losses will persist throughout individuals' lifetimes unless something is done to make up for them. In simplest terms, if schools were doing the best that they could before the pandemic, a return to that pace of learning will not erase the deficits from the pandemic.[14] Second, this cohort can expect lower earnings than the cohort finishing school immediately prior to the pandemic and the cohort starting school immediately after the pandemic.

13.4.1 Aggregate Economic Impact of the Pandemic for the United States

The COVID cohort implies that the labor force of the future will evolve with less-skilled students. As such, the previous description of the relationship of skills to growth implies that the learning losses will have a lasting impact on the economy.

We can estimate the impact by comparing the lower growth as the COVID cohort works through the system with growth that would be expected without a pandemic.[15] The simulation behind this allows for members of the COVID cohort to move into the labor force steadily as they graduate, to stay in the labor force for forty years, and then to retire. Thus, the quality of the labor force dips for a period as this cohort moves fully into the labor force and then returns to the pre-COVID quality level as this cohort fully retires. Using the historic growth relationship, we estimate future growth in GDP through the remainder of the twenty-first century. We then calculate the present value of GDP with and without a pandemic (using a 3% discount rate) so that the differences in future GDP are all placed in terms of present value.[16]

The impact of the lower-quality future labor force on the economy is dramatic. The present value of the losses amounts to $31 trillion (in 2020 dollars). While numbers of this magnitude are difficult to understand, Table 13.1 puts them into perspective.[17] This loss on average amounts to a 3% lower GDP throughout the remainder of the century.

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[14] See the discussion on pace of learning in Raymond (2023). Discussion of historical periods of school closures can be found in Hanushek and Woessmann (2020).

[15] A detailed description of these calculations can be found in Hanushek and Woessmann (2020).

[16] Present value can be thought of as calculating what amount needs to be deposited in a bank account today to completely offset the future losses in GDP, assuming that the bank account accrues 3% interest on any annual balances.

[17] Aggregate changes use the scores on the LTT NAEP from 2020 to 2023.

Table 13.1 Comparisons of aggregate economic costs of pandemic

PV of learning losses (billion USD)	Compared to discounted GDP	Compared to GDP in 2020	Cumulative business cycle	
			2008	COVID
$30,711	3.1%	147%	$4983	$1760

Source Author calculations

The lopsided attention to the business-cycle losses from the 2008 recession and from the pandemic is startling once we see the comparable pandemic figures. Table 13.1 displays the total losses from the two recent economic downturns: the 2008 recession and the COVID-recession. The 2008 recession continues to spur discussions of its severity—a recession labeled the largest since the Great Depression, but the total costs from unemployment and lowered productivity are one-sixth of the estimated economic costs of the pandemic learning losses. The business cycle costs of the pandemic are a fraction of the costs that are likely from learning losses.

13.4.2 Heterogeneous Individual Economic Losses

As calculated from the historical skill-earnings relationship of the US, the average student in the United States will have 5–6% lower lifetime earnings compared to expected earnings without the pandemic. This reduced payoff acts just like an income tax surcharge applied just to the pandemic cohort.

The school disruptions and closures, however, had a very uneven impact on students, implying that the average losses do not tell the entire story. Clearly, some families were better able to offset the school closures—by direct help in learning, purchase of learning supplements, etc.—than others. The differential impact was also seen in NAEP scores where there was a noticeably larger decline at the bottom of the score distribution than at the top. The PISA 2022 scores also show an increased variation of skills.

The NAEP score differentials imply a 4% loss for those at the top of the score distribution and a 9% loss for those at the bottom of the score distribution. The full explanation of the causes of the differential losses is not available, but there is evidence that the hybrid and remote instruction related to closures contributed to the distribution of losses (Goldhaber et al., 2023).

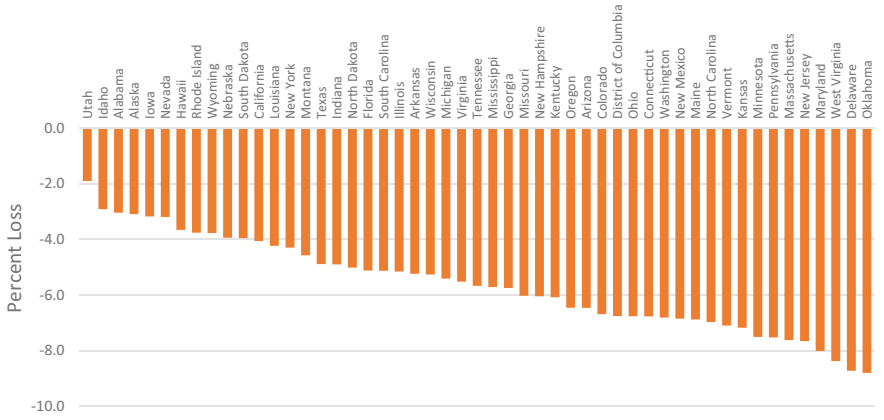

Fig. 13.4 Average individual economic losses by state. *Source* Hanushek (2023). *The Economic Cost of the Pandemic: State by State*. Stanford, CA: Hoover Education Success Initiative, Hoover Institution

13.4.3 Heterogeneous State Economic Losses

An alternative perspective on the heterogeneous losses comes from the differences in outcomes seen across the states. The differential losses shown in Fig. 13.3 translate into very different expected economic outcomes.

At the individual level, students in Utah, which navigated the pandemic better than other states, would on average lose 2% of their lifetime income (Fig. 13.4). But students in Delaware and Oklahoma can expect to lose 9% of their lifetime income. These dramatic differences underscore the direct linkage between learning loss and expected incomes of students.

As previously seen at the national level, there is also a direct linkage between skills of the state population and state GDP growth (Hanushek et al., 2017a, b). In percentage terms, the losses in state GDP follow exactly the same pattern as seen for individual earnings. Utah can expect future GDP that is 0.6% lower than that without the pandemic while Oklahoma and Delaware can expect 2.9% lower GDP.

But the picture changes when considering the total dollar value of losses, because these involve not only the magnitude of the learning losses but also the size of the state economies. The lowest losses come in Wyoming and Alaska, which have low learning losses and relatively small economies, thus limiting the present value of economic loss at around $15 billion (Fig. 13.5). On the other hand, California's learning losses were only slightly above Wyoming's, but the total economic loss is $1.3 trillion, a differential reflecting the size of the economies.

Beyond California, the economies of Texas, New York, Florida, and Pennsylvania each have losses greater than $500 billion. Again, these losses reflect both the magnitude of learning losses and the size of the economies. Each of these large-loss

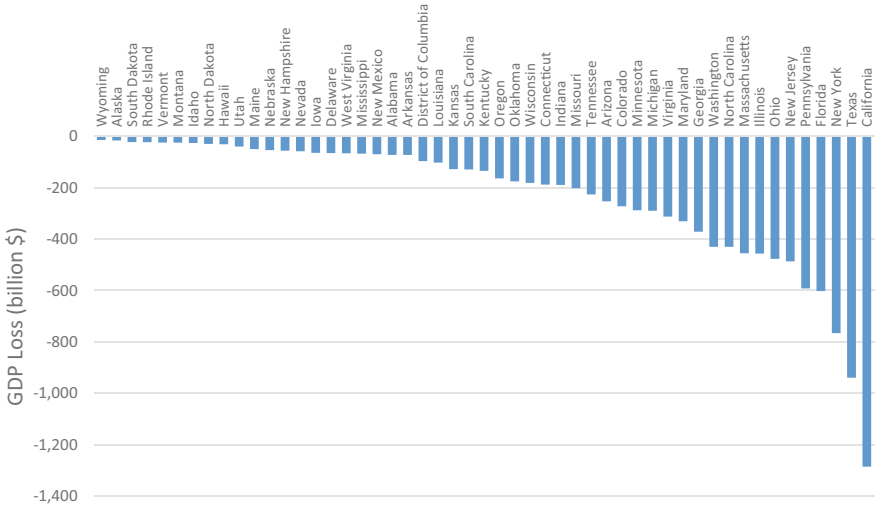

Fig. 13.5 Present value of aggregate state losses in GDP. *Source* Hanushek (2023). *The Economic Cost of the Pandemic: State by State*. Stanford, CA: Hoover Education Success Initiative, Hoover Institution

states, except Pennsylvania, suffered less than average learning losses as measured by NAEP scores.

13.5 Dealing with Learning Losses

The recessionary costs have already occurred and cannot be erased. The costs associated with the learning losses are future costs, and they can be eliminated with appropriate remedial measures. Unfortunately, the opportunity to alleviate the costs for the COVID cohort is quickly disappearing because the chance to aid this cohort becomes difficult if not impossible as this cohort ages out of the schools.

Substantial historical research suggests that these losses will be permanent unless something is done to make the schools better than they were before the pandemic.[18] And that underscores the urgency of the situation. We have few systematic ways to remediate students of the pandemic once they have left the K-12 schools. This means that long-term plans, no matter how useful for future school improvement, cannot deal with the learning losses of the pandemic cohort of students.

[18] See the summary of international studies in Hanushek and Woessmann (2020), Werner and Woessmann (2021), and Cygan-Rehm (2022).

From the start of the pandemic in March 2020 through 2023, about seventeen million students left the K-12 system with, according to the recent data, significant learning deficits.[19] This group on average has little chance of recovering.

The federal government appropriated $190 billion to K-12 schools to compensate for the disruptions and challenges of the pandemic. These funds, which mostly went directly to schools, will disappear soon, but little of these funds has been directed at remediating the learning losses.

The most widely employed approaches have been either tutoring programs or additional time through expanded school days, summer school, or other ways of adding time. Schools have pursued very different strategies with, for example, a minority of schools offering the high-dosage tutoring that is often held to be the best alternative.[20] For these, initial investigations suggest highly variable outcomes where attempted.[21]

One alternative that has received limited attention is using the current teacher corps more effectively. A substantial body of evidence has emphasized the effectiveness of teachers in raising student achievement (see, e.g., Hanushek & Rivkin, 2012; Chetty et al., 2014; Bacher-Hicks & Koedel, 2023). This importance of teachers is the clearest way to interpret the evidence of the superiority of in-class instruction to hybrid instruction to fully remote instruction (Jack et al., 2023). Moreover, there is evidence that effective teachers will respond to incentives in taking on more demanding classroom tasks (Morgan et al., 2023).

If the more effective teachers could through varying incentives be induced to teach a greater proportion of the students, the average effectiveness of the schools could be improved immediately (Hanushek, 2022; Raymond, 2023). Of course, this would require a restructuring of school operations and as such meets with considerable opposition.

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[19] These calculations include students in grades nine through twelve in spring 2020 from public (15.3 million) and private (1.4 million) schools along with home-schooled (0.3 million) students (U.S. Department of Education, 2022). There is no consistent information on the differential learning losses across sectors. There is some partial evidence suggesting that charter and private schools responded more quickly than traditional public schools. The reaction of home schooling is less clear although school closures have less meaning for this population.

[20] Data for the 2023–2024 school year show different kinds of tutoring offered by tutors with varying backgrounds or training; see https://nces.ed.gov/surveys/spp/results.asp.

[21] Guryan et al. (2023) report very strong impacts of high-dosage tutoring on Chicago high school students, but there is little evidence of general adoption in either Chicago public schools or in other schools.

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