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THE PANDEMIC, SOCIOECONOMIC DISADVANTAGE AND LEARNING OUTCOMES

CROSS-NATIONAL IMPACT ANALYSES OF EDUCATION POLICY REFORMS

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Dedication

This book is dedicated to policymakers and stakeholders around the world who have committed themselves to evaluating the causal effects of education policy interventions and thereby improving the development and implementation of evidence-based policies to support socioeconomically disadvantaged children and young people.

Foreword by Stephen Quest

Director-General of the Joint Research Centre

The COVID-19 pandemic disrupted the learning process of more than 1.5 billion students and youth around the world. The abrupt and unplanned shift to online schooling had a negative impact on student learning and achievement, with the greatest challenges experienced by the most vulnerable learners. Scientific evidence from across the globe is revealing the scale of the learning losses attributable to the school restrictions in response to the pandemic. The literature discussing the efficacy of policy interventions developed to address this generational challenge is very much limited to deliberations about reforming national education systems. Relatively little available research considers this topic from a cross-national perspective.

The current volume, *The Pandemic, Socioeconomic Disadvantage and Learning Outcomes: Cross-National Impact Analyses of Education Policy Reforms*, provides a timely and detailed cross-cultural and comparative analysis of the relationship between pandemic-related school restrictions, learning loss and education policy development. Cases from Germany, Italy, the Netherlands, Belgium, Hungary and England provide a close examination of the pressing learning challenges precipitated by COVID-19 and its disproportionate impact on socioeconomically disadvantaged students.

The Joint Research Centre of the European Commission provides scientific evidence to support the design of policies within the European Commission and EU Member States. Our scientists advance the use of causal impact evaluation of policies in line with the Better Regulation Guidelines in order to find out which policies work. While causal impact evaluation entails sophisticated econometric methods and poses high requirements on the quality of data used, it is a prerequisite for identifying how and to what extent a policy (school restrictions and online learning) or a crisis (the COVID-19 pandemic) affects a specific outcome (learning loss).

The chapters collected in this volume are about the application of counterfactual methods for estimating the learning loss caused by pandemic-related school restrictions. The results reported here go far beyond just monitoring learning outcomes before and after the pandemic; they contribute to our understanding of the differential impacts of pandemic related school restrictions across education systems and offer implications for pandemic-era schooling contexts, making us better prepared for future crises.

The national profiles discuss in detail country-specific education policies and practices implemented during and after the pandemic, making it possible to do comparisons and draw conclusions on interventions' potential to decrease the learning loss over time. In light of the recently published results of the Programme of International Student Assessment (PISA) reconfirming the widespread learning decline since the start of the pandemic across Europe and other countries, the search for policy interventions helping children catch up is particularly pertinent.

Apart from offering reflections related to selected national education systems, the volume provides additional chapters that look into European performance declines and global developments, which have thought-provoking implications. For example, one result indicates that distance learning has led to a loss of equalising effects provided by peer learning in school, thereby amplifying the link between parental socioeconomic backgrounds and learning outcomes. The related rising inequality in education performance has hit socially and culturally disadvantaged students hardest. A logical conclusion would be that, for best impact, catch-up policies would be targeted specifically at students who display severe learning deficits in basic skills in deprived regions. The comparative analysis also implies that some of the more effective strategies to bridge learning deficits have been the allocation of tutoring for students lagging behind and the introduction of longer school days with additional teaching tailored specifically to the needs of low-performing students.

While nobody hopes that another disruptive event will test our take-away from the COVID-19 pandemic, we must adapt our policies to a volatile, uncertain, complex and ambiguous world. Identifying what we did right and what could be improved will not only help us be prepared for what is coming at us, but increase the impact of our policy interventions and, ultimately, improve our education systems.

I hope our readers will find this volume useful and enlightening.

Stephen Quest
Director-General
Joint Research Centre
European Commission
Brussels, Belgium

Foreword by Pia Ahrenkilde Hansen

Director-General of the Directorate-General for Education, Youth, Sport and Culture

The improvement of quality and equity in education is a key priority for our European Education Area. The pandemic has brought unprecedented challenges to EU education systems. Since the onset of the pandemic, anticipating a possible decline in educational outcomes, the European Commission has been working with Member States to address its impact on the quality and equity of education. Close and fruitful cooperation between Member States and the Commission is ongoing through various policy initiatives under the European Education Area. For instance, the EU education ministers adopted a Council recommendation on 'Pathways to School Success' in November 2022. The recommendation proposes a new framework for systemic action to inspire Member States when developing their strategies towards school success for all learners. Furthermore, the Recovery and Resilience Facility has made EUR 73 billion available for investment in education and skills between 2021 and 2026.

An important lesson from the past 4 years is that the impact of the pandemic on educational outcomes differed across countries and between groups of learners. Gathering more comparative evidence is key to better understanding how to design and implement effective remedial policy measures. This book is particularly welcome in this regard, because of its comparative focus on learning losses of disadvantaged children and possible policies to help them catch up and to decrease the impact of socioeconomic background on education outcomes. Its findings on increasing educational inequalities in the aftermath of the pandemic provide an important contribution to our reflections on the issue of equity in education.

The book investigates the causal impact of the pandemic on learning outcomes. The use of impact evaluation methods in the field of education is at the core of the recently established Learning Lab on Investing in Quality Education and Training. Through its activities, the European Commission and EU Member States are working together to promote a culture of rigorous policy evaluation and thus make investment in education more effective, equitable and efficient. The Learning Lab aims to help improve the understanding of what works in fostering educational outcomes for all young people. This book demonstrates the need to expand education policy impact evaluation.

In addition, the book stresses that the impact of the pandemic went far beyond school performance. Children experienced higher stress levels, psychological challenges and greater levels of worry. All had an impact on students' mental health and non-cognitive skills. Big efforts are needed to improve students' well-being. The European Commission launched a dedicated expert group in 2023, on supportive learning environments for groups at risk of underachievement and for supporting well-being. The expert group has been developing guidelines for policymakers and schools to improve wellbeing and mental health in schools.

In sum, the fresh evidence provided in this book, of the differentiated impacts of the pandemic on learning outcomes, the need for rigorous education policy evaluation and the importance of students' well-being, will support the ongoing work of the European Commission towards meeting the European Education Area's goals of promoting quality and equity in EU education systems.

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Part I:

Introduction

CHAPTER 1

COVID-19 and learning loss: a global perspective

Louis Volante, Don A. Klinger, Sylke V. Schnepf, Luca Salmieri and Orazio Giancola

Abstract

This introductory chapter provides a preliminary overview of the emergent research literature on the impact of the pandemic on primary and secondary pupils' learning losses. Examples of subsequent and prominent education policies that have been adopted to address these learning losses will be briefly noted, particularly those to support socioeconomically disadvantaged student populations. The introduction also explains the rationale for the inclusion of select educational jurisdictions that are represented in this volume. A framework for the national profiles presented in the second part of this book and limitations of this edited volume are also discussed. The chapter situates the importance of the volume within a broader global context, arguing that the pandemic and resulting research illustrate the educational impacts of unexpected, devastating events that suddenly changed the learning environment, and the differential impacts of these sudden changes on vulnerable student populations. Overall, the chief objective of the volume is to promote greater understanding of the relationship between student achievement and the varying success of education policies that have been adopted to address learning losses in socioeconomically disadvantaged student groups across a number of European nations.

Introduction

There is little doubt that the COVID-19 pandemic has negatively affected student learning across the globe. We need to carefully examine its ongoing and long-term impacts on students' learning outcomes, including those related to academic achievement and to students' approaches to learning, motivation and engagement, self-beliefs about their abilities, school engagement and academic resilience (Lee and Shute, 2010; Lee and Stankov, 2018; Mazrekaj and De Witte, 2023). Research within and outside the European Union is beginning to document the deleterious effects of the pandemic on academic learning outcomes, such as lower achievement in reading, mathematics and science – particularly in relation to socioeconomically disadvantaged young people (De Witte and François, 2023; Moscoviz and Evans, 2022; Volante et al., 2021).

Not surprisingly, countries around the world enacted a variety of policies to ameliorate the impacts of the COVID-19 pandemic, but the nature and effectiveness of these policies remain open for investigation. This volume seeks to fill this gap by addressing three key questions. (1) To what extent has COVID-19 affected existing gaps in learning outcomes between socioeconomically disadvantaged students and their more affluent peers within a range of European nations? (2) Which education policies were associated with more favourable learning outcomes during, and subsequent to, the pandemic? (3) To what extent did selected European education systems use evidence-based policies to enhance support for disadvantaged student groups during the pandemic?

Each of these questions is particularly important for academics and policymakers as they study and plan for potential future pandemics and address the long-term impacts of COVID-19 on the student population. Collectively, this volume seeks to add to the body of knowledge on pandemic-era schooling by providing an important and timely cross-national analysis of COVID-19, learning loss and the relative effectiveness of educational policy interventions that have been enacted to date. Importantly, and in line with the international research literature examining educational outcomes and education policies, it is critical to examine the learning impacts of the pandemic across two distinct groups: disadvantaged young people and their more affluent peers.

Importance of (in)equality

Over the last decade, no topic has attracted as much attention among academics, public policymakers and international organisations as inequality. Rising social and income inequality, globalisation and past financial crises have led to many families and communities being left behind across a range of societies (Alvaredo et al., 2017; OECD, 2015, 2021; Wilkinson, 2010; World Economic Forum, 2021, 2022). Not surprisingly, pronounced inequalities are also found in school-aged student populations and are evidenced by the significant achievement gaps found between disadvantaged

students and their more affluent peers (Jerrim et al., 2019; Kautz et al., 2014; Lee and Stankov, 2018; Liu, 2019; Volante et al., 2019a). There are at least four reasons why this is such a pressing issue. The first is equity. Individuals do not pick their families or socioeconomic positions. Consequently, many deem it to be unfair and inequitable if life chances are to a large extent determined by factors, such as family background, that reside outside one's control. The second reason is economic efficiency. Within a global context, each country must make the most of its human resources (Angrist et al., 2021; Pelinescu, 2015; The Economist, 2016). The third reason is the persistence and transmission of inequality. Many consider education a key determinant of economic inequality and intergenerational social mobility (Jerrim and Macmillan, 2015; Leone, 2019; Stuhler and Biagi, 2018; Volante and Jerrim, 2018; Volante et al., 2022a). Thus, persistence in educational inequalities will translate into continuing inequalities in later life, in terms of not only labour market outcomes (occupation and income) but also other outcomes such as health and well-being (OECD, 2016; Raghupathi and Raghupathi, 2020; The Lancet Public Health, 2020; Zajacova and Lawrence, 2018). Finally, if young people from disadvantaged backgrounds are failing to reach their academic potential, then it is unlikely that a country is maximising its human resources.

Although definitions of socioeconomic disadvantage vary in the international literature, there seems to be broad consensus around three main indicators that are widely used in the literature: parental education, parental occupation and (permanent) family income. Each of these measures has its advantages and disadvantages. For instance, while family income is easy for a wide audience to understand and interpret, young people are unable to report it accurately, and it thus must be captured by parents directly. Conversely, young people generally can report parental occupation and parental education reasonably well (Jerrim and Micklewright, 2014). Furthermore, family income is correlated with students' educational success to a significantly lesser extent than parental education (Anger, 2012; De Graaf and Kalmijn, 2001). The Organisation for Economic Co-operation and Development (OECD) has combined several measures to create a reliable and valid indicator termed the Programme for International Student Assessment (PISA) Index of Economic, Social and Cultural Status (ESCS) (Volante et al., 2019b). The OECD defines disadvantaged young people as those in the lowest third of its ESCS indicator within each country/region, based on information about parents' occupation(s) and measures of household possessions (OECD, 2018). However, in the absence of PISA data, national governments tend to rely on their own operational definitions of disadvantage, which can vary significantly across national contexts (Schnepf et al., 2019). The latter presents formidable challenges when trying to take stock of the impacts of COVID-19 in relation to disadvantaged student populations.

Preliminary education trends amid the global pandemic

It is critical to examine the learning impacts of the pandemic across two distinct groups: disadvantaged young people and their more affluent peers. Recent research,

using large-scale assessment measures, is beginning to document and quantify the learning losses that students experienced as a result of school closures, shifts towards online and hybrid learning and other impacts associated with successive waves of the pandemic. Although these studies are relatively sparse in the Western world, in a limited number of international contexts such as Belgium (Maldonado and De Witte, 2021), Germany (Depping et al., 2021), the Netherlands (Engzell et al., 2021), other parts of Europe (Blasko et al., 2022) and the United States (Bailey et al., 2021; Dorn et al., 2020) they suggest that learning stalled during the pandemic. Studies also indicate that the greatest impacts were felt by students from disadvantaged backgrounds (e.g. Donnelly and Patrinos, 2021; Kaffenberger, 2021). It appears the global pandemic has exacerbated existing educational inequalities, leading to fears that a generation of children could be 'left behind' – particularly disadvantaged students, who are the most at risk of not having access to the necessary resources to succeed educationally amid the turmoil created by the pandemic (De Witte and François, 2023; Ikeda and Echazarra, 2021; OECD, 2020; UNESCO, 2022; United Nations, 2021).

International testing programmes such as PISA, the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) have been used by policymakers for decades to take stock of progress made (or lack thereof) on key learning outcomes. These comparative international large-scale assessment measures are ideally positioned and appropriately resourced to make determinations of the degree of academic learning losses associated with the pandemic. Of these assessments, we concede that, despite the range of measures, PISA has historically been favoured by international policymakers (Volante, 2018). Since its initial administration in 2000, the PISA triennial survey has been widely regarded as the most prominent international assessment of 15-year-old students' reading, mathematics and science literacy (Breakspear, 2012; Klinger et al., 2016; Volante, 2016, 2018). Unfortunately, the PISA 2021 administration was postponed to 2022 and results were only published in December 2023.

To provide a more timely analysis of COVID-19-related learning losses, academics must rely on national administrative data stemming from large-scale assessment programmes. These results can be juxtaposed against previous administrations and international large-scale results to provide approximations of learning losses that can be attributed to disruptions caused by the COVID-19 pandemic. Unfortunately, as with PISA 2021, many such national assessments were postponed or modified during the pandemic, making efforts to extensively measure the impact of the pandemic on educational outcomes impossible or extremely difficult to compare in a defensible manner.

Adding to the complexity of such analyses have been the substantial national and cross-national differences in responses to the global pandemic. For example, schools in New Zealand experienced only a short period during the initial outbreak in which schools were closed, although a later COVID-19 outbreak did lead to two regions (Auckland and the Waikato) having a second lockdown. In addition, Sweden did not use a lockdown approach and schools remained open throughout the pandemic. Variations in approaches increased further after the initial outbreak as countries and local governments worked to adopt regional lockdown procedures rather than large-scale

closures. As a result, cross-national analyses of the impact of COVID-19 are relatively sparse. These comparisons are constrained even further by the disruptions to and cancellations of national and international large-scale assessment programmes that have been traditionally relied upon to make system-level assessments of student learning. Overall, there is a general lack of national administrative data that facilitate extensive cross-national comparisons. This lack of data puts significant constraints on the breadth of cross-cultural analyses that can be undertaken and the resulting educational policies that could potentially be examined.

Broader impacts of the pandemic on students

Cross-national examinations of student progress and education policymakers have historically focused on traditional cognitive domains such as reading, writing, mathematics and science literacy. However, the research literature suggests that non-cognitive learning outcomes are also important for informing the development of education policies (Khine and Areepattamannil, 2016; Messick, 1979). The conceptualisation of non-cognitive skills varies significantly across national and international education jurisdictions. Nevertheless, such skills typically encompass constructs such as learning habits, approaches to learning (growth mindset), motivation for school subject matters and self-belief about their abilities (also termed resilience in the popular media), representing 'patterns of thought, feelings, and behaviours' (Borghans et al., 2008), which are influenced by schools, social environments and education policy agendas (Khine and Areepattamannil, 2016). For example, previous research indicates that countries that possess smaller achievement gaps between high and low socioeconomic status student populations are said to be more equitable and more successful in promoting academic resilience (Agasisti et al., 2018).

A similar trend occurred in the context of the pandemic. In their pan-Canadian study, Volante et al. (2022b) examined 62 provincial policy documents that were issued between 1 January 2020 and 31 December 2021 intended to support students academically. Their analysis revealed that academic policy interventions focused on three key areas: continuity of learning (during shifts from face-to-face to hybrid learning), synchronous learning support, and recovery and renewal learning strategies to address learning gaps. Importantly, the study found a general lack of policy differentiation in terms of how specific resources and support were to be allocated within provincial educational jurisdictions to support students' learning and achievement or students' resilience in the presence of educational uncertainty, especially for disadvantaged student populations. While the initial focus was primarily on achievement outcomes and on policies and practices to address academic learning, there was a shift towards the inclusion of other non-cognitive outcomes. This was probably due to the extended periods in which families remained isolated and the fact that children had to continue their schooling electronically.

Examples of research examining emotional well-being, engagement and academic resilience became and are increasingly a topic of public and research interest (e.g. Kishida et al., 2021; Luthar et al., 2021; Volante et al., 2022b). The Council Recommendation of 28 November 2022 on pathways to school success ([1]) provides a new focus in education policymaking by stressing the importance of students' mental well-being in school. Given the close link between academic achievement and mental health, questions about how students' emotional well-being should be monitored and improved in the school context are likely to guide the next decade of education policy formulation and research.

As researchers/scholars, we recognise the importance of broad conceptualisations of critical learning outcomes that extend beyond cognitive measures of academic achievement (Volante et al., 2021, 2022a) and related support programmes for disadvantaged students (Gabrieli et al., 2015; Garcia, 2016; Kautz et al., 2014; OECD, 2018). Indeed, the COVID-19 pandemic has served to exemplify the importance of a range of school outcomes. Paying attention to the non-cognitive domain from both a measurement and a learning perspective is critical, given that such skills can provide young people with resilience in the face of the challenges created by the pandemic, leading to positive learning outcomes (Agasisti et al., 2018; Erberber et al., 2015; Volante and Klinger, 2022; Ye et al., 2021). Collectively, this leads us to carefully consider these skills and other measures of learning engagement and offer perspectives when the national data afford such analyses. While we fully acknowledge that the vast majority of existing measures are largely focused on academic learning outcomes, this volume endeavours to also comment on academic resilience and other non-cognitive skills as valuable educational outcomes within a global context.

Organisation of this volume

As previously noted, this volume is especially interested in the educational outcomes of disadvantaged students, who have been particularly threatened during the pandemic (Engzell et al., 2021; Volante and Klinger, 2022). To date, there is no study across the EU that has examined the impact of the COVID-19 pandemic on academic learning outcomes using detailed national profiles, such as those contained within this volume. Understanding the impact of the pandemic on students is a timely and critical issue for public policymakers as they strive to create more equitable, just and economically competitive societies. Unfortunately, these types of research studies are relatively sparse and the reports that do exist (see UNESCO, 2022) largely focus on documenting how teaching and learning conditions were affected during the pandemic. The analyses included in this volume attempt to extend this type of work by seeking to understand the effectiveness of various policy interventions both within and across select national contexts. The latter provides valuable insights as governments around

([1]) Council Recommendation of 28 November 2022 on Pathways to School Success and replacing the Council Recommendation of 28 June 2011 on policies to reduce early school leaving (OJ C 469, 9.12.2022, p. 1).

the world seek ways to support the academic resilience of their most vulnerable student populations.

This edited volume is organised into three parts that correspond to two introductory chapters, six national profiles and a concluding chapter. More specifically, Part I provides a general discussion on the topics of COVID-19, learning loss and education policy and outlines the underlying rationale for the importance of the proposed book. It also reports descriptive statistics related to school disruptions and successive weeks of school closures around the world that were due to the pandemic. Understandably, parents, educators and policymakers remain concerned about the negative impact associated with the loss of face-to-face instruction and social isolation measures. For the most part, researchers in selected jurisdictions have begun to tackle this timely issue by examining the learning losses associated with school closures. Simply put, learning loss research attempts to quantify, using large-scale student assessment results, the degree of progress made, or lack thereof, in core subject areas such as reading, mathematics and science that have resulted from interruptions to in-person schooling. As previously noted, this research suggests that learning stalled during the pandemic and that disadvantaged pupils in primary and secondary schools were disproportionately affected. However, it is equally clear that the unprecedented hardships associated with COVID-19 and school closures have varied significantly cross-nationally, with differences partly attributable to the policy interventions and reforms enacted across countries. This volume attempts to better understand the impact of the pandemic on student learning and the relative effectiveness of policy interventions that were introduced to address this issue.

Part II examines the impact of school closures on learning losses and the effectiveness of more specific national interventions utilised to help pupils 'catch up' within a sample of European nations: Belgium, England, Germany, Hungary, Italy and the Netherlands. These countries were purposefully selected based on the availability of national administrative data required to support such a review. Overall, the national profiles provide a critical analysis of the relative effectiveness of policies enacted in response to the global pandemic – particularly in relation to more vulnerable socioeconomically disadvantaged student populations.

Part III serves as a conclusion. This final chapter discusses the key trends noted in the national education systems, especially considering both pre-pandemic inequalities and those (re)ignited by learning loss during the pandemic. A model of each country's educational policies that were developed to tackle learning loss is suggested in relation to national perspectives on reforms in the sphere of compulsory education. These suggested models facilitate cross-national analyses to understand why particular educational policies have been more/less effective in lessening the deleterious impact of the COVID-19 pandemic on disadvantaged student populations. The dominant policy interventions noted are then juxtaposed against general relationships between COVID-19, learning losses, and best practice and policies. The final chapter also proposes future areas of inquiry stemming from the limitations of the available literature and discusses the implications of the general findings for future pandemic-era schooling contexts and large-scale reform initiatives designed to tackle learning loss.

Organisation of national profiles

To promote a coherent approach and for the sake of comparability, each of the national profiles will be organised around the following four sections. The first section provides a brief overview of the structure of compulsory school systems within a given country, allowing the reader to understand the general organisation and institutional features of the compulsory school system and general governance structures used within the education system. The introduction also provides a brief overview of some of the more prominent policies implemented during school disruptions and the factors and mitigation approaches adopted within a particular national context (the duration of school closures, ways to teach children, TV programmes by class, online learning platforms, the provision of tablets to disadvantaged students, etc.).

The second section of each national profile describes the participation and general performance pattern in relation to national and international assessments, both prior to and during the pandemic. This section quantifies the degree of learning losses experienced during the pandemic. Where possible, this section should quantify the learning loss in terms of standard deviations using some form of counterfactual impact evaluation / comparison of progress with that of previous student cohorts, etc. The authors largely focus on national large-scale assessment results – country profiles will be confined to using a measure of socioeconomic disadvantage that aligns with that country's operational definitions. These differences will be acknowledged in the final analysis with appropriate cautions.

The third section provides a more detailed analysis of recent national policy interventions and reforms enacted to support students during school closures and upon return to in-person schooling during the initial waves of the pandemic. It includes a description of the specific features of the various policy reforms and juxtaposes these interventions against the established and emerging empirical literature.

The final section provides an impact analysis of kindergarten to grade 12 policy reforms, with an emphasis on the most vulnerable student groups within each nation. Ideally, similar to the second section, this section discusses – in relation to the available administrative data – whether students caught up and how big the remaining learning loss is 1 year after school closures. In addition, the final section offers an overall assessment of the effectiveness of the policies employed and offers insights and recommendations for education policy development moving forward.

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CHAPTER 2

COVID-19 and the European education performance decline: a focus on primary school children's reading achievement between 2016 and 2021

Sylke V. Schnepf and Silvia Granato

Abstract

This second introductory chapter uses the Progress in International Reading Literacy Study (PIRLS) data – the only cross-national data having measured educational achievement during the COVID-19 pandemic – to investigate the educational achievement decline of fourth graders across 21 European countries between 2016 and 2021. Learning decline estimated with PIRLS data is composed of not only learning loss due to COVID-19 but also European performance trends and national policy changes.

The chapter illustrates the education performance decline in Europe by providing information on 20-year reading achievement trends, average performance declines and the increasing number of poorly performing students across European countries. The results of previous national counterfactual impact evaluation studies measuring learning decline in language subjects due to COVID-19 are compared with PIRLS reading achievement declines between 2016 and 2021. Furthermore, the chapter examines recent developments in educational inequalities within Europe first by comparing countries' education distributions between 2016 and 2021 and second by investigating changes in the proportion of children lacking important reading skills by socioeconomic background.

The entire chapter puts the national profiles focused on in this volume into context by comparing them with other European countries.

Introduction

The COVID-19 pandemic affected the learning of 1.6 billion children in 190 countries across the world (United Nations, 2020). In the 21 European countries that will be compared in this chapter, schools were fully closed for 14 weeks and partially closed for 21 weeks, on average. In addition to COVID-19 restrictions, countries differed in their implementation of online learning and other support provided to students to progress during the pandemic. It is widely acknowledged that COVID-19-induced physical school closure led to considerable learning loss. This will clearly have a negative impact on meeting the European Commission's EU-level target of decreasing the proportion of low-achieving 15-year-olds to 15 % by 2030 (in 2018, average levels of underachievement were around 23 % in Europe; European Commission, 2022).

In addition to the concern about the overall learning loss associated with COVID-19, the fact that the impact of physical school closures has been heterogeneous across students with different socioeconomic backgrounds has led to even greater concerns about the social gradient of education outcomes. In particular, it appeared that, during the pandemic, the family into which a pupil was born was even more significant in explaining educational outcomes than previously.

If research showed that pupils caught up after the pandemic, the learning loss during the pandemic and its heterogeneous effects would simply be a short hiccup not worth investigating further. However, empirical studies show that closing the gap might be difficult over time and that pandemic pupil cohorts might suffer long-term effects on their career prospects, such as future earning losses (Psacharopoulos et al., 2021).

The existing literature commonly defines learning loss as the delay in expected learning progress. This learning loss, according to Angrist et al. (2021), comprises forgotten learning (i.e. the deterioration of skills that students gained before school closure) and forgone learning (i.e. what students did not gain as a result of having missed or had less effective tuition). The first studies to put forward hypotheses about possible COVID-19-induced learning loss focused on forgotten learning during regular scheduled school closures, showing that its importance must not be underestimated. However, as is common in most of the literature, the chapters of this volume cannot differentiate between the two components – even though determining the contributions of the two components to overall learning loss could be informative in terms of the long-term impact of learning loss – as pupils can probably catch up on forgotten learning more rapidly than forgone learning.

Learning loss is generally measured by comparing the learning progress of previous cohorts with that of the COVID-19 cohort of children in the same school grade or age cohort. Consequently, at the country level, the causal impact of the pandemic on learning outcomes can be measured only if longitudinal or cross-sectional administrative data are available on student- or school-level educational outcomes shortly before and after the pandemic. Robust studies also rely on trend data going

back several years before the pandemic to enable a differentiation to be made between the learning trends of educational outcomes and the impact of the pandemic.

What do we know about COVID-19-induced learning loss?

Very shortly after the pandemic outbreak, experts raised concerns about the impact of pandemic-related physical school closures on learning outcomes (e.g. Blaskó and Schnepf, 2020). These concerns have subsequently been confirmed by an increasing number of robust national studies exploiting administrative achievement data to compare pre- and post-COVID-19 cohorts' educational outcomes using counterfactual impact analyses (e.g. Maldonado and De Witte, 2020, for Belgium; Schult et al., 2022, for Germany; Contini et al., 2021, for Italy; and Engzell et al., 2021, for the Netherlands).

Clearly, these national studies use different achievement outcomes, varying in their scale. To make results comparable across countries, researchers calculate the so-called *z*-score of the learning loss, which is the difference in educational achievement between the pre-COVID-19 and post-COVID-19 average achievement divided by the standard deviation of the pooled achievement scores. The chapters in this volume also report the learning decline in terms of the standard deviations of the countries' achievement distributions.

Meta-analyses on robust studies examining national learning loss

With the publication of increasing numbers of robust country studies, meta-analyses were conducted by averaging the learning loss identified by national studies expressed in standard deviations. Donnelly and Patrinos (2022) found an average learning loss of 0.13 standard deviations in seven high-income countries, while Patrinos et al. (2022; 35 studies representing 20 high- and low-income countries) found a learning loss of 0.17 standard deviations. Betthäuser et al. (2023; Figure 3 of that publication provides standard deviations by country study) considered 42 studies across 15 countries, including four lower-income countries (Brazil, Colombia, Mexico and South Africa) where the COVID-19 impact on learning outcomes was considerably larger than in Europe. They found an average learning gap of 0.14 standard deviations. König and Frey (2022) came up with an estimate of a 0.18 standard deviation learning gap based on 109 effect sizes estimated in 18 studies while accounting for mode of learning, school type and timing of COVID-19 school closures. Di Pietro (2023) reviewed 39 studies covering 19 countries and estimated an average pandemic-induced learning deficit of 0.19 standard deviations, also highlighting that the learning loss was higher for mathematics/science than for other subjects and that students had not recovered more than 1 year after the pandemic outbreak. Closest to this volume's geographical focus is the study by De Witte and François (2022), who, by examining 15 European countries, found that, while there was considerable variation across countries, the average European learning loss was around 0.11 standard deviations. Consequently, given that students' educational achievement increases by around 0.3

to 0.4 standard deviations per year of schooling (Azevedo et al., 2022; Patrinos et al., 2022), European students lost out on as much as between 28 % and 37 % (i.e. 0.11 / 0.4 or 0.11 / 0.3) of a year's worth of school progress because of physical school closures during the pandemic.

Results across meta-studies are similar, as they focus on mostly identical research studies covering the same countries with just slight variations in the number of studies and the timing of the learning loss estimation considered. These variations between studies can be exploited in the meta-study design. For example, by linking the magnitude of estimated learning deficits and the date of measurement, Betthäuser et al. (2023) showed that, while further learning loss was prevented over time, countries did not manage to reverse learning losses. In addition, learning loss for mathematics was found to be considerably higher than for reading and more difficult to catch up on. It is also widely agreed that countries opting for longer school closures paid the price of higher learning loss (De Witte and François, 2022; Patrinos et al., 2022; the latter estimated that 1 week of additional school closure increased the learning loss by 0.01 standard deviations). That longer school closures resulted in higher learning loss has also been shown by a study examining PIRLS reading outcomes and school closure length for 29 countries (Kennedy and Strietholt, 2023). Furthermore, remote learning appeared to be more effective in later lockdown phases than in spring 2020 (König and Frey, 2022).

Heterogeneous learning loss during the pandemic

While learning improvements in general tend to benefit all pupils in school, past trends have revealed that learning decreases disproportionally affect disadvantaged students (Azevedo et al., 2022). As mentioned in Chapter 1, educational inequalities were already very sizeable before the pandemic. Data from the Programme for International Student Assessment (PISA) show that, on average, across 26 EU Member States (excluding Spain) and in line with the Organisation for Economic Co-operation and Development (OECD) average, as much as 13 % of the variation in reading performance of 15-year-olds in 2018 could be explained by family background (measured with an indicator capturing home possessions, parental education and occupation; see Table 1.1 in Reimers, 2022).

The rationale behind disadvantaged students faring worse during physical school closures lies in the equalising effect of schools, which – even though not providing uniform education opportunities – still offer collective education for all in a similar way (Blaskó et al., 2022). Once schools are closed, families need to support children's education endeavours. However, the socioeconomic background of families has an impact on their provision of learning support for children and home-learning resources, such as internet access, the availability of digital devices, books at home and parental teaching skills.

Owing to different operationalisations of socioeconomic background measures (e.g. by focusing on parental education, occupation or income) and the lack of standardised reporting of the gap between advantaged and disadvantaged students, it is difficult to quantify how much the average European social gradient changed during the

pandemic. Nevertheless, all of the meta-studies cited above agree that disadvantaged students lost out more than advantaged students. For example, focusing on 20 country studies, 15 (12 of which were European) found a greater learning loss among students or schools with lower socioeconomic status, while the remaining five did not find a significant difference (Patrinos et al., 2022). Studies also highlight that those students who were struggling academically prior to COVID-19 lost out more (Betthäuser et al., 2023). Consequently, the already substantial association between student background and learning further increased during the COVID-19 pandemic, which justifies the special focus of this book on disadvantaged students.

Why does this chapter use cross-national achievement survey data?

Given this background, this chapter examines the learning deficit across European countries by utilising data from the cross-national educational achievement survey PIRLS, which is the only survey that provides standardised achievement outcome measures during the pandemic. Unless a researcher comes up with a huge number of daring assumptions, cross-national achievement data cannot be used for measuring the impact of the COVID-19 pandemic on learning loss. The main reason for this is that the time intervals between data collections are too large (e.g. 5 years for PIRLS) to state that a learning deficit found between the most recent two cycles is due to COVID-19-induced physical school closure. Instead, any learning difference between the pre- and post-COVID-19 cohorts could simply reflect previous or new downward learning trends or other kinds of consequences deriving from education policy changes introduced between the two cohorts.

Why then should we use educational achievement surveys in a volume investigating the impact of COVID-19 and education policies on learning outcomes? The rationale is fivefold. First, educational achievement survey data aim to measure achievement in the same way in all countries. This is different from current country studies, which all refer to a country-specific measure of education outcome. The choice of the education measure is likely to have an impact on the result, and this is an important limitation of meta-studies that compare results deriving from single countries – standardisation hides the problem but does not deal with it. Second, all available country studies providing information on pandemic-induced learning loss have one characteristic in common: they collect educational achievement data as administrative data. However, countries collecting educational achievement data might dedicate more attention and effort to improving education outcomes than countries that do not collect these data (and for which national studies are therefore not available). Consequently, national studies might be based on a positive selection of countries. With the PIRLS data used in this chapter, we can focus on 21 European countries that have taken part in both the 2016 and 2021 survey rounds. This reflects a European country sample that is larger than that covered in any meta-study. Third, from a European perspective, the possibility of focusing on a large group of European countries is beneficial. Fourth, the cross-national perspective allows the national profiles of this volume to be considered in the context of the wider European picture of educational achievement and learning loss. Finally, the disadvantage of cross-national achievement surveys of allowing only an estimation of education decline over a longer time span might well be interpreted

as an advantage, as it puts the COVID-19 learning loss into perspective in terms of education trends over time. Nevertheless, how cross-national achievement data, such as those stemming from PIRLS and PISA, inform policy development and monitoring processes in the future remains an open question (Klinger et al., 2022; Volante et al., 2022).

The value added of this chapter is twofold. First, we estimate educational achievement decline in Europe between 2016 and 2021 by exploiting educational achievement measures standardised across European countries and relate it to learning loss induced by COVID-19. Second, we provide insights into the development of educational inequalities and the social gradient. This is possible only because the survey measures family background equally across countries.

Consequently, this chapter does not focus directly on COVID-19-related learning loss but measures learning decline between 2016 and 2021. Only a part of this estimate, the size of which is unobservable, is likely to be due to COVID-19 education policies. In addition, the chapter (as well as the entire volume) focuses on cognitive learning outcomes only, not examining other important learning-related outcomes affected by COVID-19. For example, school dropout considerably increased during COVID-19, especially in low-income countries (Moscoviz and Evans, 2022). Furthermore, children's mental health, which is closely linked to academic performance (Agnafors et al., 2021), declined noticeably during the pandemic (Mazrekaj and De Witte, 2023).

Data

PIRLS, administered by the International Association for the Evaluation of Educational Achievement (IEA), was introduced in 2001 and measures trends in reading comprehension at the fourth-grade level (generally 10-year-old children). Cross-sectional data are collected every 5 years, so that currently PIRLS provides trend data over 20 years (2001, 2006, 2011, 2016 and the most recent, 2021, cycle). Like other educational achievement surveys, PIRLS collects a representative sample of schools at the first stage and then pupils within schools in a second stage. PIRLS measures reading literacy with a battery of questions and collects additional student information including socioeconomic background and attitudes. In addition, in-depth information on pupils' schools, their teachers and their parents is covered. All survey items, such as the measurement of education outcomes and family background, are the same across countries. While the 2021 data include fewer questionnaire items than previous cycles, new items specifically aiming to collect information on students' and schools' challenges encountered during the pandemic were added. While this information will not be exploited for this chapter, which focuses on the country level, it provides interesting material for future research.

The OECD decided not to run PISA during the pandemic in 2021 due to education disruption. PIRLS organisers conducted their 2021 cycle as planned, but it was not without difficulties. While the pilot data collection was timely, this was not the case for the final data collection. Of the 21 European countries that we compare, 16 collected

the assessment data towards the end of students' fourth year of schooling, similar to the 2016 cycle, that is, between February and July 2021 (i.e. Belgium (Flemish and French communities), Bulgaria, Czechia, Denmark, Germany, Spain, France, Italy, the Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia, Finland and Sweden). In Ireland, Latvia, Lithuania and Hungary, assessment data collection was delayed, happening at the beginning of the fifth grade (September to December 2021). English data were collected an entire year later (April to July 2022). Consequently, for five of the countries that we focus on, students' 2021 achievement estimates are likely to be biased upwards, given the later collection of data. Nevertheless, even though data collection faced many disruptions due to the pandemic, PIRLS organisers state that 'most countries met the standards for high-quality data collection' (PIRLS, 2023a).

The PIRLS 2021 cycle incorporates two important design changes compared with previous rounds. First, 13 of the 21 European countries (counting Belgium as one) across which we compare 2016 to 2021 achievement changes altered the data collection mode from the paper-administered tests used in 2016 to digital assessment (Belgium (Flemish Community), Czechia, Denmark, Germany, Spain, Italy, Lithuania, Hungary, Portugal, Slovenia, Slovakia, Finland and Sweden). In those countries, the main country sample (about 4 500 students) received the new digital survey, while about 1 500 students received the booklets as in the PIRLS 2016 paper-and-pencil format. PIRLS organisers do not assume mode effects on trend results given that they state that the bridge samples 'were judged to be the same quality as their digital counterparts' (PIRLS, 2023a). (It is important to note that a similar change from the paper-and-pencil mode to computer assessment was implemented for PISA in 2015, leading to considerable mode effects that, without adjustments, threatened the comparability of results over time (Jerrim et al., 2018).) The remaining eight countries in our study sample plus part of Belgium (i.e. Austria, Belgium (French Community), Bulgaria, England, France, Ireland, Latvia, the Netherlands and Poland) kept the same mode of data collection, paper and pencil, for the 2021 cycle (Davier et al., 2023).

Second, PIRLS employed a 'group adaptive design' in the 2021 cycle, aiming to improve reading assessment within countries by aligning the difficulty of the reading tasks with the students' average achievement in the country. In practice, students based in, on average, better-performing countries received a higher proportion of difficult reading task booklets than students in countries with lower achievement. PIRLS organisers state that 'the group adaptive design in PIRLS 2021 led to a lower item non-response rate and more precise achievement estimates than the non-adaptive design in PIRLS 2016' (PIRLS, 2023a). PIRLS organisers state that there was no impact on PIRLS trends, so results can be compared across all cycles (Davier et al., 2023).

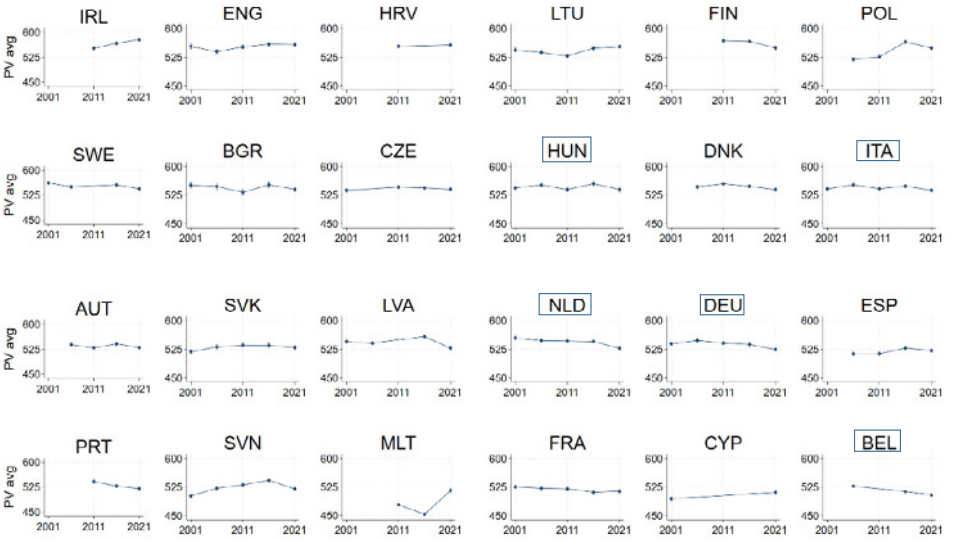
The study focuses on fourth-grade children in primary schools who are around 10 years of age. Younger children require more parental support during online learning and home schooling and are more prone to suffering from a lack of learning resources at home. Most studies therefore show that younger children were more negatively affected by the pandemic than older children (Fuchs-Schündeln et al., 2021; König and Frey, 2022). Consequently, our results cannot be generalised to the entire student population.

Results

Changes in education trends over time

Figure 2.1 provides trends in PIRLS reading achievement data for fourth graders for all European Union Member States covered in the PIRLS 2021 cycle, plus England, across two decades. (Among the 27 Member States of the European Union, Estonia, Greece, Luxembourg and Romania did not participate in the PIRLS 2021 cycle; therefore, our focus is on the remaining 23 Member States, plus England. PIRLS collects data for the Flemish and French communities of Belgium separately. We merged the data into one measure for Belgium, weighting by population size.) Countries are ordered by achievement in 2021.

Figure 2.1: Mean reading achievement (PIRLS score) of fourth graders by year and country



NB: Countries are ordered by their average achievement in 2021 (from high to low). 2001 to 2016 are the years prior to the COVID-19 pandemic, whereas 2021 was during the pandemic. The 95 % confidence intervals of the mean PIRLS reading scores are shown. Means and standard error estimates take plausible values and weights into account. The countries covered in the national profiles in this volume have a box around their three-letter abbreviation. PV denotes plausible values.

Source: PIRLS 2001 to 2021 data, authors' calculations.

The countries covered in this volume have a box around their three-letter abbreviation. The six countries that we focus on in this volume in national profiles are well placed in the overall 2021 reading achievement distribution of European countries: while England had the second-highest average reading performance, Belgium had the lowest performance in the group of countries that we focused on. Italy and Hungary had slightly higher than average reading performance results and Germany and the Netherlands had slightly lower than average results.

Looking at these country trends, would someone who did not know about the pandemic guess that education provision was seriously hampered throughout Europe (and beyond) after 2016? Probably not. We cannot see an uncharacteristic fall in average achievement from 2016 to 2021. While there seems to be a general trend (i.e. achievement decreased in the 2021 cycle), this was not always the case and was often in line with the previous national trends.

Focusing on Finland and Sweden (where, in the latter, schools were not closed during the pandemic), two countries for which counterfactual impact analyses show that the COVID-19 pandemic did not lead to decreases in education outcomes (Lerkkanen et al., 2023, for Finland, and Hallin et al., 2022, for Sweden), we found a considerable decrease in reading performance between 2016 and 2021 (decreases of 17 and 11 PIRLS points for Finland and Sweden, respectively). However, this could be interpreted as simply being in line with trends of already decreasing education outcomes within these countries before 2016. Similarly, in Denmark, Germany, the Netherlands and Portugal, the 2021 education decline is in line with previous trends of education performance decline. Furthermore, in some countries, education performance varied, changing in different directions across PIRLS cycles, and the decline between 2016 and 2021 appears to be in line with these changes (e.g. Bulgaria, Czechia, Spain, France, Italy, Hungary and Austria). Only in Latvia, Poland, to some degree, and Slovenia was the decrease between 2016 and 2021 in education performance completely uncharacteristic of the situation before that period.

We also found that, in two countries, achievement improved between the most recent two cycles, namely in Ireland and Malta. The increase in the latter was as large as 63 PIRLS points. However, given that the changes to the survey design that were introduced between the 2016 and 2021 cycles are likely to have had a particular impact on Malta's results (Malta changed from paper-and-pencil to digital data collection and received more easy task booklets than other European countries), we consider this result too suspicious for further investigation in this chapter.

Figure 2.2 focuses on the reading performance results for the 2016 and 2021 PIRLS cycles for the 21 European countries covered in those two cycles (excluding Croatia and Cyprus, as they were not covered in the PIRLS 2016 cycle, and excluding Malta for the reason explained above). In the figure, the countries covered by national profiles in this volume have bars that are outlined in bold, and the countries are ordered in terms of their performance decrease between 2016 and 2021: Latvia and Slovenia clearly stand out, with the greatest performance decreases. In Ireland, Lithuania and England, achievement increased or there was no significant difference between the two cycles, which could be due to the delayed data collection for the fourth-grade cohort (which is likely to have led to an upward bias in the 2021 results).

For the 21 European countries displayed in Figure 2.2 (i.e. those that took part in both the PIRLS 2006 and 2021 cycles), the performance decline between 2016 and 2021 can also be expressed in standard deviations, by dividing the achievement differences between 2016 and 2021 by the standard deviation in 2016 ([2]) (in line with the

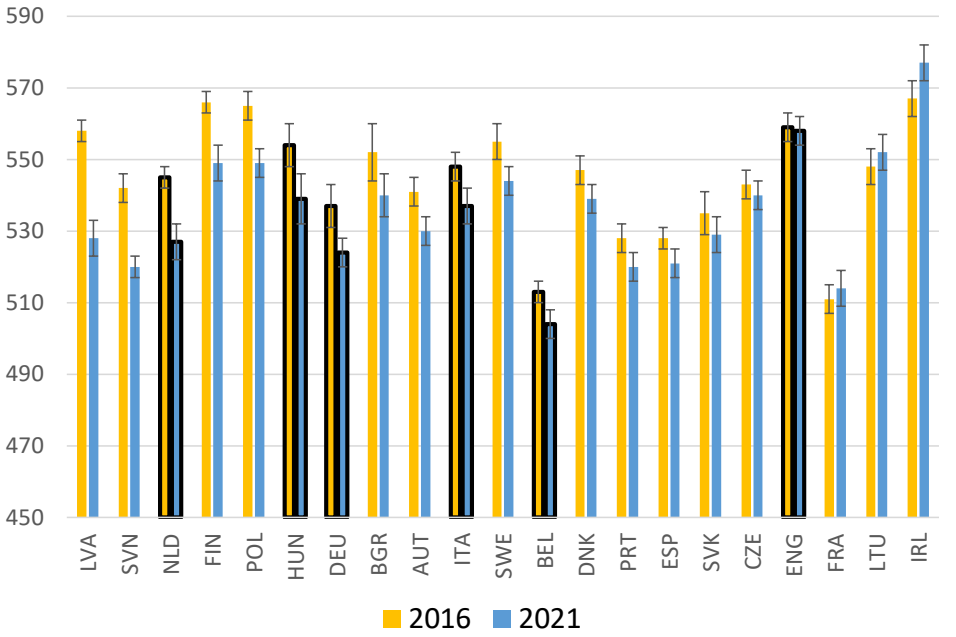
([2]) The choice of which year to use for estimating the standard deviation (i.e. either 2016 only or both 2016 and 2021) did not influence the results reported.

reporting of COVID-19 learning loss, as discussed earlier). On average across all 21 countries, reading performance decreased by 0.068 standard deviations. This indicates that European students lost out on as much as between 17 % and 23 % of 1 year of schooling (i.e. 0.068 / 0.4 or 0.068 / 0.3, based on the typical educational achievement increase of around 0.3 to 0.4 standard deviations per school year; see earlier) during the 5 years of the PIRLS cycle from 2016 to 2021.

This 5-year decline up to 2021 is smaller than the COVID-induced learning loss of 0.11 standard deviations that De Witte and François (2022) found between pre- and post-COVID-19 cohorts across 15 European countries. (We will compare the reading achievement decline between 2016 and 2021 and the learning loss due to COVID-19 at the country level in detail later on.)

The average performance decrease for our six national profile countries was 0.077 standard deviations, compared with 0.065 among the remaining 15 countries. Consequently, the countries focused on in the national profiles of this volume, at least in terms of reading performance decline between 2016 and 2021, fared slightly worse than other European countries.

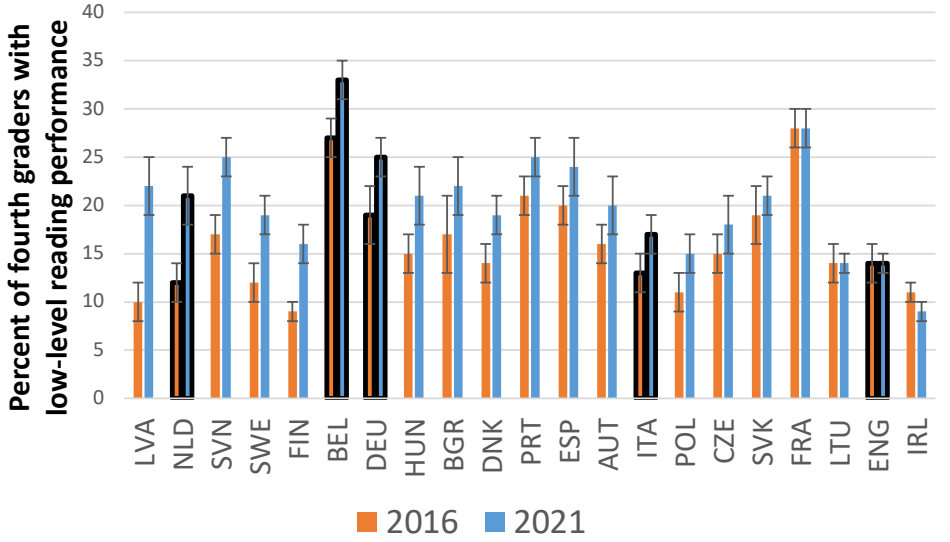
Figure 2.2: Mean reading achievement (PIRLS score) of fourth graders in 2021 and 2016



NB: Countries are ordered by the decrease in mean PIRLS reading achievement score between 2016 and 2021. The countries covered by national profiles in this volume are indicated with a bar outlined in bold. The 95 % confidence intervals of the mean reading scores are shown. Plausible values and weights are taken into account for deriving the estimates.

Source: PIRLS 2016 and 2021 data, authors' calculations.

Figure 2.3: Percentage of children with low-level reading skills by year and country



NB: The bars show the percentage of children scoring below the intermediate international benchmark for 2016 and 2021 (threshold score 475) by country. Countries are ordered by the increase in the percentage of pupils with poor reading outcomes between 2016 and 2021. The countries covered by national profiles in this volume are indicated with a bar outlined in bold. The 95 % confidence intervals of the proportions of low-performing students are shown. Plausible values and weights are taken into account for deriving the estimates.

Source: PIRLS 2016 and 2021 data, authors' calculations.

Up to this point, we have focused on changes in average reading achievement. Education experts are, however, most concerned about pupils falling behind. Figure 2.3 presents the proportion of children scoring below the intermediate international PIRLS reading benchmark (threshold score 475) for 2016 and 2021. When reading literary texts of medium or high difficulty, these students struggle in locating, recognising and reproducing explicitly stated actions, events and feelings, making inferences and interpreting reasons (PIRLS, 2023a). Like in Figure 2.2, countries are ordered based on the change between the most recent two PIRLS cycles, namely the increase in the proportion of children with low-level reading performance.

Looking at Figure 2.3, a researcher who was not aware of the pandemic would probably be puzzled about if something happened between 2016 and 2021. Of the 21 European countries covered, the percentage of low performers increased significantly in all countries except Bulgaria, Slovakia, France, Lithuania, England and Ireland (in the last three countries, data collection for the PIRLS 2021 cycle was delayed compared with the data collection for 2016, which might have led to an upward-biased achievement performance in 2021 relative to 2016). In contrast with average achievement, focusing on low performers captures heterogeneity in learning loss more predominantly, as a greater proportion of low-performing pupils come from disadvantaged families.

In line with the average achievement results, Latvia and Slovenia stand out: their percentage of poor reading performers increased by 12 and 8 percentage points, respectively, between 2016 and 2021. However, in addition, the percentage of low-performing students increased by almost 10 percentage points in the Netherlands. (It is interesting to note that the Netherlands is the only country for which the test was sat at two different time points by students, in spring 2021 and autumn 2021. The percentage of low-performing students was 22 % for the early assessment date and 13 % for the later date, indicating that there might have been a catch-up after COVID-19-related school closures. However, students were not randomly assigned to the assessment dates, so it is not possible to draw strong conclusions. Figure 2.3 reports the average value across both assessment dates for the Netherlands.)

In Finland and Sweden, the percentage of low achievers increased by 7 percentage points. For both countries, robust COVID-19 analyses show no significant impact of the pandemic on learning outcomes. Consequently, it is surprising that the learning declines in Finland and Sweden appear to be as high as the European average, which comprises results from countries experiencing considerable COVID-19-induced learning loss.

Looking at Table 2.1 would give certainty to a researcher who was not aware of the pandemic that progress in education was severely impeded in Europe between 2016 and 2021. Table 2.1 compares significant changes in both PIRLS mean achievement scores and proportions of low reading performers between two consecutive survey cycles since the start of the survey in 2001. Therefore, we indicate whether no significant change, an improvement or a decline in performance or low achievement took place between 2001 and 2006, between 2006 and 2011, between 2011 and 2016 and between 2016 and 2021. We consider only the 21 European countries that took part at least in the 2016 and 2021 cycles (excluding Malta, for the reasons discussed earlier). As a considerable number of countries did not participate in the survey from its beginning (2001), our country coverage is considerably lower for older PIRLS cycle comparisons.

While the number of countries with no significant change between consecutive survey cohorts remained relatively similar across the four comparison assessment periods (first column of Table 2.1), this was far from true for performance improvement (second column) and decline (third column). Regarding performance decline, we found (taking variation in the country coverage into account: fourth column) that average reading performance declines took place in 33 % of countries between 2001 and 2006, in 43 % between 2006 and 2011, in 17 % between 2011 and 2016 and in 71 % between 2016 and 2021. The difference between the periods appears to be similar for students lacking basic reading skills: increases in these students were seen in 17 %, 21 %, 22 % and 71 % of countries, respectively.

Table 2.1: Changes in PIRLS mean achievement scores and share of poor reading performers between two consecutive surveys

	Survey years	Number of countries with no significant change between the consecutive survey cohorts	Number of countries with significant performance improvement / fewer students lacking basic reading skills in the consecutive survey cohorts	Number of countries with significant performance decline / more students lacking basic reading skills in the consecutive survey cohorts	Percentage of countries with performance decline out of the total number of countries covered	Total number of countries covered
PIRLS mean reading achievement	2001 and 2006	3	5	4	33 %	12
	2006 and 2011	4	4	6	43 %	14
	2011 and 2016	5	10	3	17 %	18
	2016 and 2021	5	1	15	71 %	21
Percentage of students lacking basic reading skills	2001 and 2006	6	4	2	17 %	12
	2006 and 2011	7	4	3	21 %	14
	2011 and 2016	5	9	4	22 %	18
	2016 and 2021	6	0	15	71 %	21

NB: Significant changes refer to the 5 % significance level (taking weights and plausible values into account for standard error estimates). For mean achievement differences between two survey years (first four rows), declines and improvements were calculated by estimating the mean PIRLS achievement difference between the previous (e.g. 2016) and its consecutive cohort (e.g. 2021) and counting those countries with a significant difference at the 5 % level. Students lacking basic reading skills are those whose achievement score was below the intermediate benchmark (475 PIRLS points) and who were consequently able to locate, retrieve and reproduce explicitly stated information, actions or ideas only from predominantly easy literary text (in contrast with texts of medium difficulty). For more details, see PIRLS (2023b).

Source: PIRLS 2001, 2006, 2011, 2016 and 2021 data, authors' calculations.

While educational achievement data are not suitable for determining the exact impact of COVID-19 on learning outcomes, as discussed earlier, these results clearly indicate that COVID-19-induced physical school closures and learning impediments are very likely to have been the cause of the unusual overall European decline in learning outcomes between 2016 and 2021.

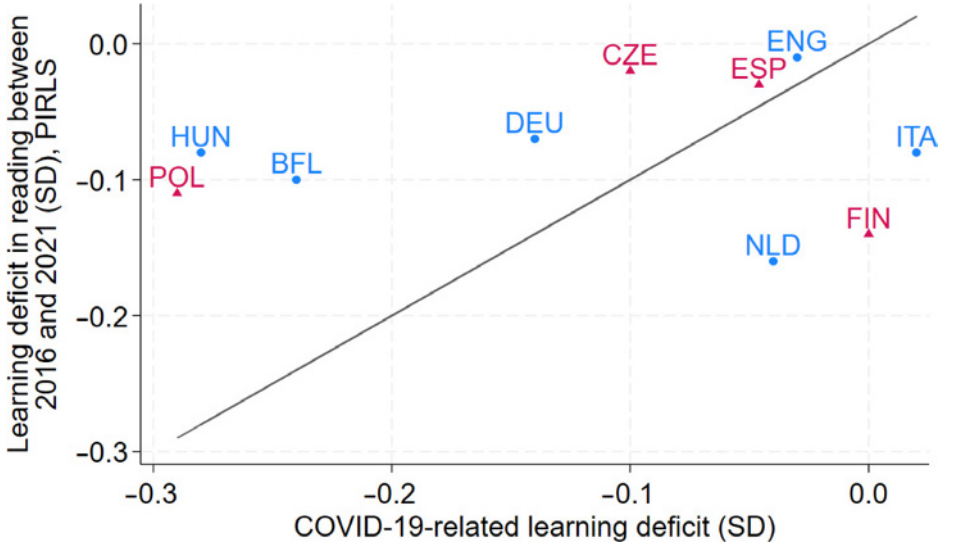
Reading achievement decline between 2016 and 2021 and COVID-19-induced learning loss

Given that reading achievement decline between 2016 and 2021 is likely to have been partly influenced by COVID-19-induced learning loss, Figure 2.4 compares these measures. In this figure, we use the most recent national studies measuring the causal effect of the pandemic on learning outcomes, as summarised by De Witte and François (2022). The comparability of national results with PIRLS results is, however, clearly limited. First, while the national studies measured achievement before and after COVID-19, PIRLS data refer to a 5-year learning decline. Second, while the national studies and PIRLS measure learning loss in 2021, the months of data collection differ. In addition, the Czechia study refers to 2020. Third, while all of the reported results from the national studies focus on language learning (in contrast with mathematics), which is in line with PIRLS's focus on reading literacy, the national measures of learning outcomes differ between countries and from the PIRLS operationalisation of reading achievement. Fourth, it is impossible to match the age group of the national COVID-19 studies to that of the PIRLS target population for all country studies. The note to Figure 2.4 explains important differences between the comparisons. Given these considerable limitations, the results need to be interpreted with caution.

The y-axis of Figure 2.4 gives the standard deviation decline in PIRLS reading achievement between 2016 and 2021 (the average results of this measure are discussed above), while the x-axis presents the estimates of the COVID-19-induced learning losses for 10 European country studies (the references to the studies can be found in the note to Figure 2.4). A negative or positive standard deviation reflects a decline or improvement, respectively, in reading performance. The countries covered by national profiles in this volume are indicated by blue dots in this figure and in the figures that follow in this chapter. The average COVID-19-induced learning loss across the 10 country studies was 0.11 standard deviations (equal to a loss of between 28 % and 38 % of 1 year of schooling). In comparison, there was a smaller learning deficit between 2016 and 2021 of 0.08 standard deviations (equal to a loss of between 20 % and 26 % of a school year).

For England and Spain, the PIRLS and national measures produced similar results in terms of COVID-19-induced learning loss and achievement decline between 2016 and 2021 (both countries' values are close to the diagonal line in Figure 2.4). However, for all other countries, COVID-19-induced learning loss was very different from reading achievement decline between the two most recent PIRLS cycles. Most striking is perhaps the Finnish case, where PIRLS learning decline was about 0.14 standard deviations compared with no COVID-19 impact on language learning (Lerkkanen et al., 2023). This might indicate that educational achievement trends in some countries are much more significant than COVID-19-related learning loss. Conversely, the Hungary and Poland national studies measured a COVID-19 learning loss close to 0.3 standard deviations, while PIRLS found only a slightly elevated learning decline compared with other European countries across 5 years. In summary, the estimates of the 5-year learning decline and COVID-19-induced learning loss are not correlated (correlation coefficient 0.09).

Figure 2.4: Comparison of estimates of COVID-19-induced language learning loss and the learning deficit in reading between 2016 and 2021, by country



NB: The graph shows PIRLS reading decline between 2016 and 2021 on the y-axis and learning loss due to the pandemic on the x-axis. All values are expressed in standard deviations (SD) of the underlying achievement distribution. The correlation between the two values is 0.09 and is not statistically significant at any conventional significance level. COVID-19 country studies for Belgium, Czechia, Germany, Italy and Finland focus on a similar age group to that of PIRLS. The Hungarian data focus on slightly younger students. The Dutch and English data refer to primary school pupils. Data for Spain and Poland focus on children in secondary school (eighth grade and third grade secondary, respectively). For this graph, the Belgium figures refer to the Flemish community only. For more details, see De Witte and François (2022).

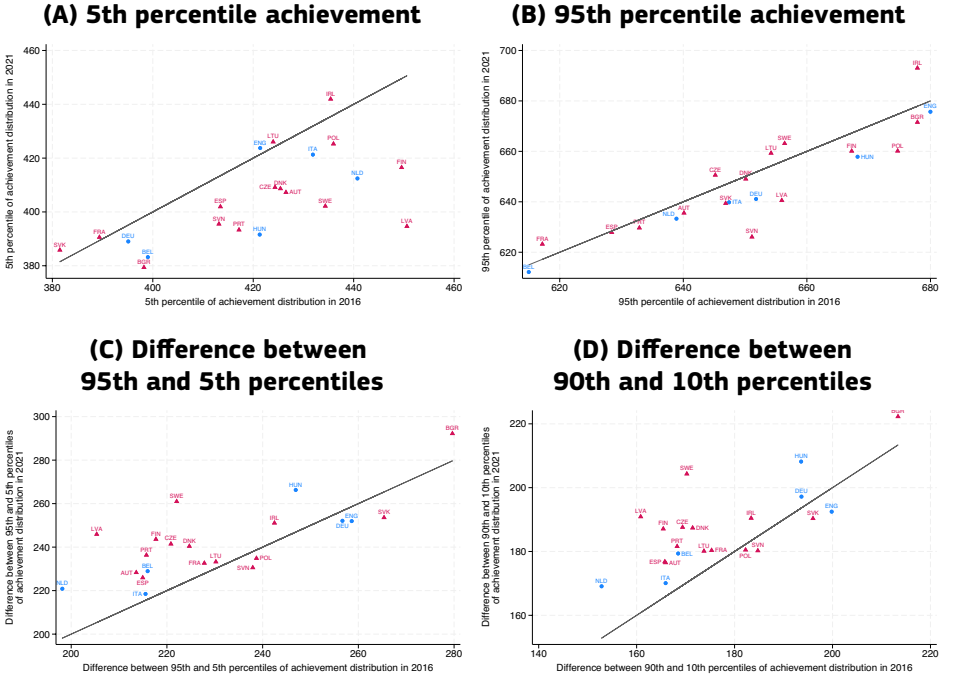
Source: PIRLS 2016 and 2021 data for y-axis values, authors' calculations. For the x-axis, causal estimates of language learning loss due to COVID-19-induced school closures were used, which were derived from the following studies: for Belgium (Flemish Region), Gambi and de Witte (2021); for Czechia, Korbel and Prokop (2021); for England, Education Policy Institute (2021); for Finland, Lerkkanen et al. (2023); for Germany, Ludewig et al. (2022); for Hungary, Molnár and Hermann (2022); for Italy, Borgonovi and Ferrara (2022); for the Netherlands, Haelermans et al. (2022); for Poland, Jakubowski et al. (2022); and for Spain (only the Basque region), Arenas and Gortazar (2022).

Trajectories of educational inequalities in Europe

Up to now, the focus of this chapter has been on the average achievement decline and the proportion of students falling behind in Europe. We found, among other things, that the percentage of low-performing students has considerably increased throughout Europe. Is this due to a shift in the education performance distribution to the left and hence to lower PIRLS performance scores, while the overall distribution curve has remained similar? Alternatively, have recent European education declines happened in line with increases in educational inequalities in Europe?

An appropriate question to ask is whether cross-national achievement scores can actually capture changes in educational inequalities properly. These scores are derived from item response theory (IRT) models (a very accessible description of IRT models is provided by Jacob and Rothstein, 2016). The models impose a distribution of educational achievement that is not immanent in the raw data; thus, whether or not educational achievement scores based on cross-national surveys follow a normal distribution is not independent of how the raw data are modelled with IRT models (Atkinson, 1975; Schnepf et al., 2024). Survey organisers generally do not provide insights into how the choice of IRT models affects educational inequality results, but research shows that it clearly does (Brown et al., 2007).

Figure 2.5: Distributional changes in educational achievement between 2016 and 2021 by country



NB: Plausible values and weights were taken into account for the estimates.

Source: PIRLS 2016 and 2021 data, authors' calculations.

With this note of caution, Figure 2.5 shows the changes in educational inequalities between 2016 and 2021. Figure 2.5A provides the PIRLS reading achievement score at the 5th percentile of the education distribution (i.e. the score below which 5 % of the other students' achievement falls) for 2016 on the x-axis and for 2021 on the y-axis for all countries. The diagonal line indicates where countries would lie if the 5th percentiles were the same for both years. With the exception of England, France, Ireland, Lithuania and Slovakia, low-performing students performed worse in 2021 than in 2016. The 5th percentile value decreased by more than 20 PIRLS points (about a fifth of a standard deviation) in Latvia, Hungary, the Netherlands, Finland and

Sweden. Consequently, in 17 of the 21 countries, we found that low-performing students had lost out further since 2016. This explains a great part of the European average reading performance decline described earlier.

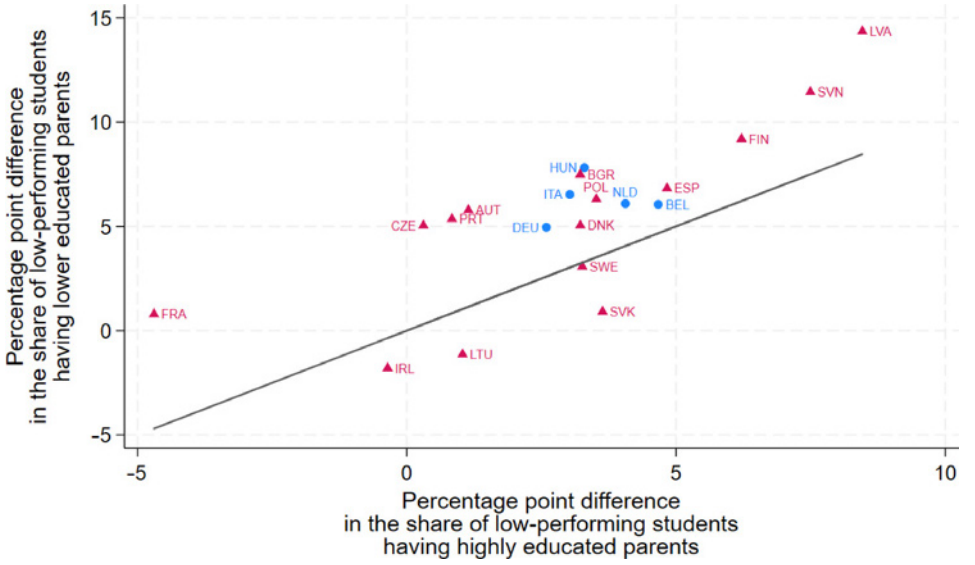
Did high-performing pupils lose out as well? Figure 2.5B compares the 95th percentile PIRLS achievement scores for 2016 (x-axis) with those for 2021 (y-axis). At the top of the educational achievement distribution, most countries are placed close to the diagonal line, indicating that top performance did not change greatly across the 5 years. Nevertheless, in 10 of the 21 European countries examined, the 95th percentile value declined significantly (Bulgaria, Germany, Italy, Latvia, Hungary, the Netherlands, Poland, Slovenia, Slovakia and Finland).

Given the pattern of top achievers performing slightly worse but low achievers experiencing considerably lower education outcomes, educational inequalities undoubtedly increased over the 5 years in question. This is shown in Figure 2.5C, which displays the difference between the 95th and 5th percentiles of the PIRLS achievement distribution for both years. On average, across all countries, the difference between the 95th and 5th percentiles was 231 in 2016 and increased to 242 in 2021. In Bulgaria, Hungary and Sweden, the last of which is generally renowned for high equality values, educational inequalities were highest (above 260 PIRLS points), while they were lowest for Italy and the Netherlands (around 200) in 2021. To double-check that our results on increasing educational inequalities do not derive only from the choice of the percentile threshold, Figure 2.5D measures educational inequalities with achievement scores between the 90th and 10th percentiles. The general pattern of rising education inequalities across Europe is confirmed.

Socioeconomic disadvantage and performance decline

As discussed above, the literature indicates that the pandemic disproportionately affected students from lower socioeconomic backgrounds (e.g. Betthäuser et al., 2023). Figure 2.6 shows that this is also true of the PIRLS reading achievement decline between 2016 and 2021.

Figure 2.6: Difference between 2016 and 2021 in the percentage of students below the PIRLS intermediate international benchmark by parental education



NB: Students with highly educated parents are those who have at least one tertiary-educated parent, while students with lower educated parents do not have a parent who completed tertiary education. Pupils who did not provide information on parental education were excluded.

Source: PIRLS 2016 and 2021, authors' calculations.

Figure 2.6 displays the difference in the percentage of low-performing students between 2021 and 2016 with at least one parent having completed tertiary education (x-axis) and without a tertiary-educated parent (y-axis) for all of the countries covered in this chapter, excluding England, for which the information on parental education was not available. A positive or negative number shows that the percentage of low-performing children increased or decreased, respectively. The diagonal line indicates where the country would lie if the percentage of low-performing pupils had equally increased or decreased independent of parental educational background.

Research suggests that pupils can accurately report their parents' education level (Jerrim and Micklewright, 2014). Nevertheless, there was a problem of non-response to the question on parental education that was heterogeneous across countries, ranging from 3 % in Bulgaria and Poland to 47 % in the Netherlands in 2016 and from 4 % in Bulgaria to 54 % in the Netherlands in 2021. Research also shows that student non-response to parental background is not random. Instead, students from lower socioeconomic backgrounds tend to refuse to answer more often than those from higher socioeconomic backgrounds. Indeed, we found that the percentage of low-performing students was significantly (at the 5 % level) higher in the non-responding sample than in the sample of students with lower educated parents in 12 (out of 20) countries in 2016 and in 10 countries in 2021. In none of the countries did the non-responding sample perform better than the responding sample of pupils with lower parental education.

Figure 2.6 includes only those students who responded to the parental education question. Consequently, there is – besides the normal sampling error – a considerable unobservable non-response error around the estimates presented. Given that lower socioeconomic background students are more likely to decline to respond and are performing worse, we assume that we are actually underestimating the gap in achievement decline between students with and without tertiary-educated parents.

Nevertheless, the percentage of low-performing students increased less in the cohort of disadvantaged students than in that of the advantaged students in only three of the 20 countries (Ireland, Lithuania and Slovakia). In Sweden, socioeconomic background does not play a role. In the other 16 countries, the disadvantaged students were much more likely to drop into the low performance category between 2016 and 2021 than their advantaged peers. The largest gap was in Latvia, where there was an increase between 2016 and 2021 of 9 percentage points of advantaged students sliding into low performance, whereas this increase was of 14 percentage points for disadvantaged students.

Has the social gradient of PIRLS reading achievement changed between 2016 and 2021? To explore this question, we use a pupil-level ordinary least squares regression, pooling data on all 20 countries with the dependent variable 'PIRLS reading achievement' and the only explanatory variable being a binary variable indicating parental higher education. We ran the regression for 2016 and 2021 separately using the sample for the same 20 countries and including country fixed effects. In 2016, children with more highly educated parents had achievement levels that were approximately 41 PIRLS points higher than children with less educated parents. This increased to 44 points for the 2021 cohort. Consequently, the importance of parental education increased by 3 PIRLS points, an increase that is significant at the 10 % level and reflects a 5 % increase. (Regression results can be obtained from the authors.)

Conclusions

This second introductory chapter uses PIRLS data to investigate the educational achievement decline of fourth graders across 21 European countries over the last 20 years and especially between 2016 and 2021. Learning decline estimated between 2016 and 2021 is composed of not only learning loss due to COVID-19 but also falling European performance trends and possible impacts of education policy changes. The assessment of the trends in educational outcomes shows that the COVID-19 pandemic occurred during a time when educational achievement (measured by PIRLS reading scores) had already been declining over a longer period in Europe.

Comparing the results of national studies measuring the impact of COVID-19 on learning loss with PIRLS reading achievement decline for 10 European countries shows no correlation. For example, recent COVID-19 counterfactual impact studies show that COVID-19 did not lead to decreasing achievement in Finland or Sweden, a result that was significantly more positive than that in any other European country. However, PIRLS results indicate that both countries faced a concerning learning decline over the

5 years between 2016 and 2021. This indicates that, while COVID-19-induced learning loss is of importance, its significance might be meaningfully interpreted only in the context of longer periods of learning trends. In other words, education policymakers should not be relieved by studies showing a low impact of COVID-19 on learning outcomes if, overall, pupils' education outcomes have declined over a much longer time span. On the other hand, a very concerning learning decline due to COVID-19 needs to be compared with the country's trends of learning outcomes over time.

In most countries, the percentage of low performers increased substantially between 2016 and 2021. This increase was most pronounced in two countries for which national studies on the impact of COVID-19 on learning outcomes do not exist because administrative education outcome data were lacking, namely Latvia and Slovenia (with increases of 12 and 8 percentage points, respectively, in the numbers of students moving into the group of low performers). This evidence is surprising, as both countries have had stable or improving educational outcomes over recent decades.

Even though the extent of the COVID-19 impact on learning loss is not quantifiable with PIRLS data, the COVID-19-induced physical school closures are likely to have augmented the European achievement decline found between 2016 and 2021. The average percentages of countries having faced a decline in reading achievement and an increase in poor performers are 20 % and 30 %, respectively, between adjacent survey cycles until 2016. However, as many as 70 % of European countries have seen performance declines among 10-year-olds between 2016 and 2021. This result justifies the reference to the 'European education performance decline' in the title of this chapter.

Although, across half of the countries examined, top performers' achievement declined significantly, the European learning decline is mainly an effect of low performers falling considerably further behind. Consequently, in most European countries in 2021, educational outcomes were much more unequal than they were in 2016. This is related to the finding that the social gradient slightly increased between 2016 and 2021, making parental background a more significant determinant of education outcomes.

In summary, the comparison of the reading performance of fourth graders between 2016 and 2021 does not present a particularly encouraging picture. With the exception of Ireland, Europe's current cohorts of young children seem to have worse chances of learning and acquiring reading literacy skills than those in previous cohorts.

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Part II:

National profiles

CHAPTER 3

The pandemic, socioeconomic disadvantage and learning outcomes in England

Jake Anders

Abstract

This chapter sets out the extent of disruption resulting from the COVID-19 pandemic on young people's education and examines the impact of this disruption on learning losses in England and the effectiveness of national policy interventions aiming to mitigate this. English schools were closed to most pupils for around 16 weeks at two main time points, but significantly more disruption was caused by individual school closures and within-school group stay-at-home directions both as a direct result of COVID-19 cases and because of resulting staff absence issues. Analysis by the Education Policy Institute suggests that English primary school pupils experienced learning losses, resulting from the school disruptions and closures, of around 2 months in reading and almost 4 months in mathematics. The catch-up has been encouraging, but stubborn gaps in mathematics attainment appear to persist at both the primary and secondary levels. Moreover, further analyses of these estimates suggest that those from disadvantaged backgrounds, in more disadvantaged areas and in schools with more disadvantaged intakes have fared worse, resulting in increases in educational inequality compared with before the onset of the pandemic. This chapter examines these findings and considers the education policy response to the disruption caused by the pandemic, principally through the government's policy initiatives packaged under the banner of the national tutoring programme.

Introduction

This chapter examines both the impact of disruption resulting from the COVID-19 pandemic on learning losses in England and the effectiveness of the national policy response aiming to mitigate this. The COVID-19 pandemic and the restrictions that followed dramatically changed the experience of schooling for young people in England. A national suspension of in-person schooling began in March 2020 and was intermittent until March 2021, covering two school years, with continuing disruption beyond that point. The speed and scale of these changes put immense pressure on schools, teachers, pupils and parents, with parents becoming the main facilitators of learning during the initial school closure periods, particularly for younger children.

English schools were closed to most pupils for around 16 weeks at two main time points. The first of these, which we will refer to throughout the chapter as lockdown 1, was the immediate policy response to the first period of rapid spread of COVID-19 in spring 2020. In-person schooling was suspended on 20 March 2020 for all but 'children who are vulnerable, and children whose parents are critical to the Covid-19 response and cannot be safely cared for at home' (DfE, 2020). The second national lockdown ran from 5 November to 2 December 2020, but attending school during that time was a specific exception to requirements to stay at home. This was widely referred to as lockdown 2.

Despite frequent reassurances to the contrary, a third national lockdown that did restrict in-person attendance at school was announced on 4 January 2021, with in-person schooling suspended from 5 January (a significant number of schools opened on 4 January for a single day) until 5 March 2021. There were a larger number of exceptions to these restrictions than was the case in lockdown 1, allowing some pupils to attend in person, including those 'who may have difficulty engaging with remote education at home' (DfE, 2021a). This was referred to as lockdown 3.

However, these national periods of restrictions do not capture the full extent of the disruption to schooling that was experienced across this period. There was further disruption due to individual school closures and within-school group stay-at-home directions (often referred to as 'bubble closures'), both directly due to COVID-19 cases and because of resulting staff absence issues. These restrictions posed even more of a concern than those of lockdown 1 in terms of inequalities in learning loss (Anders et al., 2022a), given the correlation between socioeconomic status and the extent of further disruption: 21 % of young people whose parents had a routine/manual occupational status missed more than 20 days of school (on top of national closures), compared with 17 % of those whose parents had higher managerial / professional backgrounds (Montacute et al., 2022).

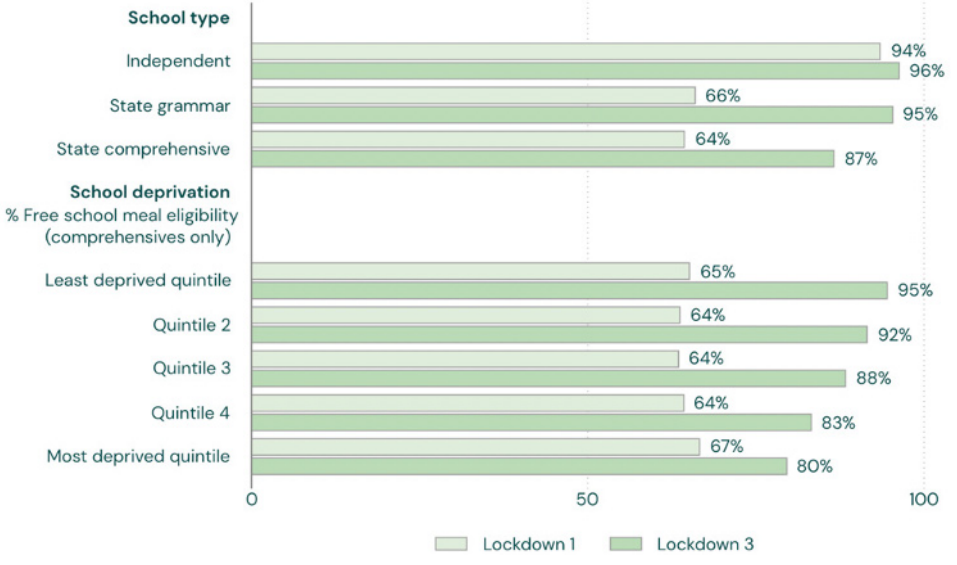
Unequal disruption to learning

From the early days of the pandemic, the effects of the public health measures described above had unequal impacts on young people's educations, depending on their socioeconomic status. To document the immediate and longer-term implications of these unequal impacts, the COVID Social Mobility and Opportunities study (Anders et al., 2022b) was established to track the experiences of a representative sample of young people across England. We draw on findings from this cohort extensively in this chapter.

When people think of education during the pandemic, many people's minds go to online classes conducted over videoconferencing software, such as Zoom or Microsoft Teams. However, only two thirds of young people in publicly funded (state) schools reported receiving live online lessons like this during England's lockdown 1 (Cullinane et al., 2022), which was substantially lower than the proportion in private schools (94 %). England's private schools educate fewer than 10 % of pupils, are highly socially selective and are particularly well resourced, by international standards (Henseke et al., 2021).

The gap in live online learning between state and private schools narrowed substantially between lockdowns 1 and 3, not least because the figure could not increase much for pupils in private schools, rising to 95 % in academically selective state grammar schools and 87 % in state comprehensive schools. However, more of a gap opened within the state sector, with 80 % of those in the most deprived state comprehensive schools receiving live online lessons compared with 95 % of those in the least deprived quintile group (Figure 3.1).

Figure 3.1: Provision of live online lessons by school characteristics, lockdowns 1 and 3



Source: COVID Social Mobility and Opportunities study (Cullinane et al., 2022).

In addition, young people faced different barriers to learning at home depending on their family background. Young people from working-class backgrounds were substantially more likely to lack a quiet space to work, to have to share the electronic device they used for schoolwork or to have to use a mobile device for this work (Cullinane et al., 2022). Most likely as a result, at least in part, of these differences in experiences and environment, pupils in private schools reported spending over 20 hours per week on schoolwork during the first lockdown, which was substantially more than the 16.5 hours reported by those attending state grammar schools and the 13 hours reported by those in state comprehensive schools (Cullinane et al., 2022).

Furthermore, there was substantial variation in school attendance during the 2020/2021 academic year beyond national closures (Montacute et al., 2022). Much of this was due to closures of individual schools or stay-at-home directions for 'bubbles' within schools caused by COVID-19 outbreaks and staff absence. Across the academic year, 18 % of young people reported missing more than 4 weeks of school, 24 % reported missing between 2 and 4 weeks and 31 % reported missing between 1 and 2 weeks. This varied by school and pupil characteristics: a fifth of pupils at schools with the most disadvantaged intakes missed more than 4 weeks, while under a sixth of those at schools with the least disadvantaged intakes reported the same.

Quantifying learning loss

Despite a strong portfolio of education administrative data, there have been challenges in exploring learning loss through administrative data in England for significant periods of the COVID-19 pandemic (Leahy et al., 2021). The usual tests and examinations that feed into the United Kingdom's National Pupil Database were cancelled as part of the government's pandemic response.

National curriculum tests at age 11 (end of primary school) were cancelled without replacement (the accountability measures that are reliant on these were also suspended for the duration of the pandemic), while examinations at ages 16 (end of secondary education) and 18 (end of further education) were replaced with teacher-assessed grades. Teacher-assessed grades are not comparable with grades based on examinations before the pandemic: the distribution of grades was much higher than in pre-pandemic years (this was widely referred to as 'grade inflation', although it is also likely that teachers were taking a longer-term view of pupils' abilities and, so, assessing something different from examinations). This was supplemented by concerns about the implications of teacher assessment for inequalities between pupils based on their gender, ethnicity and socioeconomic background (Doyle et al., 2023; Wyness et al., 2022).

Despite this paucity of administrative data, other attempts have been made to provide timely research into the implications of COVID-19 disruption in terms of lost learning in England. These have applied counterfactual impact analysis methods (albeit mainly what are fundamentally before–after designs) to sample-based sources of data. It is

these analyses that this chapter focuses on, while noting the potential limitations of the samples used.

Learning in primary schools

Research commissioned by England's Department for Education and carried out by the Education Policy Institute uses data from Renaissance Learning's online Star Reading and Star Maths tests, which are widely used by schools in England ([3]) for formative and diagnostic purposes for their pupils. Aided by the computer-administered nature of these tests, they continued to be used throughout the pandemic. As a result, these tests provide snapshots of potential learning loss at a range of time points throughout the pandemic and of how this learning loss differed between groups.

In interpreting these analyses, it is important to be mindful of the extent to which the sample of schools using Renaissance Learning tests (and, hence, that are able to be used in this analysis) is representative of the wider population of schools. Over 3 000 primary schools use Renaissance Learning tests according to the reports. This represents more than a sixth of the 16 791 primary schools that existed in the 2020/2021 academic year, according to the official statistics (DfE, 2021b). For a sample, this is impressive coverage, but it is highly unlikely to be random. One might, for example, hypothesise that more proactive and, perhaps, effective schools are more likely to use these kinds of tests, which could bias our findings. Furthermore, it is unclear whether data from all of these schools are used in these COVID-19 analyses, as, while pupil numbers are included in the reporting, school numbers are not ([4]). Nevertheless, the observable characteristics of pupils used in the analyses are broadly similar to those of the comparable population, albeit with some differences in terms of ethnicity and prior attainment measures (RL and EPI, 2021b, pp. 16–20).

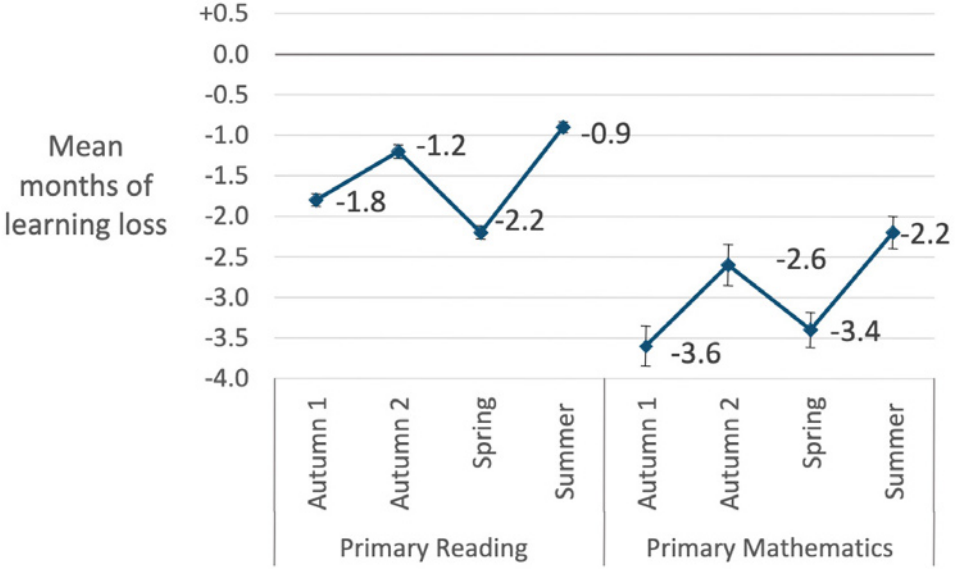
These analyses (RL and EPI, 2021a, b, c, d, e, 2022) 'estimate what a pupil would have achieved in 2020/21 had they followed the same pattern of progress – based on their prior attainment and characteristics – as similar pupils in 2019/20' (RL and EPI, 2021b, pp. 8–9). Thus, they can be thought of as employing a design similar to a difference-in-differences design, in which similar (based on gender, eligibility for free school meals, whether English is an additional language, special educational needs and region) pupils' progress in the Renaissance Learning assessments prior to the onset of the pandemic provides the counterfactual.

The studies estimate that primary school pupils had lost 1.8 months (0.09 standard deviations) of reading skills and 3.6 months (0.21 standard deviations) of mathematics learning (Figure 3.2), while secondary school pupils had lost 1.7 months (0.05 standard deviations) of reading skills early in the autumn term of the 2020/2021 academic year (i.e. after the disruption of lockdown 1).

([3]) The tests are used in over 3 000 primary schools (RL and EPI, 2021a, p. 12).

([4]) Indeed, small sample sizes are cited as a reason for not producing secondary school mathematics estimates, which, along with the availability of National Reference Test data for secondary schools, is the reason for the focus on these reports' primary school findings.

Figure 3.2: Estimated primary school learning loss and catch-up across the 2020/2021 academic year



NB: Autumn 1 and 2 time points refer to 2020; spring and summer time points refer to 2021. Estimates of learning loss are relative to the study's estimate of what a pupil would have achieved in 2020/2021 had they followed the same pattern of progress – based on their prior attainment and characteristics – as similar pupils in 2019/2020.

Source: EPI and RL (2021e, p. 39).

By the end of the same term, during which in-person schooling had largely resumed (notwithstanding further disruption including the national lockdown 2 restrictions, which did not include a suspension of in-person schooling), there was evidence of catch-up. Primary school pupils at that point were estimated to have lost, on average, around 1.2 months of learning in reading, implying that they had managed to catch up on just over half a month's worth of learning compared with their position at the start of the academic year. The picture was similar in mathematics, but with a faster catch-up of around a month – albeit from a lower starting point – resulting in learning loss of approximately 2.6 months in mathematics by that point.

These gains were wiped out during the 2021 spring term, most likely by the lockdown 3 restrictions of early 2021, taking learning losses back to 2.2 months in reading (lower than the measure early in the 2020 autumn term) and 3.4 months in mathematics (almost the same magnitude as early in the autumn term of 2020). The larger losses during this period than in lockdown 1 have been attributed in other contexts to 'pandemic fatigue' (Lewis et al., 2021), that is, less energy for home learning than could be mustered at the outset. Thankfully, this was the final national suspension of in-person schooling, and the subsequent catch-up by the summer term of 2021 was encouraging, with the estimated losses narrowing to 0.9 months (0.03 standard deviations) in reading and 2.8 months (0.20 standard deviations) in mathematics.

These results paint a more worrying picture for mathematics, which has also been noted in other contexts (Blanden et al., 2023, p. 470). This is consistent with the wider literature on the variation in the importance of school effects across subjects (Ma and Klinger, 2000; Willms, 2000), plausible reasons for which could include parents' greater knowledge, enthusiasm or ability to engage in reading activities with their children than to engage in mathematics, including due to their own anxieties in this subject (Outhwaite, 2020).

Importantly, these studies also explored differences in learning loss and catch-up based on pupils' characteristics. Larger learning loss and slower catch-up was found for pupils from disadvantaged backgrounds than for their more advantaged peers. As a result, the authors concluded that '[t]he pandemic has exacerbated a situation in which pupils from disadvantaged backgrounds achieve lower progress and lower outcomes than their peers' (RL and EPI, 2021e, p. 11). The importance of location is also highlighted. This manifests in terms of both area-level deprivation, with non-disadvantaged pupils in deprived areas experiencing similar learning loss to disadvantaged pupils in areas of low deprivation, and regional disparities, with pupils in the North East and Yorkshire and the Humber regions of England experiencing up to twice the learning loss of those in the South West and London (RL and EPI, 2021e, p. 12).

Weidmann et al. (2022) also explored the issue of learning loss in primary schools, but focused on changes in the gap between disadvantaged students and the rest of the cohort. Like the work described above, this used a convenience sample of schools using a particular set of standardised tests (in this case, tests provided by the educational assessment company Rising Stars), again with encouraging representation of the characteristics of primary schools more broadly. They found no evidence of a widening in the disadvantage gap for reading, but an 11 % widening of the mathematics disadvantage gap, estimated to be equivalent to a widening of 1 month's progress (or 0.048 standard deviations).

Finally, we can look at population administrative data for primary school learning using the national curriculum assessments at the end of key stage 2 that are taken by most age-11 pupils across England. These data reinforce the message that performance has remained largely flat in reading (a small improvement of 0.04 standard deviations) and declined in mathematics (this time equivalent to around 2 months' progress; 0.15 standard deviations), but also highlight that performance has declined in writing (around 3 months' progress; 0.20 standard deviations) (Thomson, 2022a). Furthermore, the analysis of these figures again indicates that the gap in mathematics performance between the most disadvantaged pupils and the rest of the cohort has widened by the equivalent of a month's progress (0.10 standard deviations) (Thomson, 2022b).

Secondary school learning

Every year, the UK Department for Education commissions the National Reference Test, a sampling test used to inform the setting of grade boundaries for national examinations at age 16. Despite the disruption of the pandemic, this was able to run every academic year throughout the period. The 2020 test was carried out in February

2020, shortly before restrictions began. The 2021 test was delayed by a few months, being carried out in April–May 2021, but otherwise the design was as usual (Benson et al., 2022).

That said, there was a greater issue of non-compliance by schools in the 2021 test than usual, which was most likely due to the continuing pressures of the pandemic on their workloads. The official report concludes that 'although the 2021 achieved sample is smaller than in previous years, there is no evidence of change of bias in terms of the stratifying variable' (Burge and Benson, 2021). Nevertheless, one might be concerned that this would lead to schools that had faced more disruption being under-represented, potentially biasing average scores upwards if this correlated with learning loss. In addition, it is important to be mindful of the difference in the timing of the test caused by the delay in administration in 2021. It is plausible that this would increase the available time for pupil learning (and catch-up), again suggesting a potential for upward bias in the scores.

Strikingly – especially given that the likely sources of bias would seem to suggest that performance in 2021 could be inflated – there is evidence of a statistically significant reduction in mathematics performance. This was seen as a reduction in the proportion of pupils reaching the thresholds of the three grades examined, namely a reduction of between 3.0 and 5.2 percentage points (Burge and Benson, 2021, p. 18). By contrast, in English, there is no evidence of a statistically significant change in performance compared with just before the onset of the pandemic. These results are, therefore, rather consistent with the picture for primary schools painted by the analyses discussed earlier: learning loss in mathematics being a continuing issue.

Further analysis of this change in performance in mathematics (Benson et al., 2022) finds evidence of a widening in the attainment gap associated with a school's composition in terms of disadvantaged students – but not associated with individual-level advantage. Using regression analysis, individuals in schools that had a proportion of disadvantaged students that was 10 percentage points higher than the average were around three quarters as likely to achieve a higher grade in 2021 as they were in 2020 (other factors held equal), pointing to a considerable increased disadvantage in these schools. This shows parallels with the findings for primary schools, highlighting the importance of differing schooling experiences during the COVID-19 period (in the way highlighted earlier with the findings from Montacute et al., 2022).

Education policy response

In response to the disruption of the COVID-19 pandemic, in June 2020, the UK government announced a package of GBP 1 billion ([5]) to support education catch-up. Of this package, GBP 650 million was to fund a one-off 'catch-up premium' provided to schools across the 2020/2021 academic year, while GBP 350 million was under the

([5]) This equates to approximately USD 1.25 billion in May 2023.

banner of a national tutoring programme (NTP), which will be further discussed below. Further tranches of targeted funding were announced in February, June and October 2021. By February 2022, a cumulative GBP 4.9 billion ([6]) had been announced for catch-up initiatives (Table 3.1).

Table 3.1: Catch-up funding in England (as of 14 February 2022)

Use of funding	Amount of funding (GBP)
June 2020	**1.0 billion**
A universal catch-up premium, allocated on a per-pupil basis	650 million
The NTP, including: a schools' programme for 5- to 16-year-olds a ring-fenced tuition fund for 16- to 19-year-olds an oral language intervention programme for reception-aged children	350 million
February 2021	**0.7 billion**
A one-off recovery premium, building on the pupil premium	302 million
Expanding the NTP for children aged 5–16	83 million
Extending the tuition fund for 16- to 19-year-olds	102 million
Supporting language development in the early years	18 million
Delivering face-to-face summer schools in secondary schools	200 million
June 2021	**1.4 billion**
Expanding the NTP and the tuition fund for 16- to 19-year-olds	1 billion
Professional development for early-years practitioners (also used to give some year-13 students the chance to repeat their final year)	153 million
Expanding teacher training and development (also used to give some year-13 students the chance to repeat their final year)	253 million
October 2021	**1.8 billion**
A recovery premium covering the next two academic years, building on the recovery premium announced in February 2021	1 billion
An additional 40 hours of education across the academic year for all 16- to 19-year-old students	800 million
Total	**4.9 billion**

Source: House of Commons Education Committee (2022).

There has been significant criticism of the extent of this response bearing in mind the scale of the challenges of learning loss (House of Commons Education Committee, 2022). This included the resignation of the government's own Education Recovery Commissioner in June 2021, when an additional GBP 1.4 billion was announced, while the commissioner was reported to have been arguing for plans worth in the region of GBP 15 billion (Coughlin and Sellgren, 2021), and the Education Policy Institute

([6]) This equates to approximately USD 6.1 billion in May 2023.

(Crenna-Jennings et al., 2021) was arguing that the scale of the challenge required investment of around GBP 13.5 billion.

At the same time, Sibieta (2021) estimated that England's catch-up spending plans were worth around GBP 310 per pupil, comparing rather unfavourably with the per-pupil catch-up funding in the United States of GBP 1 830 and in the Netherlands of GBP 2 090. After these estimates were published, an increase in the amount invested was announced, namely a further GBP 1.8 billion (on top of the GBP 4.9 billion already announced), but this still fell a long way short of both the estimates of need and international comparisons.

Just as important as the scale of the funding is the need to consider how the funds were spent, to which we now turn.

Provision of devices for remote learning

As noted above, the switch to remote learning during the pandemic was experienced quite differently by pupils depending on their home learning environment. While some aspects of this cannot be easily addressed, the availability of suitable electronic devices (tablets and laptops) to join online lessons is more amenable (Outhwaite, 2020). This was something that the government sought to address, albeit, given the extent of the challenge, it took time for this to happen in practice (NAO, 2021). Devices started to be provided at scale in June 2020, meaning that the vast majority of pupils in need had been without devices throughout most of lockdown 1. The distribution of devices was also focused on children with a social worker, care leavers and disadvantaged children who would be completing secondary school in the following academic year (2020/2021); while these groups are undoubtedly in particular need, this did leave significant demand unmet.

Further devices were provided during the 2020/2021 academic year and, ultimately, the programme was larger than in 19 other European countries with which it was compared (NAO, 2021, p. 31). There were significant declines between lockdowns 1 and 3 in the proportion of pupils who reported having to share a device or use a mobile device to carry out their schoolwork (Cullinane et al., 2022, Figure 18), although not all of these declines are attributable to this scheme.

Additional funding to schools

The catch-up premium provided a universal GBP 80 per pupil (with a substantial enhancement for schools serving those with special educational needs). It was up to schools to decide how best to spend this funding to best support their pupils' catch-up, although the government strongly encouraged them to use it on tutoring (particularly through the subsidised NTP, which is further discussed below).

For the subsequent academic years (2021/2022, 2022/2023 and 2023/2024), a more targeted recovery premium was made available based on the number of pupils that a school has whose parents have low incomes or who are looked after by the state. In the 2023/2024 academic year this was worth GBP 145 per eligible child per year for

primary schools and GBP 276 per eligible child per year for secondary schools. By contrast with the catch-up premium, recovery premium funding may not be used to fund spending on NTP provision.

Accountability for this funding is not especially strong. There are conditions attached, including that schools must publish statements on their website about how they are using this catch-up funding. Schools may also be asked to account for their plans by the schools' inspectorate, Ofsted. This still leaves schools with a great deal of flexibility over their approach, which has significant advantages, but does pose challenges for evaluating the funding's effectiveness.

National tutoring programme

The flagship policy at the heart of the government's education catch-up plans is the NTP. The exact scope of what is considered part of the NTP is somewhat ambiguous, with the announcement (DfE, 2021c) describing it as including a schools programme for 5- to 16-year-olds (initially incorporating two pillars – tuition partners and academic mentors – with an additional school-led tutoring pillar added in the 2022/2023 academic year), a tuition fund for 16- to 19-year-olds and an oral language intervention programme for reception-aged children. The term NTP is generally subsequently applied in this section to only the first of these, but the other elements are also important to discuss and will be dealt with below.

- **NTP tuition partners.** This pillar was established to ensure the quality and arrange the provision of one-to-one and small-group tuition from private and third-sector providers to schools. It was administered in its first year by the Education Endowment Foundation (EEF), before passing in the second year to the recruitment firm Randstad as part of a competitive tendering programme. Significant criticism of the delivery of the programme under Randstand led to the government exercising a break clause in the contract and instead handing more funding and control directly to schools (see further details below), although with some remaining quality assurance support available from Tribal Education. In its first year, 33 tuition providers were recruited and quality assured by the EEF, so they were available to schools with a 75 % subsidy (schools paid the remaining 25 % using their existing budgets, including the additional catch-up premium funding described above, but excluding the subsequent targeted recovery premium) for 15 hours of one-to-one or small-group tuition, with both online and face-to-face options available. In 2021/2022, the subsidy rate was reduced to 70 %, then to 60 % in 2022/2023 and to 50 % for 2023/2024.
- **NTP academic mentors.** This strand of the NTP allowed schools to employ staff directly to support schools' approaches to education catch-up. It was initially administered by Teach First, before passing to Cognition Education (recruitment and brokering) and the Education Development Trust (training). As with tuition partners, there was a generous initial subsidy for academic mentors employed through this scheme, at 95 % in the 2021/2022 academic year, which was reduced to 60 % in 2022/2023 and 50 % in 2023/2024.

- **NTP school-led tutoring.** Reflecting a perception that the existing offering was insufficiently flexible in serving all schools' needs, an additional pillar of the NTP was introduced towards the end of the 2021/2022 academic year. This pillar supports schools in delivering their own tutoring with funding directly allocated to schools for this purpose. All NTP funding was allocated to schools directly at the point of the introduction of this change (although schools can still use it for tuition partners and academic mentors) based on the number of low-income pupils in the school (GBP 67.50 per low-income pupil in mainstream schools / GBP 176.50 in special needs schools for 2023/2024). As with the academic mentors pillar, training for school-based tutoring staff is provided by the Education Development Trust. Subsidy rates are the same as those for the tuition partners pillar and there are caps on the cost that may be incurred per hour of tutoring provided.

There have been consistent concerns about the scale of uptake of the NTP (further discussed below), even after the changes that introduced the school-led tutoring pillar. Uptake was reported as being higher in the 2022/2023 academic year (uptake by 76 % of schools) than in the 2021/2022 academic year (uptake by two thirds of schools) in the wake of those changes. However, underspending of the NTP's planned budget continued, with the teacher-training institute Tes reporting that '43 % of [the government's] planned NTP budget for 2022–23 had not been spent [and] of the £ 419.5 million allocated to the scheme, £ 178 million had not been spent, and would be used to fund the recently announced teacher pay rise' (Roberts, 2023).

Furthermore, the fairly rapid tapering of the subsidy for NTP provision has been criticised (Staton, 2023), particularly given the government's stated intent for 'tutoring to continue into the long term' (DfE, 2023). The doubling of subsidy rates in 2023/2024 (from 25 % to 50 %) from the initially announced plans may have mitigated this concern, although it leaves an even steeper cliff edge afterwards, assuming there will be no further funding announcements. These concerns are especially significant in the context of the strained financial environment for schools, which, by 2024, will have seen no net growth in spending per pupil over 14 years (Drayton et al., 2022). There are concerns that schools will quickly cease to take advantage of the scheme once they have to find most, or all, of the costs, especially as many still question the prioritisation of tutoring (Moore and Lord, 2023).

Tuition fund for 16- to 19-year-olds

The main pillars of the NTP covered children and young people aged 5–16 across primary and secondary schooling. However, catch-up was also needed for young people aged 16–19, for whom education remains compulsory in England but provision is far more diverse across schools, colleges and other types of institutions. Funding was provided to these institutions based on two proxy measures of disadvantage: one based on attainment and one based on geographical deprivation.

Nuffield early language intervention

Responding to concerns about the oral language skills of children entering schools, caused by the pandemic, an important part of the government's catch-up response was to support a large-scale intervention to address this. Specifically, they provided funding to the Nuffield early language intervention (NELI) scheme (Fricke et al., 2017) at a significant scale across the country.

NELI is a targeted oral language intervention that promotes vocabulary, narrative and listening skills. A screening process is carried out in the first term of the academic year. From this, a target group of pupils (typically three to six pupils per class) who are most in need of support are identified. These pupils then receive support from trained teaching assistants, providing three small-group (30-minute) and two individual (15-minute) sessions each week across the remaining two terms of the academic year.

Analysis of policy responses to COVID-19 learning loss

A significant portion of the policy response to learning losses as a result of the COVID-19 pandemic is not especially amenable to impact evaluation. As a result, there is somewhat limited direct evidence of the effectiveness of the implementation of these programmes in response to the COVID-19 pandemic. In addition, not all of the evaluation work that is being carried out has been completed. Given this situation, this section sets out what evidence there is, signposts the work that is currently in progress and highlights the evidence base upon which policy responses have been grounded and, based on this, the anticipated strengths and weaknesses of the response.

Additional school funding

As noted above, a significant element on the policy response was additional funding provided directly to schools, initially as a universal catch-up premium, which was subsequently replaced by a recovery premium targeted at disadvantaged pupils. This approach was chosen to provide schools with flexibility in how they spend this funding, consistent with a government policy emphasis on school autonomy, albeit with strong guidance towards certain approaches (incentivised with the initial subsidies for the NTP).

It is difficult to isolate the impact of financial interventions such as these, especially in the short term, as impact evaluations of the 'pupil premium' that was introduced from 2011 onwards (i.e. additional funding for schools based on the number of low-income students who attend) are only now starting to emerge (Gorard, 2022; Gorard et al., 2022). Nevertheless, we do know from existing domestic (Nicoletti and Rabe, 2018) and international (Jackson, 2020; Jackson et al., 2016, 2021) evidence that the value of additional funding for schools is likely to be a significant positive in itself for pupils' education. Given the inequalities in learning loss, the shift to more targeted funding means that it is also more likely to reach pupils who need the most support.

Tutoring and the national tutoring programme

The value of high-quality small-group tutoring has been demonstrated in a variety of contexts (EEF, 2023; Fryer, 2017), and using this approach as a centrepiece of the COVID-19 catch-up efforts was widely called for. The roll-out of the first year of the NTP tuition partners programme was subject to an independent evaluation using a school-level matching approach (Lord et al., 2022). As the primary aim of the evaluation was to identify the impact of schools using the tuition partners on the performance of all disadvantaged pupils in the school, the results are slightly difficult to interpret at first glance. The evaluation did not find evidence that schools participating in the NTP tuition partners programme had a positive impact on the performance of all of their disadvantaged pupils (as indicated by eligibility for the pupil premium).

However, a significant reason for this was that a large proportion of disadvantaged (pupil premium) pupils in these schools were not selected for tutoring (only around a fifth in the primary school analysis sample), which is an important finding in itself. The accompanying implementation evaluation found that under half (46 %) of pupils who received tuition as part of the programme were eligible for the pupil premium (Coulter et al., 2022, p. 6). This still means, as we would hope, that disadvantaged pupils were over-represented among those who received NTP tutoring (they make up around 24 % of the population), but not to the extent hoped, missing official targets present in the first 2 years of the programme. Separately, there have been significant concerns about the disparities in NTP uptake across regions, with the programme reaching almost all of its target schools in some regions (South East and South West), while falling far short in others (e.g. 59 % of schools in Yorkshire and the Humber and in the North West) (Cullinane and Montacute, 2023).

For the evaluation, a key implication of the tuition not being focused on pupils eligible for the pupil premium is that any treatment effect of the tuition is diluted by the group of pupil-premium pupils who did not receiving tutoring. This makes this estimate a poor proxy for the question of whether an individual pupil's receipt of tuition from the scheme improved their performance. However, in additional analyses aiming (albeit indirectly) to isolate the impact of the tutoring on actual recipients (one focused on variation in dosage and another focused on the subset of schools with high proportions of disadvantaged pupils taking part), stronger evidence of positive impacts was evident. This is triangulated by similarly encouraging findings from Anders et al. (2023), who used the self-reported receipt of tutoring among a cohort of those in their final year of secondary school.

Nuffield early language intervention

The decision to use COVID-19 catch-up funding to fund a specific oral language intervention for young children reflects strong evidence of the impact of the NELI scheme on short-range language outcomes from existing randomised controlled trials (Fricke et al., 2017; West et al., 2021). In addition, the take-up has been enthusiastic, with more than 11 000 primary schools registered to take advantage of this

programme in the 2020/2021 and 2021/2022 academic years, representing around two thirds of the primary schools in England.

On this basis, one would expect this to be a promising intervention for improving oral language and, therefore, further development that is dependent upon this. The targeted nature of the programme is also promising in terms of its prospects for helping to close the gap between those most in need of support (who are also more likely to be from lower socioeconomic backgrounds) and the rest of the cohort. However, there must be a note of caution that there are often challenges when providing highly promising interventions at a large scale (Elmore, 1996; Protzko and Schooler, 2017). Nevertheless, in this case, an evaluation funded by the EEF (using a discontinuity design based on the screening test aspect of the programme) estimated an impact of 4 months' progress on its primary outcome measure of oral language skills, as well as an even larger impact of 7 months' progress for those from low-income backgrounds (eligible for free school meals) (Smith et al., 2023).

Conclusions

This chapter has set out the extent of the impact of disruption resulting from the COVID-19 pandemic on young people's education in England and has explored the features and potential effectiveness of the policy response to this major challenge.

There is evidence of meaningful learning loss in both the primary and secondary levels of education, but it has been notably worse in mathematics (with a loss of up to almost 4 months of 1 school year at its peak) than literacy (with a peak loss of around 2 months). Where it has been possible to track over time, the evidence of catch-up has been encouraging, but with lost learning remaining evident in mathematics especially. Furthermore, the available evidence also suggests differential effects of this learning loss, with wider attainment gaps associated with pupil disadvantage in primary schools, wider gaps associated with more disadvantaged school compositions in secondary schools and substantial regional disparities.

The education policy response to the pandemic in England has received significant criticism. The response appears to have been substantially smaller in scale than responses in comparable countries, such as the United States and the Netherlands. It seems that this is, in part, a result of the intention not to sustain interventions over an extended period. The focus of the response on evidence-based interventions, including tutoring and a well-supported oral language intervention for the youngest pupils, is welcome, albeit the NTP has struggled to live up to the ambitions set for it.

The lack of a plan to continue financially supporting catch-up efforts poses a significant risk of there being lingering long-term impacts of the pandemic on children's life chances and the country's economic future (House of Commons Public Accounts Committee, 2023). In particular, the tapering of subsidy rates provided for catch-up support through the NTP, if followed through, runs a significant risk of embedding the residual lost learning and its distributional effects in the long term.

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CHAPTER 4

The pandemic, socioeconomic disadvantage and learning outcomes in Germany

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Abstract

This chapter examines the consequences of school disruptions precipitated by the COVID-19 pandemic for academic learning in German elementary and secondary schools. On average, German schools were fully or partially closed for 38 weeks from the onset of the pandemic. German students experienced moderate learning losses due to school closures. National and international trend studies show that competence test scores were between 0.17 and 0.22 standard deviations below pre-pandemic scores, on average. For students from households with a lower socioeconomic status, learning losses were twice as large as for socially privileged students, according to the Institute for Educational Quality Improvement Trends in Student Achievement study. The responses of the educational administration to the learning disruption were heterogeneous, as each of the 16 states enacted its own legislation. The compensatory policies were aimed at reaching all students or at reaching disadvantaged students in particular, for example by facilitating additional remedial teaching, mostly in the fundamental domains of language and mathematics. Judged on the basis of the World Bank's 'reach, assess, prioritise, increase and develop' (RAPID) framework, the policies were only partly successful because of ambiguous criteria for allocating funds and a lack of enough qualified teaching personnel, especially to support at-risk students. Some actions were also delayed by intricate administrative procedures. Recent large-scale assessments from late 2022 and early 2023 indicate some learning loss recovery and a slight reduction of the socioeconomic achievement gap. This suggests that the compensatory measures worked to a considerable degree. Moving forward, the lessons learned during the pandemic should be used to address new and ongoing challenges, such as the increasing number of non-German-speaking refugee students.

Introduction

In Germany, there is no federal legislation for education, only state legislation. Accordingly, the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung (BMBF)) has little influence on the school sector and can take action only through narrowly defined financial allocations. Responsibility for the educational system lies with the 16 states, making Germany's schooling system a patchwork of 16 state-specific systems. Because of this cultural sovereignty, kindergarten to grade 12 (K–12) schooling varies between states, for example with regard to the length of primary school (4 years in most states), regulations governing the transition between different school types (e.g. from primary to secondary school) and the development of different school types. Similarities can be found in terms of compulsory schooling and school-leaving qualifications: compulsory schooling includes primary and lower secondary school. Schooling can then be successfully completed with a general education school-leaving certificate after grade 9 (*Hauptschulabschluss*) or grade 10 (*Mittlerer Schulabschluss*). To obtain a higher education entrance qualification (*Hochschulreife*, also called *Abitur*), students must attend upper secondary school (see McElvany, 2022, for further details).

To ensure that there is sufficient commonality in education across states, the Standing Conference of the Ministers of Education and Cultural Affairs (Kultusministerkonferenz (KMK)) was founded in 1948. This voluntary assembly of the ministers of education of all states formulates the joint interests and objectives of all states. One focus of the KMK's work was the development and implementation of cross-state educational standards. Educational standards define the subject-specific competences that children and young people should have developed by a certain stage in their school careers. It is important to note that the KMK has no legislative power, so its decisions are not directly binding, but must be enacted by the state as state law.

To contain the spread of the virus, school closures were discussed by the ministers of education in the KMK session on 12 March 2020. At a higher level, Chancellor Angela Merkel met with the 16 minister-presidents on the same day to discuss preventive measures to curb the spread of the virus. Subsequently, all state governments (minister-presidents and ministers of education) mandated school closures within the next 5 days. By early June, local incidence rates had plummeted and each state decided on its own reopening strategy (Fickermann and Edelstein, 2020). By the end of 2020, incidence rates were soaring again and state governments once more mandated the suspension of in-person education. More periods of school closures followed in the first half of 2021. German elementary students missed a total of 64 days of in-person learning during the lockdowns. Students at secondary schools missed 84 days of in-person learning, on average (OECD, 2021). The length of remote teaching periods varied widely between and even within states (Schult et al., 2022a).

During school closures, the main political goal was to continue lessons and thus fulfil the school curricula. On the eve of the first school lockdown, the educational ministries asked teachers to provide worksheets and repetitions of previously learnt content for the students who had to stay at home and undertake in-home learning (Huber and

Helm, 2020). During the following few days, teachers, students and students' families had to switch from classroom teaching and learning to distance teaching and in-home learning, facing challenges such as insufficient technical equipment for schools, teachers and students. However, no specific further instructions were provided by the educational ministries, for example with regard to the question of which school subjects should be taught at all. Later on, educational administrations provided detailed regulations regarding hygiene rules and short-term conditions that permitted (or prohibited) in-person learning for particular groups (e.g. graduation classes, exams, special needs students, physical education and music lessons). These regulations were sometimes updated multiple times per week, challenging and irritating school personnel, students and students' families. Furthermore, educational administrators struggled to provide an infrastructure for digital learning. Online learning tools became available at short notice. Each state tried to find its own solutions, creating differing policies. For example, some video chat programs were widely adopted in one state but were forbidden in others because of data protection issues. For example, schools in Rhineland-Palatinate were allowed to use Microsoft Teams, but schools in Brandenburg were not. Overall, the response to the COVID-19 pandemic was a collection of state-specific and teacher-specific actions rather than unified crisis management.

Consequently, the school closures in Germany led to a variety of remote-learning modes, ranging from interactive online courses to teachers who cycled to students' homes to distribute worksheets for the upcoming week (Schneider et al., 2021). Teachers used a wide array of available resources to deliver adequate teaching, often under adverse conditions such as slow internet connections, insufficient computer equipment and a lack of digital learning materials. Students' home lives with their families spilled directly over into remote classes, particularly when students did not have their own devices or did not have a room to learn without distractions from other household members. Thus, it is no surprise that the time spent learning during the school lockdowns was greatly reduced compared with pre-pandemic learning time (less than half; Werner and Woessmann, 2023). The reduction in learning time was most pronounced for students with low sociocultural status and low-achieving students (Grewenig et al., 2021). Even when schools had regular online classes, some students never showed up throughout the remote-learning periods (Schneider et al., 2021). Those who did participate still reported a lack of interaction with their peers (Huber and Helm, 2020).

Taken together, the periods of remote learning turned into a series of ad hoc adjustments to the pandemic restrictions at the time and the available technical and pedagogical options. The amount and quality of remote learning mainly depended on the engagement of teachers, students and students' families, as well as on the available technical infrastructure. Almost inevitably, disparities arose. While many students were able to continue learning and stay connected, others fell behind and lost contact (Jaekel et al., 2021). The disruption to regular schooling led to varying degrees of learning loss.

National administrative data

Rise and fall before the pandemic

In Germany, the Federal Statistical Office collects no data regarding individual learning trajectories. The KMK decided in 2003 to introduce a core dataset containing longitudinal microdata of the schools and courses that a student attends during K–12 education (KMK, 2011). However, this core dataset has still not been implemented 20 years later. Legal details, such as data protection issues, and technical challenges regarding the data collection in each of the 16 states keep stalling the project. Thus, statistics in education are commonly limited to the yearly numbers of schools, teachers and students.

Germany did not have educational monitoring and did not participate regularly in international assessments until the turn of the 21st century (McElvany, 2022). The turning point was the programme for international student assessment (PISA) of 2000, in which Germany participated and received rather unfavourable results in reading, mathematics and science (which is referred to as Germany's 'PISA shock'). Students with an immigration background performed particularly poorly. These results led to an extensive political reaction, shifting educational policy towards competence-oriented curricula and establishing educational standards and regular monitoring. Consequently, the main strategy of the KMK (2015) regarding educational monitoring encompassed the following pillars:

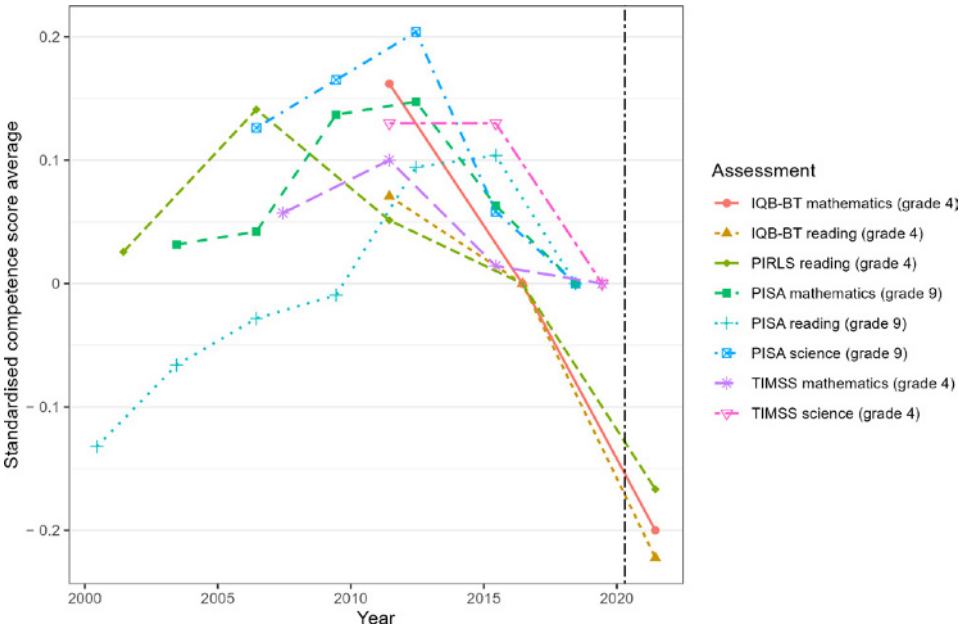
- participation in international large-scale assessments (PISA, the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS));
- development and maintenance of educational standards for elementary and secondary schools, including assessments every 5 years in grades 4 and 9 (Institute for Educational Quality Improvement Trends in Student Achievement studies (IQB-BT)) and the provision of tasks for *Abitur* examinations;
- quality assurance at the school level through comparative assessments in grades 3 and 8 (known as *Vergleichsarbeiten* (VERA));
- an educational report (the national report on education) every other year;
- more knowledge transfer from science to the classroom.

Some federal states introduced additional annual assessments, for example in grade 5 (an assessment named 'Lernstand 5' in Baden-Württemberg), in grade 6 (Saxony, Schleswig-Holstein and Thuringia) and most extensively in Hamburg in grades 2, 5, 7 and 9.

Student performances in TIMSS, PIRLS and PISA increased in the first decade after 2000. In recent years, however, a decline has been observed in average test scores (Figure 1; see Woessmann, 2021). For example, the results of the IQB-BT showed a decline in reading scores (Cohen's $d = -0.07$) and in mathematics scores ($d = -0.17$) from 2011 to 2016 for elementary school students in grade 4 (Stanat et al., 2022). For secondary school students in grade 9, scores also declined in reading from 2009

to 2015 (d = – 0.07; Böhme and Hoffmann, 2016), but remained stable for mathematics from 2012 to 2018 (d = – 0.01; Mahler and Kölm, 2019).

Figure 4.1: Average competence scores from large-scale assessments in Germany (see Woessmann, 2021)



NB: The mean scores were standardised using the mean and the standard deviation from the last pre-pandemic assessment (Cohen's d). The unstandardised data table is available online (https://doi.org/10.17605/OSF.IO/H6BVF). The sample sizes per cohort were n > 25 000 (IQB-BT), n > 4 000 (PIRLS), n > 5 000 (PISA) and n > 3 000 (TIMSS).

Pandemic learning loss

In 2022, the first results from the national education monitoring activity in Germany were published, which included the period of school closures and restrictions due to the COVID-19 pandemic. The IQB-BT assesses representative samples from all 16 federal states every 5 years. In 2021, the testing took place between the end of April and the beginning of August, that is, shortly after elementary schools reopened in spring 2021. The results from 2021 (n > 26 000) showed the expected downward trend associated with pandemic learning loss for students in grade 4. Compared with 2016, scores decreased in reading (d = – 0.22) and in mathematics (d = – 0.20; Stanat et al., 2022) ([7]). The latest results of PIRLS revealed that reading competences for

([7]) For this report, learning loss estimates were standardised using the last known pre-pandemic standard deviation of test scores. These standardised differences are sometimes interpreted with regard to the annual learning gains (i.e. competence increase) in pre-pandemic times. The annual learning gains differ between grades (larger in elementary school than in secondary school), domains (larger in mathematics than in reading) and countries (larger in Germany than in the United States; Bloom et al., 2008; Brunner et al., 2023).

German fourth graders were reduced in 2021 compared with the previous assessment in 2016 (d = – 0.17; n > 4 000; Mullis et al., 2023). A follow-up school panel study based on the 2016 PIRLS cycle yielded similar results for reading competence in grade 4 (d = – 0.19; n > 2 000; Ludewig et al., 2022).

For secondary school students, annual VERA test results ([8]) indicate a small negative effect of school closures. In Baden-Württemberg, Germany's third largest state, there were learning losses among eighth graders compared with previous cohorts in reading (d = – 0.04) and mathematics (d = – 0.02; n > 84 000; Schult and Wagner, 2022; see also Depping et al., 2021; Lücken, 2022; Schult et al., 2022b). Surprisingly, there is a paradox regarding the foreign language English: competences in English were increasing before the pandemic and continued to do so in 2022 (d ≥ 0.17; Schult and Wagner, 2022).

With regard to achievement differences, students from families with a higher socioeconomic status typically outperform students from less privileged families (Mullis et al., 2023). A major goal of education policy is to reduce these social disparities. Findings from PIRLS indicate no significant changes with regard to social disparities in reading between 2001, 2006, 2011, 2016 and 2021 for Germany (Stubbe et al., 2023). However, this is at odds with the results of the IQB-BT with elementary students. Stanat et al. (2022) found that declines in competences in reading and mathematics between 2016 and 2021 were more than twice as large for socially less privileged German fourth graders as for socially more privileged fourth graders. Thus, social disparities were more pronounced in 2021 than in 2011 and 2016 in reading and mathematics. This is true both when students' social background is based on the highest International Socio-economic Index of Occupational Status (ISEI) and when it is based on the number of books at home (Stanat et al., 2022).

Cross-sectional regression analyses in the context of the IQB-BT show a consistent pattern regarding the extent to which various characteristics of the learning situation during the pandemic were associated with student competences achieved in 2021. Taking students' family background into account (highest ISEI, books at home, immigration background and language spoken in the family), competences achieved by fourth graders in 2021 were strongly related to students' learning conditions during the pandemic. Students with sufficient space (space for undisturbed learning and their own desk) and technical resources (their own electronic device, sufficient internet access and a printer) achieved significantly higher competence scores, on average, than students who did not have such facilities at their disposal (Stanat et al., 2022; see also Sachse et al., 2022). The substantial correlations between home resources and competences also show that these resources are relevant prerequisites for

([8]) Unlike PIRLS, TIMSS, PISA and the IQB-BT, the annual statewide assessments, such as VERA, are usually not suited for trend analyses, owing to the item selection, the scaling procedure and voluntary participation. The tests rarely contain linking items themselves. The scoring of linking samples deviates from the teacher scoring rules. Point estimates are used to denote individual students' competences. The resulting estimates for the competence distribution in the population therefore fluctuate (Harych, 2022, pp. 107–161). However, there were considerably more linking items across years during the pandemic (as no new items could be tried out in schools), so the competence scales could be scaled in a similar way to international large-scale assessments (i.e. using plausible values for unbiased population parameter estimates; Wu, 2005).

learning at home, but are not fully captured by socioeconomic status and families' cultural capital (Schneider et al., 2022).

All of the results presented here are based on cohort studies examining different students in the same grade level in different years. One reason that is often used to explain the competence declines found (even before the pandemic) is the change in the student body due to immigration in recent years. Students in Germany with an immigration background (mostly from Arab countries, the former Soviet Union and Türkiye) typically score lower in educational assessments than students without such a background (e.g. Stanat et al., 2022). Accordingly, it was assumed that an increase in the number of students with an immigrant background would lead to the negative trends in competences found. However, statistical corrections for changes with regard to immigration background and social background (immigration-related disparities are in part attributable to family characteristics such as lower socioeconomic status and less cultural capital) lead to only a small decrease in the learning loss estimates (Ludewig et al., 2022; Weirich and Hafiz, 2022).

Motivation, school satisfaction and social integration

In addition to looking at student competences, non-cognitive aspects – such as students' school-related motivation, satisfaction with school and the feeling of being socially integrated – are regularly examined in large-scale assessments. Results of the IQB-BT indicate that the mean values for self-concept and for interest in the subject of German and interest in mathematics were significantly lower in 2021 than in 2016. The negative effects found are comparable to or somewhat smaller than the declines in competences among fourth-grade elementary school students (changes of non-cognitive aspects from 2016 to 2021: $-0.17 \leq d \leq -0.10$; Stanat et al., 2022). In contrast, the latest results of PIRLS revealed no significant change in students' reading self-concept and reading motivation between 2016 and 2021 (McElvany et al., 2023).

Despite the disruptions to in-person learning during the pandemic, findings on school satisfaction and social integration are quite encouraging (Stanat et al., 2022): fourth-grade students in 2021 were largely satisfied with their school, independent of their immigration background. For some groups, mean values in 2021 were even higher than in 2016 (changes of school satisfaction from 2016 to 2021: $0.08 \leq d \leq 0.14$). Furthermore, a majority of the students examined felt well integrated in their class. Students with a refugee background were even more satisfied, on average, than their classmates.

Education policy reforms

In Germany, the first student group returning to regular in-class teaching in 2020 was made up of students in the graduation classes at the end of secondary school. This strategy was intended to facilitate the preparation for final exams. The second group returning to regular in-class teaching was students in the fourth (i.e. final) year of

primary school, to enable them to catch up on the remaining curriculum before the transition to secondary school. The legislations in different states made these initial decisions at short notice with limited scientific counsel. As with most policies regarding school closures and their reopening, the subsequent remedial actions focused on the next few weeks or at best months (Fickermann and Edelstein, 2020). Organising how these reopenings would take place (e.g. distribution of funds and personnel) and communication about them (e.g. letters from the ministries of education to school principals) took additional time, during which school managers and teachers struggled to plan strategic remedial actions on their own.

The Standing Scientific Commission (Ständige Wissenschaftliche Kommission (SWK)) is an independent scientific advisory board of the KMK that was assembled in 2021. To advise the states on the further development of the educational system, the SWK identifies existing problems and makes evidence-based recommendations for their solution. The commission takes an interdisciplinary, long-term and systemic perspective. Its members include educational researchers from various disciplines. Experts and representatives from politics, administration, educational practice and civil society are involved in relevant hearings. By the time schools reopened in the early summer of 2021, the SWK gave clear and comprehensive recommendations for resuming in-person teaching and for dealing with the negative impacts of school closures. Specifically, the commission recommended focusing on the most affected student groups, facilitating transitions and graduations, concentrating on competences central to learning (e.g. reading and mathematics), training and employing additional educational personnel, and evaluating the measures taken to curb the negative effects of the pandemic on learning (SWK, 2021). This advice closely resembles the World Bank's RAPID framework to address COVID-19 learning losses, which recommended reaching every child and keeping them in school, assessing learning levels, prioritising teaching the fundamentals, increasing the efficiency of instruction including through catch-up learning and developing psychosocial health and well-being (World Bank, 2022).

The BMBF and the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (Bundesministerium für Familie, Senioren, Frauen und Jugend (BMFSFJ)) provided special funds to the states for the recommended remedial actions (*Aufholen nach Corona für Kinder und Jugendliche*, EUR 2 billion; BMBF and BMFSFJ, 2021). However, in an international comparison, Germany, with its EUR 2 billion COVID-19 catch-up programme, is in the bottom third when this sum is calculated per capita, as it amounts to only EUR 93.14 per student per year. The financial support was supposed to, among other things, expand the financial leeway of schools and enable the deployment of additional personnel to provide remedial courses and social-emotional support in the wake of school closures ([9]). However, the states mainly decided individually how to invest the additional funding, often leaving it up to schools to decide. The schools supposedly knew best where they needed additional support to reach students at risk of persistent learning loss (Helbig et al., 2022).

([9]) The programme also included additional funding for domains such as early education and cultural activities (BMBF and BMFSFJ, 2021). Further funding from the states was much smaller.

One measure consisted in offering additional courses during the summer vacations in 2020 and 2021, which aimed to give (disadvantaged) students more supervised learning time to catch up on previous course material in the main subjects. Schools also expanded their extracurricular support, which was related to subject content but also to social and vocational areas. To identify students' learning deficits, teachers were supposed to use existing educational large-scale assessments such as VERA. In addition, states acquired additional tests to offer teachers diagnostic tools to assess their students' competences. Owing to the pre-pandemic structure of large-scale assessments in Germany, there were very few situations in which pre-pandemic measures existed to inform learning progress during and after school closures. Among the few measures that did exist were states tracking students' individual test scores over time (Hamburg) and teachers using formative assessments to track students' learning progress (e.g. Förster et al., 2023).

Moreover, states appealed to retired teachers to return to school in order to offer additional classes in the main subjects. Student teachers could also apply for jobs as instructors at learning camps that offered low-achieving students an opportunity to catch up on learning during vacation periods. Moreover, schools tried to recruit additional social workers to improve their students' social skills through specific activities outside the regular class schedule. Data from interviews and document analyses indicate that this was possible only to a limited extent given the shortage of specialists. Instead, the working hours of staff already employed at the schools in these professional groups were occasionally increased (Helbig et al., 2022).

It took some time for the BMBF and the BMFSFJ to make the political decision to allocate considerable funding for schools. Subsequently, the states also had to determine the details for distributing the funds. The acquisition of additional personnel and the organisation of additional remedial courses also took time. Thus, just a fraction of the funding was spent in 2021 (KMK, 2022). The spending became steadier in 2022, and the majority of schools are thought to have received and eventually used these additional resources (Helbig et al., 2022).

However, there was no systematic scientific programme accompanying the major policy interventions. Small-scale programmes occasionally included a scientific evaluation. Nevertheless, small samples and a lack of suitable control groups often rendered these evaluations ambiguous. It remains uncertain to what extent the student groups targeted received and benefited from the multitude of remedial measures (Schneider, 2023). The main strategy used by the KMK (2015) remains the only overarching approach to monitoring the development of selected data points at key points in compulsory K–12 education. Owing to its temporal resolution and psychometric properties, this strategy highlights long-term trends rather than specific day-to-day developments. Meanwhile, new developments – such as Russia's attack on Ukraine, the subsequent refugee influx into the German educational system and the economic tensions – have also affected learning at schools in Germany and elsewhere.

Impact analysis of policy interventions

The recommended policy interventions (SWK, 2021) and their implementation in Germany mirrored the World Bank's RAPID framework (World Bank, 2022). Across Germany, the sovereignty of states with regard to education led almost inevitably to a somewhat heterogeneous response to the challenge of compensating for the adverse effects of the pandemic on students' learning. However, the evaluation of the policy interventions described above shows some common patterns.

Reaching the most affected students

Most states applied funding mechanisms that were supposed to reach all schools equally. Only a few states (e.g. Brandenburg, Bremen and Hamburg) tried to focus on specific schools that needed remedial actions the most. These few states attempted to allocate funds based on learning assessment surveys, social indices or other school characteristics, but the allocation of funds was largely scattershot. The schools could largely decide for themselves what to use the money for; the distribution of funding within schools was not assessed systematically. Therefore, it remains unknown to what degree the students most in need benefited from the additional resources (Helbig et al., 2022). The students most in need were those who were the most difficult to reach, for example when they had refugee status and did not speak German (Saischek, 2022). Nevertheless, most general programmes, such as statewide summer schools, were aimed directly at student groups that were hard to reach during the pandemic (KMK, 2022). At-risk students were thus able to benefit from additional learning opportunities at short notice.

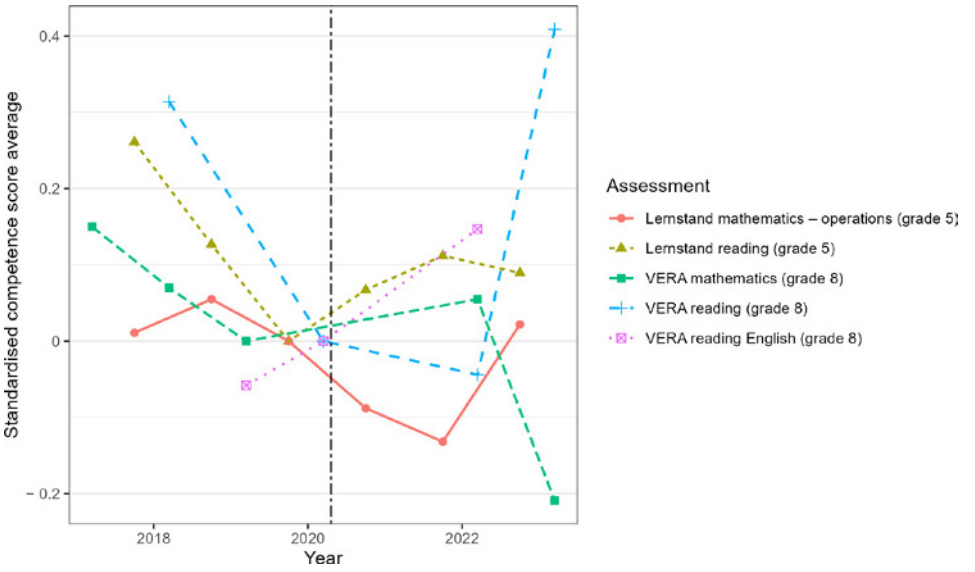
Assessing learning levels

The aforementioned lack of systematic longitudinal student data hampered the diagnosis of individual learning loss. Mandatory tests took place in some states, whereas other states opted to suspend mandatory testing to relieve teachers from the hassles of administering and scoring the tests. Teachers reported that they did not have sufficient time to perform additional tests (Helbig et al., 2022). The results of large-scale educational tests such as VERA indicate the students who showed particularly low competence levels, but they usually cannot identify whether this was the result of pandemic learning loss or of general learning problems.

National and international large-scale assessments usually compare cohorts that are 3 to 5 years apart. The complex analysis and the formal reporting mean that there can be a delay of over a year between the undertaking of the assessments and the trend estimates becoming public. As shown in Figure 4.1, the 2021 findings from the IQB-BT and from PIRLS indicate considerable learning loss in the wake of the pandemic. Did these downward shifts change in the 2022/2023 school year as a result of the full return to school across the country?

Annual low-stakes tests such as VERA offer a first glimpse of potential learning loss recovery. In Figure 4.2, the mean competences of incoming fifth graders and eighth graders in Baden-Württemberg are depicted (Schult et al., 2023). Overall, a downward trend can be seen from 2017 to 2023, which resembles the IQB-BT findings. Nevertheless, the most recent assessments in mathematics (grade 5 in September 2022) and reading (grade 8 in March 2023) suggest that, on average, some pandemic learning loss has been recovered. Scores in English reading comprehension also improved, possibly thanks not just to English classes but also to increased consumption of English-speaking media in general, and in particular during lockdown periods, when social activities were mostly prohibited. Furthermore, mean scores in reading and mathematics (in grade 8) were considerably lower when students' everyday language was not German ($d > 0.70$). However, by 2023, this achievement gap had shrunk by at least 0.12 standard deviations to $d < 0.58$.

Figure 4.2: Average competence scores from large-scale assessments in Baden-Württemberg, Germany



NB: The mean scores were standardised using the mean and the standard deviation from the last pre-pandemic assessment (Cohen's *d*). The unstandardised data table is available online (https://doi.org/10.17605/OSF.IO/H6BVF). Missing years are due to postponed tests (VERA in 2021) or a lack of linking items. The scores are prone to slight fluctuations due to limited linking options and varying scoring procedures (Harych, 2022). The sample size per cohort was $n > 78\,000$ (Schult et al., 2023).

Prioritising teaching the fundamentals

German language and mathematics were generally the first subjects that were resumed after schools reopened. Mandatory assessments of students' competences focused almost exclusively on these two subjects. The widespread remedial actions had a clear focus on the fundamental competences deemed necessary for successful learning in other fields (Helbig et al., 2022; KMK, 2022). The lack of systematic large-

scale assessments in most other subjects makes it impossible to establish whether the focus on the main subjects and fundamental competences came at the expense of learning in other subjects such as geography, music, social studies and physical education. Initially, summer schools had a clear focus on reading and mathematics to give students opportunities to catch up on missed learning time in the main subjects (Helbig et al., 2022). However, the broad variety of remedial actions offered by schools suggests that the subjects and topics that were neglected during remote learning did benefit from the support programmes (KMK, 2022).

Increasing the efficiency of instruction

Most schools offered additional instruction to help students to catch up on learning. Despite the additional funding, they often struggled to find qualified personnel for remedial courses. Demographic changes in the student population along with an ageing teacher population further aggravated the situation (Klemm, 2022). Schools with a positive culture and structures that facilitated the integration of new measures benefited most from the compensatory measures described earlier. Fostering teacher–parent relations also helped to implement remedial actions in the wake of the pandemic. Teacher shortages still interfered with the development of collective teacher efficacy. Nevertheless, teachers were generally eager to tackle the negative consequences of the pandemic on learning (Helm and Huber, 2023).

The transfer of scientific research findings into the classroom benefited from remote teaching during school closures. A large number of virtual training courses and presentations of research findings are now available to teachers without the need for costly travel. This development is in line with the strategy of the KMK (2015) to help both new and experienced teachers. During the pandemic, student teachers could not gain as much practical experience in classes as during pre-pandemic times. Now that they teach regularly, they can use these digital communication tools to reflect on their experiences and to develop pedagogical skills *in situ* while still being connected to other peers and teacher teams. Experienced teachers can refresh their skills through remote and in-person training. They can also receive direct input from educational scientists who offer hands-on advice based on current findings (Capparozza et al., 2021).

The pandemic left teachers, students and students' families strained. However, a collective effort seems to have resulted in the recovery of some learning loss, preventing a 'learning inequality catastrophe' (Azevedo et al., 2022) in Germany. The empirical findings so far suggest that learning losses in Germany during the pandemic were moderate and that subsequent compensatory efforts helped many students to catch up on lost learning time. Of course, the sizeable number of low-achieving, disadvantaged students remains a challenge. Just like before the pandemic, an ongoing effort is needed to adapt instruction to students' needs throughout their educational trajectory.

Developing psychosocial health and well-being

In the wake of the pandemic, many schools are using additional funding for programmes that foster social skills and inclusion. However, a nationwide, population-based study (Kaman et al., 2023) found that the health-related quality of life of children and adolescents decreased between May 2020 and January 2021 and the prevalence of mental health problems, anxiety, depressive symptoms and psychosomatic complaints increased. The most recent waves of the longitudinal study indicate that students' psychosocial health has slightly improved, but is still considerably worse than pre-pandemic benchmarks (n > 1 000; Kaman et al., 2023). Improving the psychosocial support of students therefore seems urgently needed, as psychological well-being is a prerequisite for successful learning (e.g. Bücker et al., 2018; Kaya and Erdem, 2021). This aspect was also emphasised in the COVID-19 catch-up programme, which set the goal of increasing the hiring of or support for school social workers. According to school administrators in the German School Barometer, school social work services were available at an average of 69 % of schools in the autumn of 2022. In addition, a total of 35 % of school administrators reported receiving support from school psychologists. At the same time, half of the school administrators at schools that had school social workers and school psychology support rated this support as insufficient (Robert Bosch Stiftung, 2023).

Conclusions

Overall, schools embraced the opportunity to organise activities directly aimed at helping students who were affected by the suspension of in-person learning during the pandemic. Special funding may not always have reached the students most in need; however, after in-person learning was resumed, pragmatic, actionable solutions were and remain preferable over perfect solutions that take years to implement. Most schools offered remedial courses for low-achieving students and programmes to facilitate students' social skills (Helbig et al., 2022). Just how efficiently the funding was used remains unclear. Between-state comparisons highlight ways to distribute additional funding based on socioeconomic criteria (e.g. through a social index) rather than giving each school the same funding (weighted by school size).

The division of the educational administration into 16 state ministries allowed each state to select the course of action it deemed appropriate. The division, however, increased the administrative burden of responding quickly to the development of the pandemic situation. This factor is also proving to be a challenge in implementing other unified strategies, such as a swift transition to computer-based large-scale assessments. During the pandemic, teachers and students often felt that administrative decision-making failed to consider their everyday challenges in teaching, learning and remaining on top of the ever-changing situation. After all, any educational policy critically depends on the teachers and the students in the classroom.

Moving forward, the efforts to reintegrate the students left behind during school closures are transforming into efforts to integrate refugees and other disadvantaged students. The long-term consequences of the COVID-19 pandemic will intertwine with the need for learning opportunities for the growing number of non-German-speaking students. The resulting challenges demand a combination of reliable long-term planning and flexible adaptations to (both small- and large-scale) disruptions.

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CHAPTER 5

The pandemic, socioeconomic disadvantage and learning outcomes in Italy

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Abstract

This chapter analyses the extent of the impact of the COVID-19 pandemic in Italy on educational learning. It examines the effects of school closures, distance learning, and discontinuity in and disruption to in-person schooling, as well as the (few) remedies that have been identified, based on national policy interventions, to mitigate and/or recover accumulated learning loss. In the first school year affected by the pandemic, Italian schools were closed for a lengthy period, and the return to normality in the following years was very inconsistent, with marked differences between regions, subregional areas and grades. In line with several other studies on the topic, our analysis shows that the learning loss, although not entirely attributable to the pandemic's disruption to normal schooling, was quite significant for Italian students, especially those in upper secondary schools, probably because these grades adopted a scheme of rotating student groups between in-person and distance learning during the 2020/2021 and 2021/2022 school years. In all grades, the learning loss was more intense and severe for mathematics than for reading proficiency. As in many other European countries, learning loss has exacerbated educational inequalities among students based on socioeconomic and cultural conditions. Additionally, in Italy, there are different tracks of upper secondary school, and these often differ in the socioeconomic and cultural composition of students. Learning losses were more severe for students at technical and vocational schools than for those studying at scientific and general schools designed to prepare students for tertiary education. In examining these findings, this chapter also addresses the fact that the results of national programmes aimed at recovering learning loss have not been evaluated. Moreover, there have been few such programmes and they have mainly entailed allocating economic resources that schools can use as they see fit to improve educational achievement.

Introduction

The COVID-19 pandemic arrived in Italy in late February 2020. The first cases were officially reported in the Lombardy region on 21 February 2020. Subsequent cases quickly emerged in Lombardy and other regions of northern Italy. The outbreak subsequently spread to other parts of the country, with cases reported in various regions, including central and southern Italy. The government implemented assorted containment measures, including quarantines and lockdowns in affected areas, but the virus continued to spread. Italy faced a significant healthcare crisis as its healthcare system became overwhelmed by the high number of cases and the country experienced a high number of fatalities. Italy was the first country in Europe to be hit by the COVID-19 pandemic and had one of the highest rates of excess mortality in Europe adjusted for population size, together with Belgium, Portugal, Spain and the United Kingdom (as shown by the World Health Organization's Health Emergency Dashboard in October 2023). The Italian government implemented strict nationwide lockdown measures in March 2020 to slow the spread of the virus, including restrictions on movement and the closure of non-essential businesses. Throughout 2020 and into 2021, Italy experienced multiple waves of the virus, and various measures were taken to manage the situation. As stated by the Italian Ministry of Health, several waves of COVID-19 struck the population after the first wave, involving multiple surges in case numbers, with peaks and dips. The following is a simplified overview ([10]): the first wave of COVID-19 began in Italy in late February 2020 and peaked in March and April 2020. During this wave, Italy was one of the hardest-hit countries in the world. After the first wave, Italy, like many other countries, experienced a decrease in cases during the summer months of 2020. A second wave emerged in the autumn of 2020 and cases began to rise again, particularly in the colder months. The third wave occurred in early 2021, with cases rising once again, owing mainly to the emergence of new variants of the virus. Italy subsequently experienced additional waves throughout 2021, with variations in the intensity and timing of these waves in different regions.

In this sequence of events, the vaccination campaign was an essential tool to control and eventually mitigate the impact of COVID-19 waves. As more people were vaccinated, there was a gradual reduction in the severity of illness and hospitalisations, particularly among the most vulnerable populations. The initial vaccination roll-out took place in late 2020 and early 2021. From mid 2021, as the vaccine supply increased and more vaccines received regulatory approval, Italy aimed to vaccinate a broader portion of its population. This phase focused on making vaccines available to all eligible adults and eventually adolescents as well. Different

([10]) According to Pavolini et al. (2021), the first wave was between 25 February and 17 October 2020, the second wave was between 18 October 2020 and 5 March 2021 and the third wave was between 6 March and 30 June 2021. The first wave led to the closure of schools at all levels. The second wave was met with chaotic and varying policies, with in-person school re-entry (except for the most heavily hit areas, called *zone rosse* or red zones) for primary and lower secondary students and a prevalence of remote learning for upper secondary students. In the first phase of the third wave, schools of all levels were again closed in red zones and areas with more than 250 weekly COVID-19 cases per 100 000 people, and remote learning continued. Then, from 26 April 2021 onwards, there was a gradual return to in-person schooling.

regions in Italy adjusted their strategies based on local conditions and available vaccine supply. As established by Law No 133 of 2021, starting from mid December, it was mandatory for all school personnel to receive a COVID-19 vaccine. On 1 September 2022, this obligation (enforced in part through potential suspension) was removed, as the general conditions related to the pandemic improved.

During the 2019/2020 and 2020/2021 school years, in an attempt to limit the spread of COVID-19, Italy, like many other countries (Bazoli et al., 2022), implemented a range of measures to counter the spread of COVID-19 in schools. These measures evolved over time in response to the changing situation. Many schools in Italy instituted hybrid or remote learning models to reduce in-person class size and maintain social distancing. As stated by Pavolini et al. (2021), most of the measures designed to curb the pandemic in Italy were implemented in a highly decentralised manner. Some of the decisions regarding school closures during the COVID-19 pandemic were made at the national level by the Ministry of Education, while other actions were taken by regional and local authorities. During the first wave, the ministry issued guidelines and recommendations to schools and local authorities and set the general framework for educational responses to COVID-19 (Colombo et al., 2022). Decisions about whether to close or reopen schools were often made locally, in consultation with the Ministry of Health and other applicable authorities. School closures and reopenings were often implemented in a dynamic and fluid way, with schools adapting to the evolving local COVID-19 situation on a case-by-case basis.

Beginning on 24 February 2020, first in the northern Lombardy and Veneto regions and soon after in all Italian regions, nurseries, preschools, schools and universities were closed and remained closed until the end of the school year, in June 2020, to prevent and reduce the spread of the virus. Schools did not reopen at all and there were no recovery programmes during the summer of 2020, unlike in other European countries. Overall, primary and lower secondary schools in Italy remained closed from March 2020 until the end of the 2019/2020 academic year, one of the longest periods of school closure in Europe during the first wave (13 weeks versus the European average of 10 weeks). Like in many countries, school closures in Italy generated a debate in the following months (Hammerstein et al., 2021) about the usefulness of such measures in the light of the trade-off between its relative benefits and costs (e.g. delays in educational attainment and the impact on young students' motivation and psycho-physical well-being; Champeaux et al., 2022; Consolazio et al., 2022; Sandner et al., 2023). Upper secondary schools were also closed for long stretches of the 2020/2021 academic year, while efforts were made to keep primary schools open as much as possible. However, local conditions sometimes led to partial closures for primary schools as well, and individual circumstances meant that both pupils and teachers were in quarantine at times and had to shift to distance learning. Beginning in November 2020, distance learning was implemented in upper secondary schools across the country and in schools in high-contagion areas; this also included the final two grades of middle schools. From January 2021, between 50 % and 75 % of teaching was again in person, although schools in high-contagion areas remained closed.

When the pandemic broke out in Italy, there were already serious issues of inconsistency in students' access to and use of digital technologies and infrastructure

for distance learning. Italy had one of the lowest Digital Economy and Society Index scores compared with other Member States, with a limited proportion of households having fixed broadband connections and individuals with basic software skills (European Commission, 2020). The scenario analysis conducted by Pavolini et al. (2021) shows that Italian schools entered the pandemic with large groups of students lacking minimum acceptable conditions of access to digital learning, especially in families with less well-educated parents and, to a more pronounced extent, in certain schools, especially primary schools in the country's south.

Another significant issue is that teachers in Italy showed a low level of ICT proficiency and had limited experience with blended and technology-related teaching methods, according to various iterations of the Teaching and Learning International Survey of the Organisation of Economic Co-operation and Development (OECD) (Bertoletti et al., 2023; OECD, 2018; see Chapter 9). At the same time, Italy faced one of the highest rates of children lacking access to individual and school-based learning resources in Europe, further demonstrating the overall degree of the digital divide and its effects during the pandemic (Bazoli et al., 2022; Blaskó et al., 2022).

Despite many local studies based on small samples or individual experiences, little research has attempted to estimate the loss of learning associated with the COVID-19 pandemic in Italy on a larger scale. One example is the study by Contini et al. (2022a) investigating the immediate effects of the pandemic and focusing on third graders in the Piedmont region in relation to the first lockdown (spring 2020). Other studies used data from the national standardised tests administered by the National Institute for the Evaluation of the School System (Istituto nazionale per la valutazione del sistema educativo di istruzione e di formazione (Invalsi)). In this case, difference-in-difference methods were used by Borgonovi and Ferrara (2023) for fifth and eighth graders and by Contini et al. (2023) for 13th graders. The same counterfactual impact evaluation methods were used by Bazoli et al. (2022), who included 2nd, 5th, 8th and 13th graders but did not control for prior achievements, and by Battisti and Maggio (2023), who addressed 5th, 8th and 13th graders all together. All of these studies present similar findings: a sharp drop in learning from the pre-pandemic situation to the end of the first year of the pandemic and a failed (or partial) recovery of learning loss 1 or 2 years after the pandemic outbreak, especially for students from disadvantaged social backgrounds, and different magnitudes of learning loss in different grades.

National educational system and administrative data

The Italian education system can be accessed by all Italian citizens and foreign minors. It is organised to consist of a first cycle of compulsory education provided for at least 10 years covering the 6- to 16-year-old age group. Completion of compulsory education involves a certificate attesting to the students having finished 2 years of upper secondary school by the age of 18. This kind of structure, in which a compulsory period falls in the middle of upper secondary education, is atypical among European education systems.

After the primary education cycle (International Standard Classification of Education (ISCED) level 1, from grade 1 to grade 5), students progress to lower secondary

educational schools (ISCED level 2) where they follow the same common core curriculum from sixth to eighth grade (Benadusi and Giancola, 2014).The final 2 years of compulsory education correspond to the first 2 years of the upper secondary cycle, consisting of 5 years of education in total (from 9th to 13th grade). The compulsory education system provides a common core curriculum beginning from the first year of primary school and continuing until the first national common examination, which occurs after 3 years of lower secondary school (corresponding to eighth grade).

As mentioned above, compulsory education continues after lower secondary education; at that point, however, students make a choice among the three different school tracks into which upper secondary education is divided. Although formally it is possible to access any type of tertiary education course regardless of upper secondary track, one track (provided by lyceums (*licei*)) provides general education intended to prepare students for the hard sciences and/or humanities that is deemed adequate to enrol in a university bachelor's programme. The second track (provided by technical schools (*istituti tecnici*)) provides technical education usually for students who are less inclined towards future academic studies. The third track (provided by vocational schools (*istituti professionali*)) provides vocational education for students whose goal is early entry into the labour market ([11]).

The general education track offers different internal curricula: classical, scientific, applied sciences, economics and social sciences, and humanities. The same is true of technical and vocational schools, whose internal distinctions reflect many specific types of educational offerings, including economics, management, tourism, technology, informatics, electronics, chemical industry, biotechnology, construction management, geotechnics, fashion, mechanics, mechatronics, energy, ICT, agriculture, gastronomy, technical assistance and handicrafts.

Differences in track choices among Italian students depend heavily on their social background, combined with their previous learning achievements, with *licei* usually chosen by students from the middle and upper social classes or top performers from the lower classes, and technical and vocational schools commonly attended by students from the lower classes or low performers from the middle classes (Azzolini and Vergolini, 2014; Giancola and Salmieri, 2022a). Therefore, as a result of the school socioeconomic composition effect, track choice affects future student achievement (Giancola and Colarusso, 2020) and significantly predicts the likelihood of students successfully completing tertiary education (Colombo and Salmieri, 2022).

Invalsi is the Italian technical public entity responsible for assessing and evaluating public schools and students at the national level. In Invalsi assessment surveys, the three upper secondary school tracks are regrouped into four categories: (1) classical and scientific high schools (scientific lyceum and classics lyceum), (2) other high schools

([11]) Students may also opt for a fourth choice: vocational education and training courses lasting 2 or 3 years, available at the regional level (*istruzione e formazione professionale*, that is, education and vocational training). At the end of the period, students can decide whether to try entering the labour market or, after an examination, re-enter the national upper secondary school system by attending a 5-year-long degree course at a vocational school to complete the 2 missing years and therefore obtain the final state certification. This latter choice is uncommon.

(lyceum of applied sciences, linguistic lyceum, lyceum of human sciences, artistic lyceum, and music and dance lyceum), (3) technical schools and (4) vocational schools.

The overall organisation of the Italian educational system (national curricula, minimum standards, staffing, evaluation and monitoring, and financial resources) is centralised, falling exclusively under the competence of the Italian state (Giancola and Salmieri, 2022b). The 20 Italian regions hold joint responsibility together with the state for marginal aspects of school life, such as providing early childhood education and care services, establishing calendars for primary and secondary education and allocating funds and resources to schools. Municipalities (local authorities corresponding to cities and towns) have specific responsibilities for pre-primary, primary and lower secondary education, such as ensuring ordinary and extraordinary maintenance, supplying public transport for students in isolated areas, refectories and, in some cases, textbook vouchers and financial grants to support disadvantaged students or students with special needs.

Italian individual schools have a certain degree of autonomy, especially in administrative and pedagogical domains. They may define some details of the national curricula, extend their educational offerings and select teachers and staff from the national pool of hireable professionals, but at the same time they must follow central, regional and provincial procedures for staffing (Giancola and Salmieri, 2022c).

Invalsi's goal is to improve the quality of education by evaluating and monitoring students' achievements and the factors influencing educational performance. Invalsi supervises the administration of standardised tests to assess students' proficiency in mathematics, science, reading and text comprehension according to age group, type of school and geographical area. It coordinates the evaluation of school management and defines the indicators for evaluation. It implements the programme for school self-evaluation and external evaluation. To carry out such evaluation, it defines the tools used for analysing data and surveys, specifies the framework used by schools in their self-evaluation reports, develops the protocols for external evaluation and issues the training plans for inspectors and expert evaluation teams.

Founded in 1999, Invalsi did not conduct the first large-scale standardised tests of student performance until 2001, and, beginning from the 2014/2015 school year, it launched the National Assessment System (*Sistema Nazionale di Valutazione* (SNV)). Invalsi is also responsible for organising international surveys and, over the years, the SNV has absorbed several aspects of the theoretical, methodological and technical apparatus of international large-scale assessments such as the OECD's programme for international student assessment (PISA), thus making data reliable and comparable over time (Giancola and Salmieri, 2022b). Invalsi provides research reports (in extended or short form) and data at the aggregate level, as well as anonymised, individual microdata for research purposes, such as those used in some of the ad hoc data processing carried out for this chapter.

Declines in learning achievement

Measuring learning loss is a complex challenge that can vary depending on the context and specific purposes. As we know, learning loss refers to a lack of progression of or a

decrease in students' skills and knowledge associated with prolonged periods of classroom disruption or other impediments that negatively affect learning, such as the COVID-19 pandemic. As discussed in Chapter 2, the most common way to measure learning loss includes using standardised tests to assess students' levels of learning before and after a period of classroom disruption and compare it with the learning progression of previous cohorts as a control group. By comparing results across cohorts, it is possible to identify areas in which students have experienced learning loss. This produces a two-pronged approach: one part comparing the results achieved by different cohorts of students before and after critical events on the basis of valid, reliable and comparable evidence, and the other part following students longitudinally along their educational pathway and collecting performance scores in certain skills. For Italian students, valuable assessment data from standardised tests are available both as qualified representative and significant samples (tests are administered in the presence of a team of researchers) and as student population censuses (tests are administered by teachers to the entirety of Italian schools).

In the following, we have opted to use sample data because they are more reliable, as they avoid the well-known problems of cheating or bias in administration and are representative of the entire student population (Bertoni et al., 2021; Longobardi et al., 2018). Invalsi's SNV test results are available for the following levels of schooling: second-grade and fifth-grade students in primary education and eighth-grade students in lower secondary education at the moment when students are required to pass national examinations and after choosing their school track (general, technical or vocational) to attend upper secondary education. Students in the 10th grade of upper secondary education are administered Invalsi tests that are complementary to PISA tests (but with greater sample detail for provinces and regions). Finally, the test is administered in the 13th year of schooling; in this case, the test is compulsory and anchored to the examination that completes upper secondary education.

Italian students have been consistently scoring below the EU average in the PISA rounds over the last decade (Giancola and Salmieri, 2022b). The trend for reading skills has shown slight ups and downs over the last 10 years, but data from the most recent available PISA round (at the time of writing), dating to 2018 and thus before the pandemic, indicate a decrease compared with both the first PISA and the general trend, meaning that the negative trend from one cohort to the other was emerging even before the pandemic. In contrast, the mathematics average scores show a positive trend, albeit still below the EU average (Chapter 2 shows how Italy compares with the rest of Europe, with – at the time of writing – the most recent cross-national achievement survey (the Progress in International Reading Literacy Study (PIRLS) for 2021), focusing on 10-year-olds).

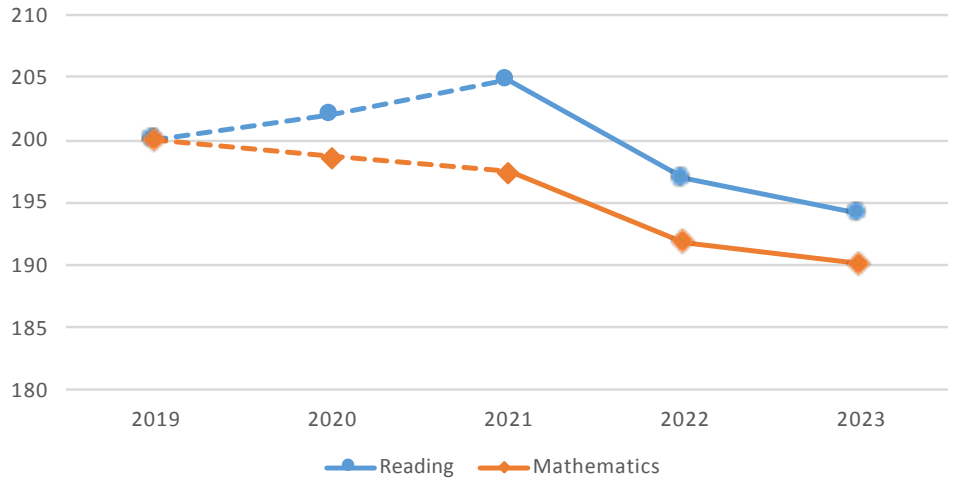
Similarly, Invalsi data do not allow us to estimate individual learning loss, but they do allow us to compare (on the basis of comparable tests) the results achieved by multiple student cohorts: the 2018/2019 cohort (who had not yet experienced school closure), the 2020/2021 cohort (who experienced 1 year of the COVID-19 pandemic), the 2021/2022 cohort (with 2 years of being affected by COVID-19 disruptions in the period) and, finally, the 2022/2023 cohort (with 2 years of schooling under pandemic conditions plus 1 post-pandemic school year).

Students in primary schools: second and fifth grades

The Invalsi reading test carried out in the second grade of primary education aims to measure and compare students' ability to read and interpret a written text, understand its meaning and grasp some early, basic aspects of the Italian language. The Invalsi mathematics test administered to students of the same age monitors early aspects of numeracy. Figure 5.1 briefly displays reading test results, comparing average scores from 2019 to 2023. There was a decline in the national average score in reading (– 5.9 points), although the average score decrease resulting from the test administered immediately after the onset of the pandemic in 2021 does not indicate a short-term negative effect of school closure and distance learning. The fact that a significant decline in learning can instead be seen between 2021 and 2022 is particularly interesting: we can hypothesise that a medium- to long-term 'pandemic effect' on learning outcomes was at play.

The trend in the average score in mathematics is similar, except that it declined in all of the years considered, while the trend for reading shows an increase in the average score for 2021. A sharp decline in the national average score (– 9.9 points with a standard error of 0.9) was recorded from 2019 and 2023. These are only descriptive results and hence cannot demonstrate any causality. However, one reasonable explanation for the result found could be that the negative influence of the pandemic on learning has not yet been mitigated.

Figure 5.1: Second-grade students' average scores in reading and mathematics (2019–2023)

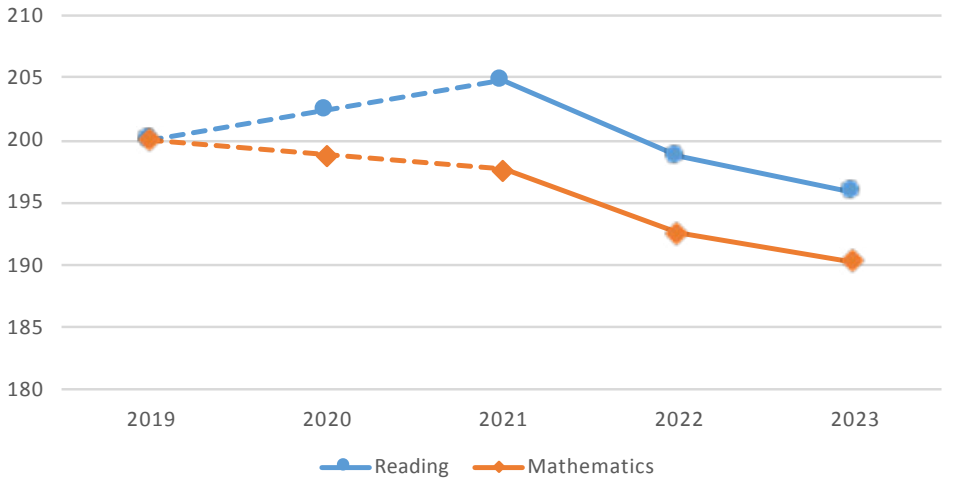


NB: The x-axis refers to the cohort year of second-grade students. For this level of schooling, the observations are for 2019, 2021, 2022 and 2023. The dotted line shows the trend between 2019 and 2021, where 2020 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

Figure 5.2 presents the trend for fifth-grade students' average scores in reading over 2019–2023. Similarly to the trend for second-grade students, there was a drop (– 4.2 points with a standard error of 0.8) in reading, especially for the younger cohorts, probably as a result of school disruption in the medium to long term. In mathematics proficiency, there was a steady decline in the national average scores from 2019 to 2023 (– 9.8 points).

Figure 5.2: Fifth-grade students' average scores in reading and mathematics (2019–2023)



NB: The x-axis refers to the cohort year of fifth-grade students. For this level of schooling, the observations are for 2019, 2021, 2022 and 2023. The dotted line shows the trend between 2019 and 2021, where 2020 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

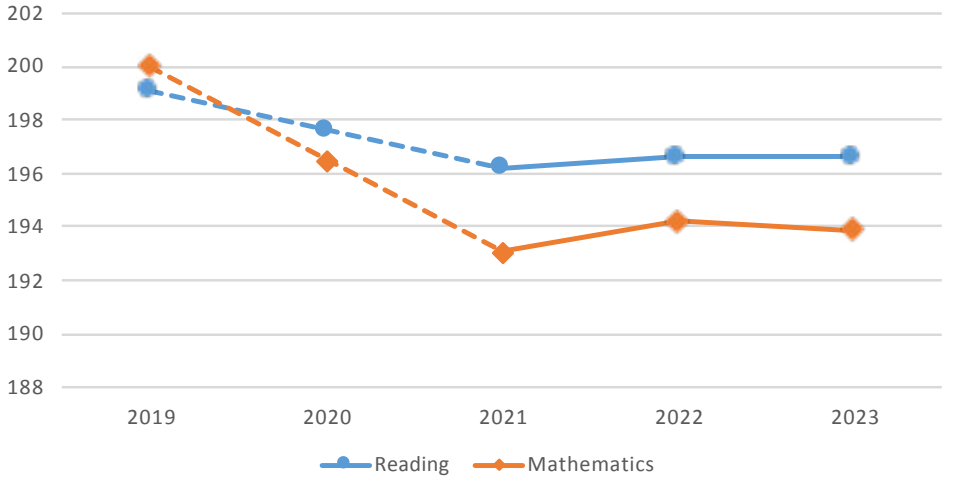
Students in lower secondary schools: eighth grade

The reading test administered to students on completion of lower secondary education (eighth grade) aims to assess and compare students' abilities to read and interpret a written text, understand its full meaning and grasp essential aspects of how the Italian language functions (Invalsi, 2023). A positive score on this test requires the proper use of basic skills, as it takes place at the end of the first cycle of education and is a projection of successful continuation in upper secondary school. From 2018/2019 ([12]) to 2023, national average scores declined by 3.4 points (with a standard error of 1.1), although the trend is not univocal: after a considerable loss from 2019 to 2021, substantial score stability followed in 2022 and 2023. This trend may signal that, after the drop in learning observed during the first pandemic year, the following cohorts in the second year of the pandemic and in the first post-pandemic year suffered less learning loss. The trend in mathematics is similar, namely a decline followed by

([12]) Eighth graders took the test in the spring of 2019 for the 2018/2019 school year, using the computer-based testing system for the first time.

stability, although the learning loss in this area was more severe (– 6.1 points from 2018 to 2023).

Figure 5.3: Eighth-grade students' average scores in reading and mathematics (2019–2023)



NB: The x-axis refers to the cohort year of eighth-grade students. For this level of schooling, the observations are for 2019, 2021, 2022 and 2023. The dotted line shows the trend between 2019 and 2021, where 2020 is an average estimate between the two years.

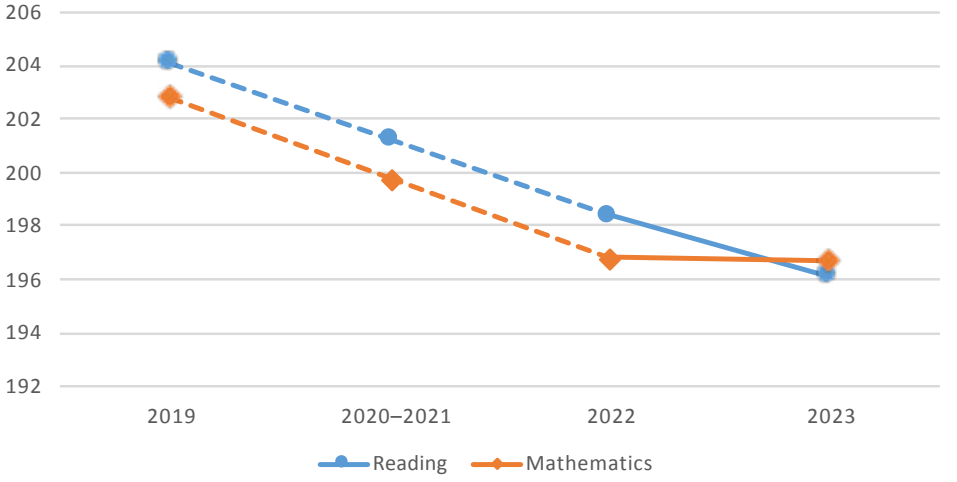
Source: Authors' processing of Invalsi data.

Students in upper secondary schools: 10th grade

Moving on to the scores achieved by upper secondary school students, it is clear that the trend is heavily negative for both reading and mathematics. It is precisely in this cycle of education that the greatest number of school closure days, prolonged educational interruptions, and extremely confusing and locally situated remedial strategies occurred. There was a significant drop in the national average reading score from the beginning of the pandemic (– 8 points with a standard error of 1.2 from 2019 to 2023). This result confirms what we already saw at the end of the first cycle of education (fifth grade), namely that, after the first year of school closure, reading proficiency did not decrease and instead remained constant.

Based on Figure 5.4, approximately 6 out of 10 students perform above level 3, that is, the minimum threshold for adequate skills in reading. The trend in mathematics is similar (– 6.1 points with a standard error of 1.3 from 2019 to 2023), although the loss is smaller than the loss in reading for the cohorts most affected by the pandemic.

Figure 5.4: 10th-grade students' average scores in reading and mathematics (2019–2023)

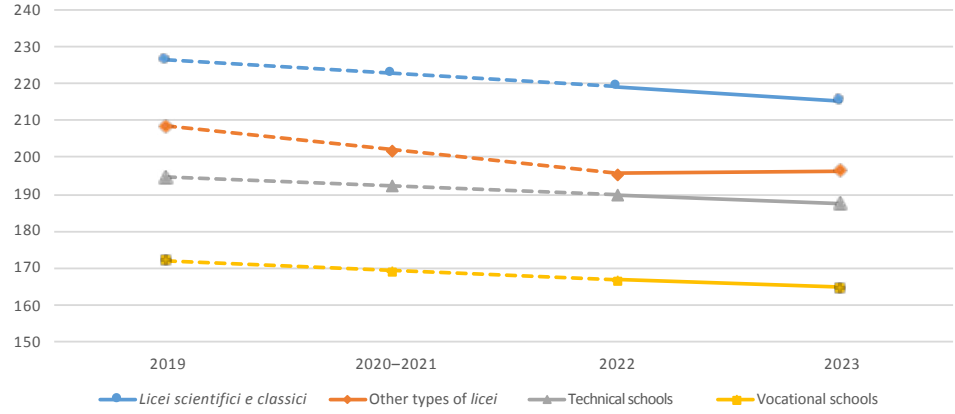


NB: The x-axis refers to the cohort year of 10th-grade students. For this level of schooling, the observations are for 2019, 2022 and 2023. The dotted line shows the trend between 2019 and 2022, where 2020–2021 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

For students in upper secondary school, it is important to highlight the sizeable effects of school track, geographical area and family background on educational performance to understand the multiple educational divides affecting the Italian education system. Taking only reading tests into consideration, we can see that results have deteriorated over time to different degrees depending on the school track (Figure 5.5). In 2023, students from upper secondary schools designed to provide general education for the upper social strata destined to go on to tertiary education (general, thus referring to curricula such as *liceo classico* or *liceo scientifico*) performed above the Italian average (200 points). Students from all other tracks achieved well below this average, however, with the most heavily penalised population being students from technical and vocational schools targeting low-economic-strata households who do not expect to continue their studies and those planning to enter the labour market early.

Figure 5.5: 10th-grade students' average score in reading, by school track

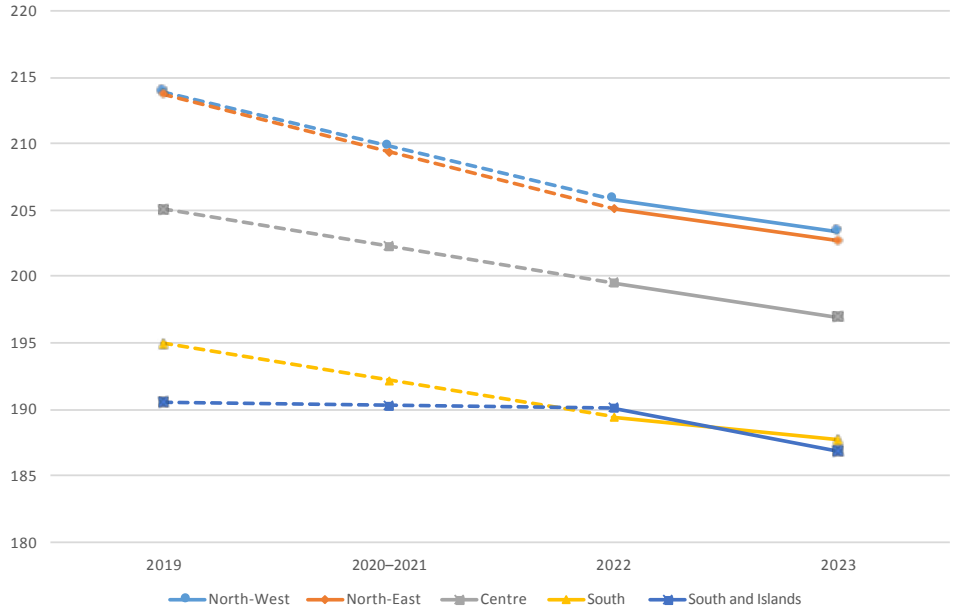


NB: The x-axis refers to the cohort year of 10th-grade students. For this level of schooling, the observations are for 2019, 2022 and 2023. The dotted line shows the trend between 2019 and 2022, where 2020–2021 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

There has always been a significant educational divide between Italian students living in the north and those in the south of the country (Benadusi et al., 2010). Research on this topic has demonstrated that the north–south educational divide does not depend exclusively on either the quality of teaching or school effectiveness. It is also affected by extra-school contextual factors that are outside schools' control (Argentin and Pavolini, 2020; Giancola and Salmieri, 2020). As we can see from Figure 5.6, the decline in the average reading skills score over 2019–2023 was similar across Italy, and there is no sign of recovery. Differences between the geographical areas are relevant as well. In the context of the generalised decline reported above (based on the historical trend in OECD PISA data), the pattern of variation between Italy's geographical areas in terms of average reading scores in grade 10 remains constant over time, with a relative advantage shown by students in northern areas over those in southern areas, while students in the centre occupy a median position.

Figure 5.6: 10th-grade students' average score in reading, by geographical area



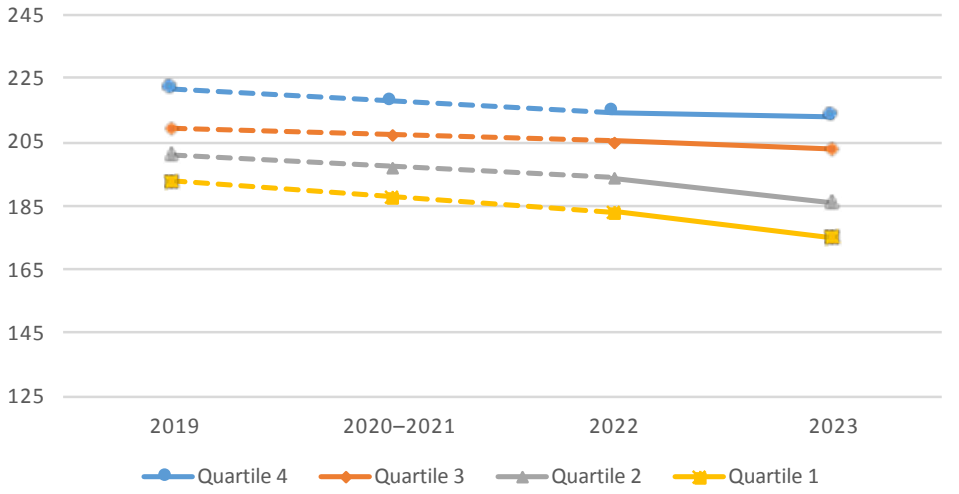
NB: The x-axis refers to the cohort year of 10th-grade students. For this level of schooling, the observations are for 2019, 2022 and 2023. The dotted line shows the trend between 2019 and 2022, where 2020–2021 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

Increasing inequalities

Educational inequalities have also increased according to students' socioeconomic and cultural background. In the last pre-pandemic Invalsi assessment survey (2018/2019 school year), the gap between students from the highest and lowest quartiles of socioeconomic and cultural status ([13]) was 29 points on the learning scale, while in the first assessment survey after schools reopened the gap had expanded to 31 points (the difference between these time points, however small, is just above the threshold of significance). The socioeconomic and cultural status index was derived from items regarding parents' highest level of education, parents' highest occupational status and student home conditions, such as books in the home, a quiet place at home to study and further cultural resources. Given this, we can speculate that educational inequalities among students from different socioeconomic and cultural strata reflect inequalities in accessing online schooling, using digital devices and tools for schoolwork at home, and parental support and help with learning activities, which in turn affect the severity of learning loss.

Figure 5.7: 10th-grade students' average score in reading, by economic, social and cultural status index quartiles



NB: The x-axis refers to the cohort year of 10th-grade students. For this level of schooling, the observations are for 2019, 2022 and 2023. The dotted line shows the trend between 2019 and 2022, where 2020–2021 is an average estimate between the two years.

Source: Authors' processing of Invalsi data.

([13]) The Invalsi index of students' socioeconomic and cultural status is compatible (questions in the questionnaire and estimation procedures) with the OECD's PISA index of economic, social and cultural status.

With all the appropriate caveats and in the understanding that we cannot directly impute the differences in these analyses to the consequences of the pandemic, we now look at different variables affecting inequalities in the learning outcomes of reading skills among 10th-grade students at two distinct points in time (the 2018/2019 and 2022/2023 school years) ([14]). To do so, we developed two multiple regression models (ordinary least squares (OLS)) in which the dependent variable was students' reading scores. The OECD's PISA index of economic, social and cultural status (ESCS), school track (which is dependent on the ESCS and thus absorbs much of the variance), geographical area, gender and migratory background were the independent variables. Results from the OLS analyses are displayed in Table 5.1. It is important to note that OLS regressions cannot identify causality or the direction of association between the variables examined. The degree of association between the ESCS and reading scores increased from 2018/2019 to 2022/2023, and we can see that the degree of association between reading scores and studying at general upper secondary schools (*licei*) rather than vocational schools increased as well. The geographical gaps likewise intensified during and after the pandemic. Finally, while gender differences in reading seem to have narrowed, with female learning loss evidently becoming greater than male learning loss, the differences between native and immigrant students – especially first-generation immigrants – became more pronounced. In summary, comparing pre- and post-pandemic periods, we find that social inequalities widened and educational outcomes declined: the degree of association of reading scores with socioeconomic and cultural background, type of secondary school track, and native versus immigrant status increased in the period under consideration. Only in the case of gender differences has the gap reduced slightly, but this comes at the cost of a greater learning loss among girls than boys.

Overall, therefore, in a diachronic comparison between the two non-longitudinal cohorts examined here, the pattern of inequality in reading outcomes at the 10th-grade schooling level remained essentially stable. Some differences widened, however, such as those directly related to social origin and migratory background (with a slight narrowing of the gender gap). It is as if the entire population of Italian students slid downwards in terms of achievement on standardised tests while retaining most of the gaps already recorded in pre-pandemic periods.

([14]) Invalsi scales and metrics are constructed to allow comparability in test scores over time.

Table 5.1: Association of variables with test scores in reading (2018/2019 and 2022/2023) – OLS models

	2018/2019			2022/2023		
	B	**SE**	**Beta**	**B**	**SE**	**Beta**
Constant	176.218	0.167		173.578	0.179	
ESCS	2.546	0.05	0.067	3.894	0.053	0.091
School track (reference category: vocational schools)						
Scientific, classics and linguistic lyceums	42.294	0.165	0.571	48.424	0.156	0.599
Other types of lyceums	24.146	0.191	0.238	29.685	0.16	0.333
Technical schools	18.31	0.165	0.229	19.197	0.149	0.235
Area (reference category: Centre)						
North-West	9.099	0.144	0.106	11.014	0.139	0.123
North-East	9.01	0.153	0.097	11.815	0.148	0.12
South	– 8.487	0.149	– 0.095	– 9.743	0.141	– 0.108
South and Islands	– 10.68	0.163	– 0.105	– 13.929	0.152	– 0.138
Gender (reference category: male)						
Female	5.771	0.097	0.076	3.716	0.101	0.051
Migratory background (reference category: native)						
First generation	– 18.38	0.226	– 0.099	– 25.333	0.265	– 0.126
Second generation	– 11.039	0.197	– 0.068	– 13.11	0.191	– 0.092

NB: All coefficients are significant for 0.000. B, unstandardised coefficient; Beta, standardised coefficient; SE, standard error of the unstandardised coefficient.

Source: Authors' processing of Invalsi data.

A longitudinal approach

Invalsi data can also be employed to conduct longitudinal analyses. The increasing completeness of archives pertaining to Italian schools, and data management digitisation characterised by an ever-increasing level of information, now make it possible to trace students' educational pathways back in time (Invalsi, 2023). By combining information from the National Student Registry (*Anagrafe Nazionale degli studenti*) with Invalsi tests, results and outcomes can be derived for different cohorts of students moving through the national school system.

For this longitudinal analysis, we observed the performance of the cohort of students who attended 8th grade in 2018 and 13th grade in 2023. The latter group of students lost 17 % of its members compared with the starting population of 2018. School-leavers are those who have switched to vocational training courses outside the formal education system, those who no longer live in Italy and, finally, those who have dropped out of school (conventionally referred to as early leavers from education and

training). School-leaving thus represents a process of (self-)selection that has pushed many vulnerable and low-achieving students out of education.

There are some caveats to consider, however. Although the COVID-19 pandemic intervened in schooling in 2020–2021, we cannot use only diachronic comparison to determine causal imputation with respect to the resulting learning loss among students. The recorded drop in reading scores is certainly very marked. The problem, however, is that we cannot calculate precisely what proportion of this decrease is directly attributable to the effect of school closures and teaching disruptions and what proportion is instead caused by other factors than the pandemic's effects on education.

Table 5.2 displays students' reading proficiency levels as of the 2023 Invalsi test, juxtaposed with the scores achieved for the 2018 test. Only 30.2 % of students who were performing at the highest level of proficiency (level 5) in 2018 remained at the same level in 2023; 42.4 % dropped to the level below (level 4, which is still an acceptable deviation) but 27.4 % dropped to even lower levels (levels 3, 2 and 1). Approximately 60 % of students who were scoring at level 4 in 2018 fell to levels 3, 2 and 1 in 2023.

Over the period examined, the decreases in students' mathematics performance were even sharper (Table 5.3). Almost 50 % of students who performed at level 5 in 2018 had fallen to lower levels in 2023, and approximately 53 % of students who performed at level 4 in 2018 dropped to levels 3, 2 and 1, the levels considered as falling below a minimum level of proficiency in mathematics. As mentioned earlier, these findings do not cover the selection process that leads to the exclusion of the most highly disadvantaged and vulnerable students from the formal education system. These students, therefore, did not take part in the 2023 Invalsi tests. This means that school closures and disruptions not only resulted in increased learning loss for students over this period, but also gave rise to a significant population of school-leavers. Italian school principals, teachers and educators have a great deal to do to identify and implement remedial strategies to mitigate the disadvantages accumulated by students and keep vulnerable students from leaving school before completing their education.

The post-pandemic picture indicates that eighth-grade students who were low performers in 2018 remained at the same low proficiency levels in 2023. Many students who were top performers in the 8th grade in 2018, on the other hand, lost levels of proficiency by the time they reached the 12th grade; in between there was the pandemic, and this disruption certainly covaried with this result, even though it is not possible to accurately estimate the extent of this covariation effect.

Table 5.2: Students' levels of proficiency in reading from the 2023 Invalsi test, based on the levels from the 2018 Invalsi test (percentage distribution)

		Levels of proficiency in 2023						
		Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Total**	**Level 3 or above**
Levels of proficiency in 2018	Level 1	**72.0**	23.8	3.8	0.4	0.1	100.0	4.3
	Level 2	39.6	**42.5**	16.1	1.7	0.1	100.0	17.9
	Level 3	16.0	34.6	**37.4**	11.0	1.0	100.0	49.4
	Level 4	5.4	15.4	39.8	**31.4**	7.9	100.0	79.2
	Level 5	2.0	4.6	20.8	42.4	**30.2**	100.0	93.4

NB: The table shows how students changed achievement levels between 2018 and 2023 based on longitudinal data. For example, only 30 % of students who performed at the highest level (level 5) in 2018 were also among the top performers in 2023 (figures in bold represent those in the same level in 2018 and 2023). Since the figures below the diagonal line of bold entries are considerably larger than those above this diagonal line, this table shows a much greater downgrading than upgrading of students between 2018 and 2023.

Source: Invalsi (2023).

Research measuring the causal effect of COVID-19 on learning loss in Italy by employing counterfactual impact evaluation methods has reported findings that are partially convergent with the descriptive and OLS regression results we have outlined in this chapter. Using longitudinal data from 1.5 million students and comparing cohorts from the 2018/2019 and 2020/2021 academic years, Borgonovi and Ferrara (2022) estimated the impact of COVID-19 on student achievement in mathematics and reading in primary and lower secondary schools. On average, the cohort of students who completed primary school in 2020/2021 (the COVID-19 cohort) experienced a small increase in mathematics and reading achievements compared with those who completed primary school in 2018/2019 (the pre-COVID-19 cohort).

Table 5.3: Students' levels of proficiency in mathematics from the 2023 Invalsi test, based on the levels from the 2018 Invalsi test (percentage distribution)

		Levels of proficiency in 2023						
		Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Total**	**Level 3 or above**
Levels of proficiency in 2018	Level 1	**69.4**	21.3	6.9	1.8	0.7	100.0	9.3
	Level 2	44.3	**33.3**	16.5	4.6	1.3	100.0	22.4
	Level 3	19.9	31.5	**29.8**	13.6	5.1	100.0	48.5
	Level 4	7.0	17.1	31.3	**26.5**	18.2	100.0	75.9
	Level 5	1.8	4.6	14.8	25.2	**53.6**	100.0	93.6

NB: See note to Table 5.2.

Source: Invalsi (2023).

Borgonovi and Ferrara claim that, during the summer of 2020, primary schools were open for more days than secondary schools and, more importantly, were better equipped to handle distance learning, although this explanation has been partially critiqued by De Witte and François (2023). At any rate, whatever the explanation might be, findings from the Borgonovi and Ferrara (2022) study fit with the results presented in this chapter (see Figures 5.1 and 5.2). The significant value added by the Borgonovi and Ferrara (2022) study is its coverage of every province in Italy. When controlling for the fixed effects of provincial residence, the authors observed a marked increase in test score inequality. In other words, they found there had been an improvement, on average, 1 year after the pandemic, but this improvement did not take place everywhere in the country. This aligns with the chronological series of results provided by Invalsi (2023) for primary and lower secondary education students as differentiated by Italian geographical area. Contini et al. (2022a, 2022b, 2023) also conducted key analyses of the potential learning loss suffered by Italian students during the pandemic period using counterfactual impact evaluation methods. Using a standardised assessment for the entire Italian student population in grades 2, 5, 8 and 13, they distinguished between a student cohort never exposed to the pandemic (2019) and a student cohort completing the upper secondary cycle in 2021, controlling for students' achievements 3 years before. The resulting finding is that the pandemic's impact varied by school grade (with the higher grades suffering the most) and by prior skills (with lower skilled students experiencing the greatest losses). The results also highlight that learning loss is generally greater in schools attended by students from lower socioeconomic backgrounds.

Given the validity and robustness of the analyses conducted by Borgonovi and Ferrara (2022) and Contini et al. (2023), to be able to make the most of the interpretive potential of these results we would probably require additional longitudinal measures of learning to estimate medium-term effects. At the same time, in line with our findings, the authors found that the lower secondary school COVID-19 cohort experienced a sizeable reduction in mathematics achievement and a smaller reduction in reading achievement compared with the non-COVID-19 cohort (Borgonovi and Ferrara, 2022).

Educational policy reforms

It is theoretically possible to distinguish between educational policy reforms during the pandemic era. On the one hand, there were policies and interventions that were aimed at preventing the negative effects of school closure during the pandemic outbreak, at a time when these negative effects were expected but not yet measured. On the other hand, there are the policies that have eventually been implemented to remedy and counter the learning loss ascertained via testing. In most cases, the former category of policies was adopted more or less intensely in all European countries as a remedy to and during school closures, focused above all on meeting the needs of the most disadvantaged schools, students and families. In contrast, the latter group of policies usually presuppose a measurement of learning loss and rely on robust evidence to

determine which educational domains, types of student and types of school are the most heavily affected. In addition, these latter policies employ impact assessment tools and actions to assess how effective they have been in remedying learning loss, because they are focused on the learning loss itself.

Keeping this distinction in mind, we can state that the Italian education system developed the former but not the latter. Contingent interventions falling into the first category of policies were effectively and rapidly implemented so that schools and students lacking digital equipment would not be left behind (Grek and Landri, 2021). As documented by Kelly et al. (2021), schools in Italy utilised available funding to upgrade their digital tools for distance learning and received external technical support funded by a dedicated government budget line. This policy, which aligned with Italy's existing school computerisation plan (Salmieri, 2019) in various respects, underwent intense acceleration between the first and second pandemic waves.

Schools were also allowed to use funds to provide free digital equipment to socioeconomically disadvantaged students. Teachers attended special digital training to become proficient and self-oriented in choosing reliable software, effective didactic materials and affordable videoconference tools for distance learning (Ministero dell'Istruzione, 2020). In addition, schools were supported by special funding and extra administrative personnel to handle the social distancing measures, sanitation plans and rotation schemes adopted to curb the contagion. In the summer of 2020, no remedial measures were taken to support student learning. One school year into the pandemic, the government funded face-to-face extra teaching projects to reduce learning deficits in primary and secondary schools in disadvantaged areas. The funded scheme was selective rather than universal, however, and not all of the proposals submitted for funding were approved. No national large-scale programme expressly targeting learning losses has been implemented or designed to date. Concerns that the loss of learning would rapidly accumulate have prompted government authorities in the educational system to direct more investment towards strengthening the educational infrastructure. This includes the construction of more than 200 new schools, providing modern furniture for existing schools, upgrading technological infrastructure, renovating conventional classrooms and providing dedicated spaces for digital learning, serving as the main cornerstones of the ongoing programme to modernise the country's educational system. The biggest problem is that, since many of these measures are tied to Italy's recovery plan and thus involve extremely lengthy implementation times, they will not be able to effectively mitigate real-time learning loss (Domorenok and Guardiancich, 2022).

Another pillar of the country's renewed investment in education entails both training existing teachers and training and selecting new teachers, especially in secondary schools, where they have traditionally not been systematically trained in teaching pedagogies (Giovannella et al., 2022; Toscano and Verduci, 2023). As ambitious as these investments may be, they seem oriented more towards resolving some pre-existing structural weaknesses of the Italian educational system than towards counteracting or mediating the sharp learning loss suffered by the last few cohorts of Italian students. It is telling that the government has also not funded any impact analysis of the specific policy interventions designed to redress learning loss.

Conclusions

The Italian education system did not enter into the pandemic with a solid level of preparedness for distance learning. Both digital broadband infrastructure and teachers' and students' familiarity with ICT were at a relatively low level compared with the European average when the pandemic erupted. Beyond the long periods of school closures experienced in Italy, additional factors have also had a more intense and longer effect on the national educational system than in other European countries. A slow and irregular resumption of in-person educational activities, a shortage of teachers due to high rates of infection among school staff, temporary closures of individual schools and logistical difficulties in maintaining social distancing in many schools contributed to the magnitude of students' learning loss and amplified the educational inequalities that existed prior to the pandemic. As reported in Chapter 2, looking at trends in the average scores of Italian students collected by the PIRLS survey in the pre-pandemic years, we see that there has been a continuous decline in literacy and numeracy proficiency. The pandemic simply aggravated this decline.

Differences in learning achievement between students from different social backgrounds also increased as a result of school lockdowns and alternative educational settings. This is quite evident for upper secondary students, whose inequality in educational proficiency levels almost directly reflects the three different tracks of the Italian upper secondary system: *licei*, technical schools and vocational schools. The magnitude of the learning deficits triggered by pandemic restrictions have widened precisely along school-track lines.

The school-closure measures adopted to mitigate the spread of COVID-19 have had a weighty impact on foreign-born students, especially first-generation immigrants. The linguistic socialisation and social integration normally guaranteed by in-person schooling – processes that also contribute to helping students acquire minimum skills in reading, comprehension and mathematics – evaporated with the shift to distance learning and teaching by means of videoconferencing. Overall, the equalising effect of the physical classroom and with the peer effect stemming from learning cooperatively at school have been undermined at their roots. Physical presence in the classroom and daily exchange with teachers and other students, so important for the achievement of suitable levels of proficiency, have long been lacking among Italian students during school closures and this has generated a significant learning deficit especially among non-native students, disadvantaged students and those with pre-existing learning gaps.

In contrast with many other European countries, learning loss in Italy appears more pronounced in the later school grades than in the earlier grades. In this chapter, we have indeed found that pandemic-related learning loss in reading and mathematics is higher among upper secondary students than primary school students. We assume that there are two main reasons for this singularity. First, the (erratic) return to school normality during the 2020/2021 and 2021/2022 school years was prioritised for primary school pupils, while upper secondary students rotated between in-person school weeks and remote learning weeks in shifts, so as to place fewer students in overcrowded classrooms. Therefore, during the pandemic period, Italian upper

secondary school students attended fewer days of normal school on average than pupils from primary school and thus suffered a greater risk of learning loss. Second, a robust body of pedagogical research literature has stressed the importance of the day-to-day classroom experience with teachers and peers for pupils, pointing out that it represents a socio-emotional tie that is extremely useful for socialisation and learning (Esposito et al., 2021).

Teenagers are usually less dependent on the school setting than younger students (e.g. those in primary school) for cultivating teacher–student emotional bonds. This difference probably explains why younger students focused on the digital environment as a surrogate for the 'world they had just lost' (Salmieri and Visentin, 2020) during periods of remote schooling, trying to learn as much as possible. Adolescents were instead less attentive and focused during remote schooling. Certainly, these assumptions would need to be substantiated with counterfactual empirical evidence, evidence that is unfortunately lacking at the moment.

While the Italian education system is based on a reasonable degree of centralisation in decision-making, the management of the pandemic in the healthcare system developed during the pandemic towards regionalisation, which in turn affected schools' opening and closing policies. Specifically, the variability in school closures was related to the rate and speed of infections in the 20 administrative regions into which Italy is organised, with a colour-based scale (red, orange, yellow and white) indicating the severity of contagion and thus the duration of school closures. A centralised educational system thus clashed with a decentralised system of health crisis management. This contradiction contributed to generating an uneven landscape of learning loss as the pandemic progressed. The historical educational gaps between the country's north and south have mixed with new lines of variation at the subregional level, rendering the picture even more puzzling and complex than before.

In this chapter, we also highlighted that many of the Italian policies aimed at recovering or mitigating learning loss relied on pre-existing, small-scale and localised strategies (teacher support for students in need; extra-class additional homework; individual, school-specific initiatives and micro projects for disadvantaged students; extended school-time learning groups for low-performers; and so on), while no national programme expressly targeting learning loss resulting from the pandemic has been implemented to date.

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CHAPTER 6

The pandemic, socioeconomic disadvantage and learning outcomes in the Netherlands

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Abstract

This chapter analyses the impact of learning disruptions and policy interventions during the 2.5 years following the start of the COVID-19 pandemic on the learning outcomes of primary school students in the Netherlands. This chapter uses data from the Netherlands Cohort Study on Education to analyse the effects of the pandemic and interrupted learning on learning outcomes, as well as inequality as a result of the pandemic, using data on about 450 000 unique students from 2 100 schools (around 40 % of all primary schools). Standardised test results for reading, spelling and mathematics are used; each student takes two such tests per year in grades 1 to 5. The overall analyses of learning loss in the Netherlands show that for mathematics in particular there is still quite a way to go (with a standard deviation of learning loss of 0.17), whereas for comprehensive reading and spelling the learning loss has reduced to around zero (from initial substantial learning losses of 0.06 and 0.15 standard deviations, respectively). During the COVID-19 pandemic, the Dutch government's policy interventions mainly invested in and focused on the most vulnerable students. The impact analyses of the remediation programmes and the interventions in Amsterdam clearly show that the policy interventions that were focused on vulnerable students paid off. Although the inequalities that were caused mainly by the first 6 months of the COVID-19 pandemic have not yet been fully reversed, the few studies that exist on the policy interventions clearly show that they have had a positive impact on vulnerable children and on decreasing the COVID-19-induced inequalities.

Introduction

More than 2.5 years after the start of the COVID-19 pandemic and the associated school closures, the concerns around decreased learning gains and inequality are still very much prevalent. To develop targeted and future-proof policies, it is important to know whether the drop in learning gains that was observed after the first two periods of school closures in the first year of the COVID-19 pandemic (see, for example, Engzell et al., 2021; Haelermans et al., 2022a) has increased or decreased in the years that followed – a time during which learning continued to be interrupted by COVID-19 until far into the second year after the start of the pandemic. The question is therefore as follows: what was the state of affairs in the Netherlands 2.5 years into the COVID-19 pandemic and what we can learn from the policies already implemented? In this chapter, we answer this question based on data from the Netherlands.

This chapter is based on standardised test data of students in Dutch primary education. In the Netherlands, primary education starts at 4 years of age in kindergarten, with school being compulsory from 5 years of age. At 6 years of age, students enter grade 1, in which they formally start to learn how to read, write and do mathematics. They remain in primary school up to the age of 12, after which they enter secondary school and are placed into tracks according to their ability. Dutch primary schools are required to have a student administration system and must administer standardised tests every year in January/February (the midterm test) and May/June (the end-of-term test). Standardised tests at the national level are taken for three main subjects: comprehensive reading, spelling and mathematics. These tests are usually administered from mid grade 1 onwards, until the midterm of grade 6.

On 27 February 2020, the first COVID-19 patient was reported in the Netherlands. On 16 March 2020, the Dutch government announced the first school closure and a partial lockdown (Ministry of General Affairs, 2020a). Vulnerable children and the children of parents with essential occupations who could not work from home were allowed to come to school during the school closure. However, these children usually followed the same programme as the children who had to stay at home and made up only around 5 % of all children in this first period of school closure. This first school closure lasted 8 weeks, including 2 weeks of regular spring break (Ministry of Education, 2021a). Schools partially reopened on 11 May 2020, allowing alternating small groups of students to go to school until 7 June 2020. On days that children did not attend physical education, they followed online classes from home.

Schools reopened entirely on 7 June 2020 for the remaining school year. After the summer break, schools were fully open again until the second school closure at the peak of the COVID-19 pandemic in December 2020. From 16 December 2020 up to and including 8 February 2021, the schools closed for a second time for 7.5 weeks (including a period of 2 weeks of regular Christmas holidays) (Ministry of General Affairs, 2020b). This closure had consequences for the midterm tests of 2021, as schools were still physically closed in January and at the beginning of February. On average, schools decided to delay testing the students by 6 weeks to allow students to

have a few weeks of regular school before the standardised tests were taken. Most students had taken the standardised test by the end of March 2021.

The Netherlands was relatively well equipped for online education, as 96 % of Dutch households have internet access at home (Statistics Netherlands, 2018). Additionally, the Dutch government made EUR 2.5 million available in April 2020 to support online learning. This money was used to buy laptops and/or to provide internet access for 7 000 students. This money was supplemented with another EUR 3.8 million in May 2020 to support vulnerable children (Haelermans et al., 2022b). At the regional level, for example, the municipality of Amsterdam implemented two programmes during the first year of COVID-19. In April 2020, the municipality offered free laptops and Wi-Fi connections to children enrolled in primary or secondary education from low-income households who would otherwise not be able to follow online classes (Haelermans et al., 2022b). The second intervention took place in January 2021 and allowed first- and sixth-grade students, as well as vulnerable students, to physically attend classes during the second period of school closures.

Nevertheless, the school closure happened relatively suddenly, with no time to prepare. Teachers had to improvise, students suddenly had to structure their own school day and parents had to act as teachers for their children (de Leeuw et al., 2023). Although we do not know exactly how much education children received while schools were closed, there are strong indications that children spent less time on their education than usual. Moreover, a survey among Dutch parents revealed that parents, especially in disadvantaged families, often did not feel equipped to support their children during the school closures (Bol, 2020).

National administrative data

The national administrative data used for this chapter come from the Netherlands Cohort Study on Education (Nationaal Cohortonderzoek Onderwijs (NCO)) dataset (for a description of this project, see Haelermans et al., 2020). The NCO is part of the Netherlands Initiative for Education Research (Nationaal Regieorgaan Onderwijsonderzoek), which is part of the Netherlands Organisation for Scientific Research (Nederlandse Organisatie voor Wetenschappelijk Onderzoek), and biannually collects data on the compulsory standardised test scores in primary education. The standardised tests are taken in three subjects: comprehensive reading, spelling and mathematics. The comprehensive reading test assesses the student's ability to understand written texts, including both factual and literary content. The spelling test asks students to write down a series of words (no verbs) to demonstrate that they have learned the spelling rules. The mathematics test contains both abstract problems and contextual problems that describe a concrete task (de Leeuw et al., 2023).

These standardised tests are strictly comparable across grade levels and across time and come from four different suppliers, with the largest supplier being the Central Institute for Test Development of the Netherlands (Centraal Instituut voor Toets Ontwikkeling (CITO)). The data used for this chapter include only the test results from

CITO. Although exact numbers are not known, CITO has by far the largest market share of all of the four test suppliers. Furthermore, schools use administration systems to store the information about the standardised test scores. From the 2013/2014 school year onwards, three administration systems have exported the data on standardised test scores as part of the NCO. With the schools' permission, the administration system exports the data on the standardised test scores to Statistics Netherlands, which pseudonymises the student and school identifiers. Before any data are exported, parents are informed about the project and data export by the school and are given the opportunity (during a period of 4 to 6 weeks) to object against the export of their child(ren)'s data (by informing the school in writing or orally). The school registers any objections in its administration system, and data are not exported from those students whose parents objected. In practice, only one or two parents per school object to this, which means that there is no selection issue because of this passive consent.

In the secured virtual environment of Statistics Netherlands, standardised test scores can be matched to the background information of students and their parents. Note that the data in the Statistics Netherlands virtual environment are pseudonymised, such that the data are fully anonymous to the researchers that use these data. The background information that we use are parents' highest education level and highest income, student migration background and student gender. Parental education is defined based on the highest obtained education level of (one of) the parent(s) and is classified as one of the following: (1) low, namely pre-vocational secondary education (basic or framework level), upper secondary vocational education (level 1) or grades 7 to 9 in pre-vocational secondary education (mixed learning or theoretical level) or in senior general secondary education or university preparatory education (11 % of the students); (2) medium, namely upper secondary vocational education (level 2, 3 or 4) or completion of senior general secondary education or university preparatory education (33 % of the students); or (3) high, namely a degree at a university of applied sciences or higher (56 % of the students). This division of parental education into three categories is also used by the NCO; this division not only is relevant at the content level, but also provides us with large enough groups to have statistical power.

This chapter is based on analyses using these unique data. It looks at how the first 2.5 years of the COVID-19 pandemic affected learning growth and inequalities in Dutch primary education and how the effect of the pandemic differed across school subjects and across students with different socioeconomic backgrounds. To understand how learning growth and inequalities have developed over the course of the pandemic, this chapter makes comparisons between different periods during the COVID-19 pandemic, namely after the first half year (in which the first school closures took place), after 1 year (with another school closure in the winter of 2020/2021) and after 1.5 years, 2 years and 2.5 years of the pandemic.

The dataset includes data on Dutch primary school students from about 2 100 schools (around 35 % of all primary schools in the Netherlands). Although schools self-selected to participate in this study, these 35 % of schools are representative of all primary schools in the Netherlands (Haelermans et al., 2022c) and our conclusions can therefore be extrapolated to all Dutch primary school children. Apart from the few children whose parents objected to the data export, our dataset includes all children

who attend these 2 100 schools, resulting in a total of 450 000 unique students for whom we have standardised test scores for comprehensive reading, spelling and mathematics, as well as detailed (social) background information. To remove the influence of outliers, the top and bottom 1 % of the absolute learning gains scores are not included in the analyses. Students' learning growth is calculated as the difference between the midterm test that took place just before the COVID-19 pandemic – which began in February 2020 – and the midterm and end-of-term tests after half a year, a full year, 1.5 years, 2 years and 2.5 years of the pandemic.

Analysis and results

As the learning growth is not comparable for the three subjects or between grades, we standardised the learning growth per subject, grade level and year for the pre-COVID-19 cohorts for comparison reasons. We standardised the COVID-19 cohort based on the pooled average and standard deviation of the two previous cohorts. This allowed us to compare the effect between subjects and between grade levels and makes the effect size understandable for an international audience. If the effect size is 0, then the students had the same learning growth after school closures compared with the pre-pandemic learning growth of previous cohorts of similar students. An effect size lower than 0 indicates a negative effect of school closures on learning growth measured in standard deviations and an effect size higher than 0 indicates a positive effect of school closures.

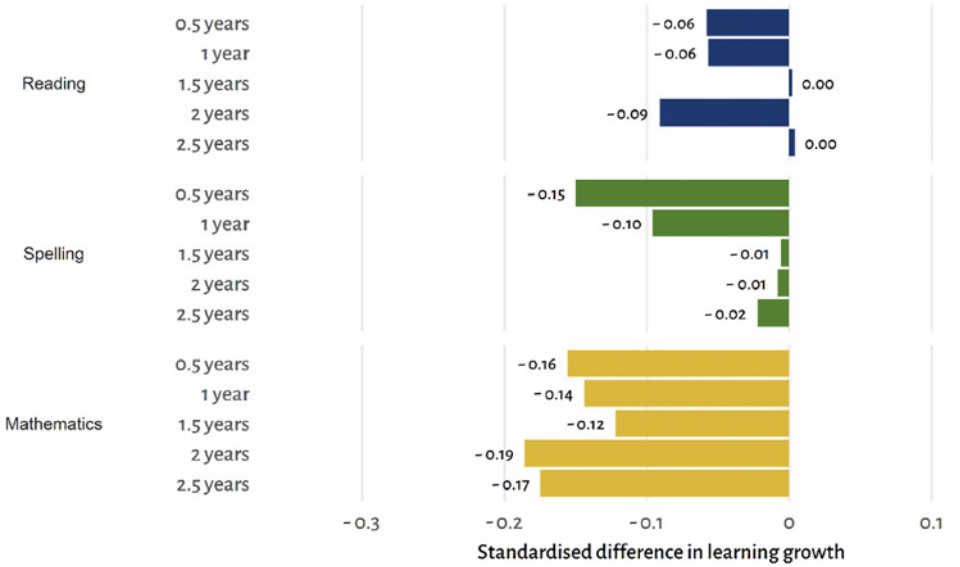
Using a design similar to difference-in-differences, we compared the COVID-19 period of learning with similar periods in the previous 2 years. In other words, for the full 2.5-year period, the COVID-19 cohort was compared with cohorts that took the midterm test in February 2016 and February 2017 and the end-of-term test in June 2018 and June 2019, that is, well before COVID-19 happened. The rationale behind a difference-in-differences design is that one looks at both the difference over time, in this case the learning growth between two test scores, and the difference between two groups of students, in this case between the pre- and post-COVID-19 cohorts. The difference in these two differences represents the effect of an intervention or unexpected event, such as COVID-19. One of the assumptions of a difference-in-differences design is that the trends of the growth in test scores between the cohorts compared would be the same if COVID-19 had not happened. In the case of the present analyses, that means that the trend before 2019/2020 would have continued in the absence of COVID-19. In an earlier publication (Haelermans et al., 2022a) we showed that, although there has been a general declining trend in learning growth over time, there was indeed a clear deviation from this trend in the year that COVID-19 happened.

The analyses include grades 1–3 of primary education for mathematics and spelling and grades 2 and 3 for comprehensive reading (as there is no midterm test for comprehensive reading in grade 1).

The autumn 2022 analyses of the effects of COVID-19 showed that, 2.5 years into the pandemic, children in lower primary school (grades 1–3) were still experiencing a

considerable delay in mathematics, but were no longer experiencing such a delay in comprehensive reading and spelling. Figure 6.1 includes all five periods since the start of the COVID-19 pandemic to allow for comparisons between periods for the same group of students. As can be seen in Figure 6.1, learning loss for spelling decreased from the first two periods to around zero in the final three periods. For comprehensive reading, we see a varying picture, with a learning loss of zero when looking at the total period of 2.5 years from the start of the pandemic. The results suggest that there was a significant difference between the comprehensive reading skills that were taught and those that were tested in a period. As for mathematics, we see that the learning loss slightly increased over time, but overall stayed relatively stable at around 0.2 standard deviations (Haelermans et al., 2022d).

Figure 6.1: Comparison of the standardised difference in learning growth for different periods after the start of COVID-19 for students in lower primary school (grades 1–3)



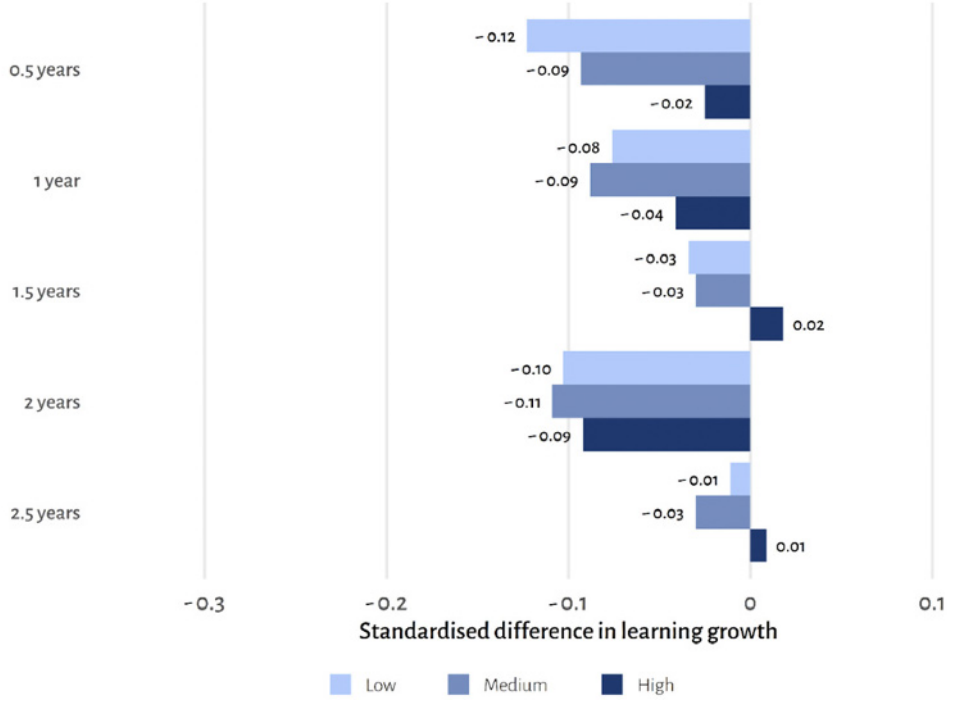
NB: The bars show the learning loss in standard deviations by subject and period. This is calculated by standardising the learning growth from the COVID-19 period in question based on the learning growth during similar periods before COVID-19. If the standard deviation in this figure is 0, then students who experienced the COVID-19-period in question have the same learning growth as those in previous cohorts who did not experience COVID-19-induced physical school closures. If the value is – 0.2, for example, this represents students' learning growth being one fifth of a standard deviation lower than previous non-COVID-19 cohorts.

Source: Administrative data based on a maximum of ~ 200 000 students for comprehensive reading, ~ 335 000 students for spelling and ~ 400 000 students for mathematics in 2 074 Dutch primary schools (numbers vary slightly by studied period).

In Figures 6.2 to 6.4, we show the learning loss per subject, with each figure showing the learning loss separately for the five periods and for the three groups (based on their socioeconomic background, as measured by parental education) of students. In all three figures, we see that inequality has decreased over time, as the difference

between students with low-educated parents and students with medium- and high-educated parents became smaller as the pandemic progressed. For comprehensive reading and spelling, the difference between these groups was no longer significant at the 2-year point. However, all three figures also show that there was still inequality in learning loss for mathematics in the final periods considered, despite inequality decreasing. Learning loss for mathematics was still 1.5 times larger for students with low-educated parents than for students with high-educated parents in the final period studied (Haelermans et al., 2022e).

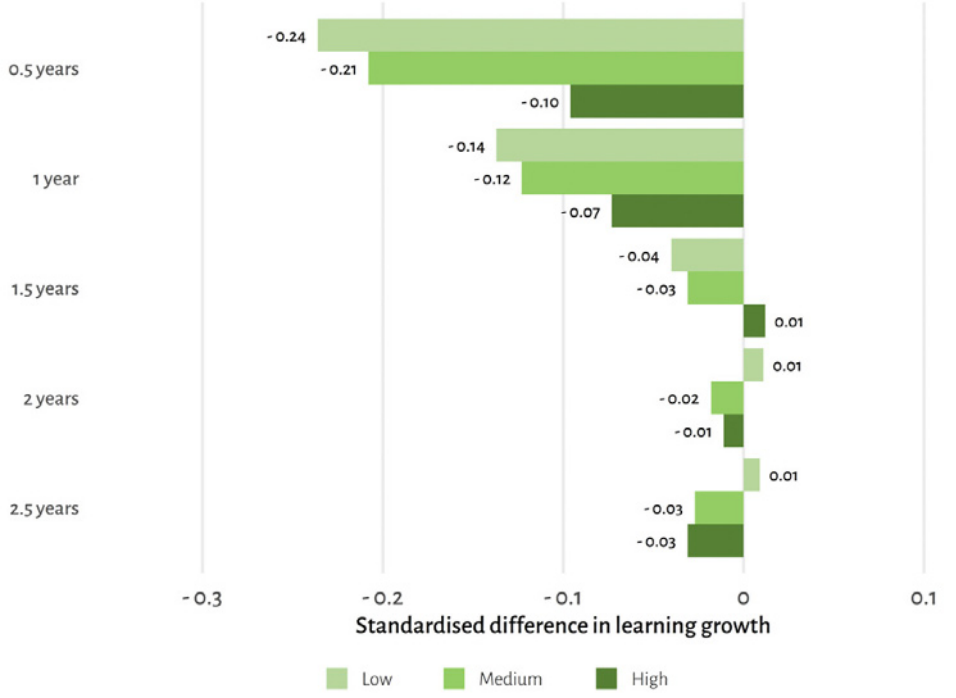
Figure 6.2: Comparison of the standardised difference in learning growth for comprehensive reading for different periods after the start of COVID-19 for students in lower primary school (grades 1–3)



NB: See note to Figure 6.1.

Source: Administrative data based on a maximum of ~ 175 000 students in 2 073 Dutch primary schools (numbers vary slightly by studied period).

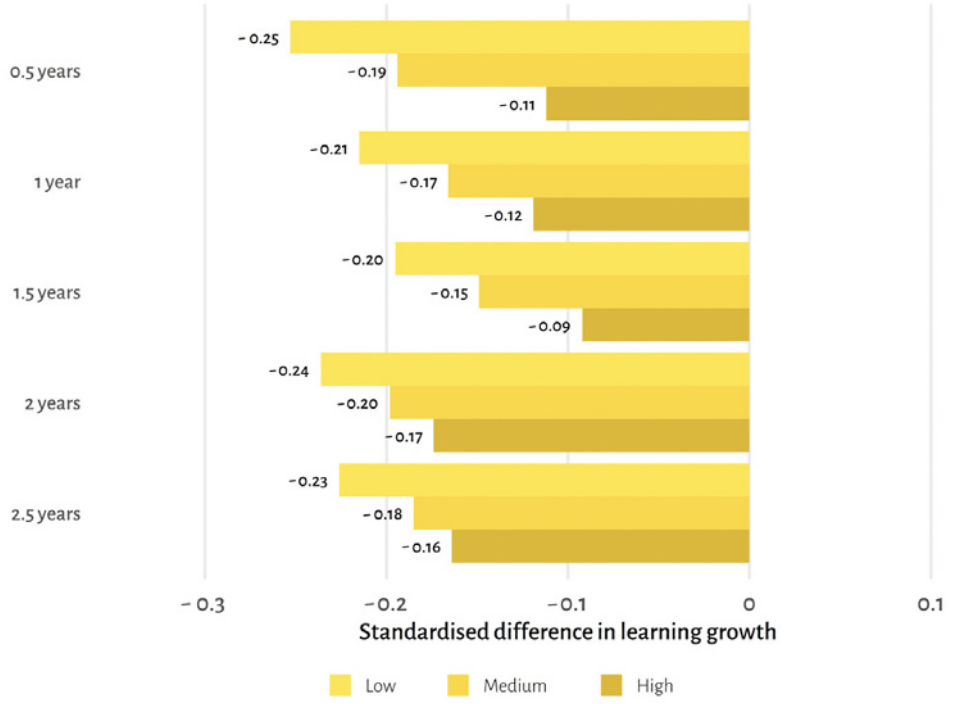
Figure 6.3: Comparison of the standardised difference in learning growth for spelling for different periods after the start of COVID-19 for students in lower primary school (grades 1–3)



NB: See note to Figure 6.1.

Source: Administrative data based on a maximum of ~ 300 000 students in 2 074 Dutch primary schools (numbers vary slightly by studied period).

Figure 6.4: Comparison of the standardised difference in learning growth for mathematics for different periods after the start of COVID-19 for students in lower primary school (grades 1–3)



NB: See note to Figure 6.1.

Source: Administrative data based on a maximum of ~ 360 000 students in 2 087 Dutch primary schools (numbers vary slightly by studied period).

Education policy reforms

This section follows a more or less chronological order of events and effect evaluations for the first 2.5 years of the COVID-19 pandemic.

Spring 2020

As described in the introduction, following the first school closure, some educational policy actions were taken immediately, such as the provision of laptops for vulnerable children, and childcare at school for children with parents who had a crucial profession and hence could not work from home. This school closure was rather sudden and applied to everyone in primary education. The schools reopened around the time that the end-of-term tests would normally be taken and most schools adhered to that schedule. Based on data from these tests, in comparison with the standardised tests

taken immediately before the schools closed down, a couple of studies show a tremendous negative effect of the school closure on the learning growth of primary school children in the Netherlands. Engzell et al. (2021) and Haelermans et al. (2022a) both showed tremendous average learning losses for all three subjects over the duration of the first lockdown, with the largest learning loss occurring for mathematics (around 0.2 standard deviations). Furthermore, both of these studies show that the inequalities between students grew in the first period of the COVID-19 pandemic. A more recent study (de Leeuw et al., 2023) confirmed the increased inequalities and showed that family composition played a large role in this.

Autumn 2020

After the first period of school closures and the alarming consequences for learning growth that the abovementioned studies showed, particularly with respect to inequality, the Dutch government made money available for remediation programmes for vulnerable students, assuming, just like everyone else, that the pandemic was over. Schools could apply for the money, and these programmes were to start as of September 2020. However, the number of cases in the Netherlands increased, and soon a second lockdown was inevitable, again including school closures. These school closures unfortunately also caused the programmes to be put on hold. After the second lockdown in the winter of 2020/2021, the schools were open more or less in time for the midterm tests, which were used for more analyses on the effects of COVID-19. Unfortunately, but not unexpectedly, studies looking into the effects of the first full year of the COVID-19 pandemic continued to show highly negative consequences of the pandemic and the two corresponding school closures (Haelermans et al., 2021). The effect sizes that were found in this study ranged from 0.06 for spelling to 0.17 for comprehensive reading. Similarly to earlier studies, this study also showed that inequalities had increased since the start of the pandemic.

Spring 2021

In its 2021 report on the Dutch educational sector, the Dutch Inspectorate of Education (Inspectie van het Onderwijs) confirmed that the students who had received extra support before the COVID-19 pandemic experienced the largest learning losses during the school closures (Ministry of Education, 2021b). The inspectorate based its conclusions on, for example, Aarts et al. (2021), who warned schools that some students might perform worse during online education. It suggested that teachers should keep abreast of study results and of the social well-being of all their students, as this can indicate which students require more support or a customised approach, such as more independent working (Aarts et al., 2021).

In an attempt to mitigate the negative effects of the pandemic on students' learning, the Dutch Ministry of Education (Ministerie van Onderwijs, Cultuur en Wetenschap), in the spring of 2021, introduced the national education programme (NEP) with a total value of EUR 5.7 billion for all education sectors together (Ministry of Education, 2022a). All schools received a certain proportion of this money (which was originally to be spent within 2 years, that is, before the end of 2023, although this was later

extended by an additional 2 years) based on the number and proportion of vulnerable children in each school. As part of the NEP, the ministry introduced a 'menu' of interventions that primary and secondary schools could choose from. It is referred to as a menu because schools can pick and choose which interventions they wish to conduct (Ministry of Education, 2022a). The basis of the NEP is the teaching and learning toolkit of the Education Endowment Foundation (EEF) (Ministry of Education, 2022a). There are two toolkits available based on the EEF toolkits: the teaching and learning toolkit and the young children toolkit (Onderwijskennis, 2023). The teaching and learning toolkit includes 29 interventions that focus on enhancing the learning development of children between the ages of 5 and 16 (Ministry of Education, 2022a). All interventions include information on the effectiveness, the duration of the effect, the strength of the (scientific) evidence and the costs (EEF, 2023; Onderwijskennis, 2023). These classifications are based on international research conducted by the EEF (Ministry of Education, 2022a). The Dutch toolkit does not include all of the interventions suggested by the EEF, as it has been adapted to the Dutch context. Therefore, some additional interventions were included. The selection was made in collaboration with school psychologists, an advisory committee and other experts (Ministry of Education, 2022a). For example, the NEP has added a couple of interventions related to spelling and an intervention that specifically focuses on the mental well-being and social-emotional development of students (Ministry of Education, 2022a).

In parallel, Kortekaas et al. (2021) reviewed some of the available remediation programmes based on existing literature. This overview also helped schools to choose from the menu. Kortekaas and colleagues looked into one-on-one tutoring, remedial teaching, summer schools, teacher professional development, strengthening parental engagement, support during school hours, extended school days and peer tutoring. They showed that one-on-one tutoring is twice as effective if done by a qualified teacher as if done by a teacher trainee or a volunteer (Kortekaas et al., 2021). However, this method requires a large number of staff to put it into practice and is therefore associated with a high cost. A less expensive measure is to provide remedial teaching in small groups. In this setting, students can also learn from each other as well as from the teacher or tutor. Nevertheless, remedial teaching is more efficient in very small groups, which also means higher costs. Furthermore, earlier research showed that summer school programmes had only limited effects on Dutch students (Haelermans et al., 2018; Onderwijs OMT, 2021; Slaap and Kuiken, 2013). Kortekaas et al. (2021) advise against implementing this method in primary education, as the only cases in which summer school appeared to be effective were to prevent students from repeating a grade in secondary school. Kortekaas et al. (2021) found teacher professional development to be highly effective for the entire classroom. However, the Netherlands is already dealing with a teacher shortage, so teachers are already working more to fill the gap. If these teachers were required to invest in additional professional training, it would take up even more of their limited time, so this might not be the best intervention. Strengthening parental engagement seemed to have more negative than positive consequences. The difference in the background characteristics of parents plays a key role in this, as parents may have differing norms and values or different financial means (Kortekaas et al., 2021). Support during school

hours was also considered. This includes extra support during independent sessions, smaller classes and grouping students with specific learning needs or with similar attainment levels together. However, this method also brings higher work pressure for teachers (Kortekaas et al., 2021). Peer tutoring is another intervention that can take place during or after school hours. It means that students support each other, often across different grade levels. Fifth graders could, for example, help third graders. This works best if children of the same gender are grouped together (Zeneli et al., 2016). However, previous research has shown that younger children experience a lower impact than older children (Kortekaas et al., 2021). Finally, extended school days have been shown to be ineffective in several studies in the Netherlands (Slaap and Kuiken, 2013; Van Klaveren and De Witte, 2015) and are therefore not recommended.

In addition to the NEP, the government introduced a compulsory so-called school scan. Each school scan is written by the school itself; in it, the school identifies vulnerabilities and aspects for improvement. The school scan is divided into three parts: part 1 focuses on the impact of COVID-19 on the students, part 2 looks at the wishes and needs of the school and in part 3 the school determines which interventions from the toolkit it wishes to implement and how this will be done in its particular case (Ministry of Education, 2022b). When looking at part 3 of the school scans from all schools, it can be seen that, out of all available interventions, the majority of schools (85 %) chose to instruct students in small groups of two to five students, 75 % of schools focused on the well-being of their students and, in many cases, education specialists and advisers were employed to support teachers in classrooms (Ministry of Education, 2022b). In addition, more than 25 % of schools spent more time on comprehensive reading, spelling and mathematics after implementing the school scan. However, this percentage differs by grade (Ministry of Education, 2021c). More than 40 % of schools invested in comprehensive reading for second graders, as comprehensive reading was seen as the most important domain. In comparison, 28 % of schools spent more time on mathematics and 25 % of schools spent more time in spelling in grade 2. In later grades, around 32 % of schools spent extra time on comprehensive reading, around 22 % of schools spent extra time on spelling and 28 % spent extra time on mathematics (Ministry of Education, 2021c).

Despite there not being any more lockdowns or school closures, the remainder of the 2020/2021 school year was heavily influenced by many interruptions, as many children and teachers were infected with COVID-19 and most schools focused only on the basic skills of mathematics and language during that period. The end-of-term test took place in the usual time slot, again allowing for another update on the effect of the pandemic.

Autumn 2021

Jacobs et al. (2021) and Haelermans et al. (2022b) analysed the state of affairs with respect to learning losses based on the data from 1.5 years into the pandemic and again concluded that there were still significant learning losses present (average of 0.1 standard deviation), in particular for comprehensive reading and mathematics. However, they also showed that the inequality, although still present, had decreased

somewhat since the first analyses a couple of months into the pandemic, which was most likely thanks to the additional financial investment of the government for vulnerable children, as well as schools' and teachers' increased attention to this vulnerable group.

Like the year before, the 2021/2022 school year had started under the assumption that COVID-19 was over and that everything could finally go back to normal. However, the virus was not gone yet, and the very strict governmental rules prescribed that whole classes and even whole schools were to be sent home as soon as three or more children in a class were infected by the virus. This led to a very chaotic first part of the school year, in which schools tried to go back to business as usual, but at the same time had to deal with constant interruptions. Although schools were not closed, many other parts of Dutch society were, creating a sort of semi-lockdown scenario. These aspects led to very chaotic situations for children with respect to online schooling despite schools formally being open. Furthermore, it led to schools not being able to start or fully implement the interventions from the 'menu' as part of the NEP, as described earlier, as many teachers were regularly out of action because of COVID-19. This was a minor disaster in itself, as it was on top of an already prevalent teaching shortage issue in the Netherlands. At the beginning of December 2021, the government decided that schools were to close 1 week earlier for the Christmas break to avoid children infecting each other at school and then infecting the whole family over Christmas. In January, schools resumed as usual and, in February/March, the midterm tests were taken in their regular time frame.

Spring 2022

In February 2022, almost all restrictions were finally lifted, even though infections were still quite high. Although schools had been open all along, now finally the rest of society was open again as well. Schools had resumed their activities as part of the NEP as of January, and the government was closely monitoring its implementation and the learning progress of students.

Two years into the pandemic, the analyses of the effects of the COVID-19 pandemic were hard to isolate from the effects of the money provided through the NEP. Furthermore, the teacher shortage also became more acute because of the pandemic. This made it harder to isolate the COVID-19 effects, so mostly only the state of affairs could be shown, given all of the planned and unplanned interventions that took place. The analyses of the effect of the 2-year COVID-19 pandemic and the various interventions showed that, by the end of this period, spelling performance was back to pre-COVID-19 levels, whereas, for comprehensive reading and mathematics, there was still a 0.15 standard deviation delay in learning (Haelermans et al., 2022f). Inequalities had again decreased because of the policy interventions that had been implemented to date, but were still present, mostly for mathematics. On the one hand, it seems that the effect of the various interventions and the additional attention given to vulnerable children started to pay off. On the other hand, there were still considerable delays, which could possibly be explained by the disorganised school year in 2021/2022. Trying to go back to normal while COVID-19 was far from gone may have been even

more detrimental to children's learning than being aware of the crisis situation and choosing to focus attention on the core subjects only.

Autumn 2022

In September 2022, the school year was finally able to start and continue without disruptions or a resurgence of COVID-19 infection rates. Schools continued to implement the interventions of the NEP and to deal with the consequences of the school closures and other disruptions during the pandemic. This included having to deal with larger heterogeneities, both within and between classes, but also with an increase in the number of students with social-emotional issues.

In addition to national measures such as the NEP, the municipality of Amsterdam, together with Education Lab Netherlands, established a research network in Amsterdam named Onderwijskennis Netwerk Amsterdam (ONA) in the autumn of 2022. Throughout the pandemic, the city saw decreases in learning outcomes, in educational opportunities and in low levels of literacy among children. Moreover, the city is struggling with the teacher shortage, especially at schools that have a very diverse student population (ONA, 2022). By bringing together teachers, school leaders and education researchers, ONA aims to improve student's learning outcomes after COVID-19 and improve primary education teaching in general in an evidence-based way (ONA, 2022).

Impact analysis of specific policy interventions

Many of the policy interventions are currently still being evaluated and therefore unfortunately cannot be included in this chapter. This is particularly the case for the interventions implemented as part of the NEP. However, some of the earlier interventions that were implemented, such as the additional money for remediation programmes for vulnerable children and the programmes in Amsterdam, have been evaluated already and are described in this section. However, before proceeding with the impact evaluation, it is important to mention that high-impact policy evaluations are not easy in the Netherlands, as many interventions are implemented through a bottom-up approach. Therefore, it is not always known exactly what schools do, unless one has school-specific data for an impact evaluation. However, policy interventions that are subsidised by the government can often be better tracked and can be evaluated by means of, for example, a regression discontinuity design. Other evaluations are often without proper counterfactuals and provide information on the situation only after the policy intervention.

The first evaluation that can be discussed here is of the online education during the two formal school-closure periods. The Dutch Inspectorate of Education conducted research between November 2020 and March 2021 to analyse the effectiveness of online and hybrid education during the school closures. The inspectorate reviewed 133 classes across 89 primary schools, with characteristics representative of all Dutch

classes and schools. The results show that online education had both negative and positive consequences. Concerning the negative aspects, there were differences among schools in terms of contact hours and the length of online classes, harder to identify non-cognitive learning delays for some students and concerns about the well-being of teachers due to higher work pressure. Positive consequences included that students became more independent in their studying skills, teachers sought professional training to provide better online education (with the disadvantage being the additional time investment required for this) and parents became more involved in learning about their children's school work (Ministry of Education, 2021a). Although this study sheds light on the consequences of COVID-19, it does not provide a proper counterfactual in its analyses and instead merely relies on the comparison between pre- and post-COVID-19 students that schools were able to make in their responses.

As described above, after the first school closure, several remediation programmes were launched to reverse the learning losses experienced, in particular among vulnerable students. A study performed jointly by the research institute LEARN! of Vrije Universiteit Amsterdam and the Research Centre for Education and the Labour Market of Maastricht University revealed that children who participated in the remediation programmes were more likely to be girls, children with an immigration background and children whose parents (one or both) were not employed (Jacobs et al., 2021). In contrast, children with highly educated parents and/or from households with high incomes were less likely to participate in the remediation programmes. In the first 6 months after the school closure, before the start of the intervention, all children had a delay in learning growth. The children targeted were those who had even lower learning growth than their peers. These children were also the children who were more likely to participate in the remediation programmes. Applying a difference-in-differences design to analyse the effect of these remediation programmes, similar to how the general COVID-19 results presented in this chapter were evaluated, Haelermans et al. (2021) found an overall significant increase in the achievement of vulnerable students after participation in remediation programmes (+ 0.04 standard deviations). Participating students had a higher increase in test scores than non-participants within the same school, and therefore the inequality between the latter and former slightly reduced (~ 10 %). Comparing different remediation programmes, Haelermans et al. (2021) found that remediation mainly occurred in small-scale and remedial teaching programmes (+ 0.16 and + 0.26 standard deviations, respectively).

A third impact analysis that can be reported on here concerns the policy interventions executed in the municipality of Amsterdam, again with a similar counterfactual to before. This study looked specifically at the learning growth of students in Amsterdam and the differences between groups of students, and evaluated particular policy interventions. The results show that, 2 years after the start of the pandemic and the school closures, the policy interventions that were implemented in Amsterdam had paid off (Haelermans et al., 2022a). Although there were still learning losses in Amsterdam, they were at a lower level than the rest of the country. Furthermore, in Amsterdam more than in the rest of the country, vulnerable students had caught up with their peers, meaning that inequality had been reduced. Finally, the starting level

of students in grade 1 was lower as a result of COVID-19, but now the scores have been restored to pre-COVID-19 levels (Haelermans et al., 2022a).

Whereas most impact evaluation studies discussed here were based on a representative sample of students and/or schools in the Netherlands, the impact analyses in Amsterdam were not. Although the municipality of Amsterdam has both high- and low-performing schools and student populations from both high and low socioeconomic backgrounds, generally speaking primary schools in Amsterdam are slightly higher performing than the national average, and Amsterdam schools are not entirely comparable to and representative of all Dutch schools.

Conclusions

Owing to regular testing and the availability of administrative data on these tests, as well as the availability of background information of students and schools in the Netherlands, it is possible to draw a detailed picture of the development of learning loss in the Netherlands since the COVID-19 pandemic, in comparison with pre-pandemic cohorts. The overall analyses of learning loss in the Netherlands show that for mathematics in particular there is still quite a way to go (with a standard deviation of learning loss of 0.17), whereas for comprehensive reading and spelling the learning loss has reduced to around zero (from initial substantial learning losses of 0.06 and 0.15 standard deviations, respectively). During the COVID-19 pandemic, the Dutch government's policy interventions mainly invested in and focused on the most vulnerable students. For most policy interventions, although not all, their effectiveness could be analysed using a proper counterfactual. The impact analyses of the remediation programmes and of the interventions in Amsterdam clearly show that the policy interventions that were focused on vulnerable students paid off. Although the inequalities that were caused mainly by the first 6 months of the COVID-19 pandemic have not yet been fully reversed, the few studies that exist on these interventions clearly show that they have had a positive impact on vulnerable children and on decreasing the COVID-19-induced inequalities.

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CHAPTER 7

The pandemic, socioeconomic disadvantage and learning outcomes in Belgium

Kristof De Witte and Letizia Gambi

Abstract

This chapter provides an overview of the measures, policies and mitigation strategies implemented in response to the COVID-19 pandemic in Belgium, both during and after the crisis. Belgium's decentralised governance system is discussed, and the policies implemented by the federal government and the three language-based communities are outlined. The chapter also explores the impact of school closures on learning deficits, utilising administrative data from the Dutch-speaking Flemish Community of Belgium. While the impact of school closures in the French and German-speaking communities is not examined in the same depth (owing to limited data availability), the effectiveness of summer schools in Flanders as a means of mitigating learning deficit is explored, particularly since the summer of 2020.

Introduction

Institutional setting

As a federal constitutional monarchy, Belgium is characterised by a highly decentralised governance system with decision-making powers divided between a three-tier government: the federal government, three regions (Brussels, Flemish and Walloon) and three language-based communities (Flemish, French and German-speaking) ([15]) (OECD, 2015). Each tier has different responsibilities ([16]), with the three communities overseeing person-related matters, such as culture, language and education. Given this, education in Belgium is divided into three autonomous education systems, while the role of the federal government is limited to establishing the compulsory school age (between 5 and 18) and duration ([17]), the minimum quality requirements for education delivery and broad retirement regulations for education staff (Golden et al., 2017). A majority of the students (58 %) are enrolled in schools affiliated with the Flemish Community. The French Community serves 41 % of the student population, whereas the German-speaking Community serves only around 1 % of students. In the Brussels Region, education is provided by both the Flemish and French communities, serving 21 % and 79 % of the student population, respectively (IBSA, 2021; OECD, 2022a).

In the Flemish Region, education is provided by two main networks of schools: public education (mainly GO! Gemeenschapsonderwijs and education organised by municipalities and cities) and private but publicly funded education (mainly Katholiek Onderwijs Vlaanderen). GO! is a network of publicly funded schools that is operated by the Flemish government. It offers education in a secular and neutral environment, with a focus on promoting diversity and individualism. On the other hand, Katholiek Onderwijs Vlaanderen is a Catholic network of schools. Despite the religious affiliation of the network, the schools operate in accordance with the official curriculum and follow the same standards and procedures as the public schools. In the Flemish Region, parents can choose between the two networks based on their preferences and beliefs.

While the three communities differ from each other in many aspects, with the students in Flemish-speaking schools scoring significantly higher in all international educational assessments, Belgium's education system is renowned for its high standards of education. Overall, Belgian students perform above average in science, mathematics and reading according to 2018 programme for international student assessment

([15]) The Flemish Region and Flemish (Dutch-speaking) Community governments merged in 1980. Since 2011, the French Community has used the name Fédération Wallonie-Bruxelles, as it operates in both the Walloon Region and the bilingual Brussels Region.

([16]) The federal government is responsible for areas including social security, justice and defence. The jurisdiction of the three regions revolves mainly around matters related to the territory and the economy. The responsibility for health matters is divided between the federal government (responsible, for example, for hospitals, healthcare and finances) and the regional governments (responsible, for example, for health inspection and prevention, but also well-being, such as elderly care) (Wayenberg et al., 2022).

([17]) Compulsory education is split into three stages: pre-primary (2.5–5 years, with only the last year compulsory, that is, as children turn 5), primary (6–12 years) and secondary (12–18 years).

(PISA) data (OECD, 2019) and in Trends in International Mathematics and Science Study (TIMMS) tests (Dockx et al., 2019; Mullis et al., 2019). Investment in education is also one of the highest among the Organisation for Economic Co-operation and Development (OECD) countries, as both the annual expenditure per student (USD 15 024 equivalent, rank 8/36, 2019) and the expenditure as a percentage of gross domestic product (5.6 %, rank 10/36) are some of the highest among OECD countries (OECD, 2022b). Furthermore, the number of higher-education graduates has been increasing steadily (FPB, 2021a) and the number of early school-leavers has been decreasing (FPB, 2021b) across Belgium since 2000.

Despite these positive indicators, a downward trend in students' performances in all domains tested by international education assessments (e.g. the Progress in International Reading Literacy Study (PIRLS), PISA and TIMSS) has been observed in Belgium in the past decade ([18]) (Dockx et al., 2019; Mullis et al., 2019; OECD, 2019). According to OECD PISA data, in 2018, approximately 20 % of students in Belgium failed to attain proficiency in at least one of the three core domains. Furthermore, PISA data highlight pronounced disparities in educational outcomes beyond the overall averages. For instance, students from more privileged socioeconomic backgrounds or whose parents have attained higher levels of education tend to demonstrate stronger academic performance. The overall decline in test scores is confirmed by Gambi and De Witte (2023), who reported a similar downward trend in standardised test scores since 2018, using data from annual formative assessments at the end of primary school in the Flemish Region. For the two main subjects, the Dutch language and mathematics, the presence of an even more pronounced downward trend has been documented since the start of the COVID-19 pandemic.

Education in Belgium during the COVID-19 pandemic

At the onset of the COVID-19 outbreak in Europe, Belgium adopted a collaborative strategy among the federal, regional and community governments. The three regions implemented comparable schedules of social restrictions, progressively escalating measures in response to the surging case numbers. Eventually, all schools were closed on 16 March 2020, followed by a complete lockdown on 17 March 2020 ([19]). Starting from 15 May 2020, primary and secondary schools in Belgium were permitted to partially reopen, bringing the total duration of total school closures to 9 weeks, which included 2 weeks of Easter holidays. Throughout this period, the implementation of distance learning measures varied significantly between schools, as they were based only on guidelines issued by each language community (Maldonado and De Witte, 2022). Most schools employed online platforms and digital exercises to facilitate distance learning, limiting instruction time to half a typical school day. However, there

([18]) A similar downward slide has been recorded in many Western countries, with the average mean performance across OECD countries in the PISA index showing a decline in both mathematics (since 2009) and reading and science (since 2012).

([19]) As of the beginning of June 2020, Belgium was experiencing the highest case-fatality ratio (16.3 %) and mortality rate per 100 000 people (80.65) in the world. This was partially attributed to the country's high reporting standards and to the timing of its national school holidays, with many early cases being traced back to travellers who had returned from northern Italy (Desson et al., 2020).

were variations in approaches between language communities. Teachers in the French Community were instructed to review previously covered material throughout the entire 9-week period (Duroisin et al., 2021). Meanwhile, Flemish-speaking schools were encouraged to engage in 'pre-teaching' by teaching new material through distance learning during the 4 weeks between the Easter holidays and 15 May, which would be repeated once schools reopened (Maldonado and De Witte, 2022).

The reopening of schools occurred in two phases. In the first phase, which began on 15 May 2020 in Flemish-speaking schools (Maldonado and De Witte, 2022) and on 18 May in French-speaking schools (Aupaix, 2021), students in the final years of primary school (6th grade) and secondary school (12th grade) were permitted to attend school for face-to-face learning for up to 2 full days or 4 half-days per week. On days when they had to stay at home, distance learning measures were continued. To ensure additional safety, the maximum number of students per class was restricted to 14 and wearing a face mask was made mandatory. For the remaining grades, distance learning continued until 8 June, resulting in a total of 12 weeks of school closures for these students (Chénier et al., 2021). In the second phase, face-to-face learning in primary school resumed on 8 June, conditional upon some safety measures (e.g. mandatory wearing of face masks), and primary schools were kept open until the start of the summer break on 1 July. While the French Community decided to cancel the external certification examinations for all students (Duroisin et al., 2021), primary schools in the Flemish Community could choose whether to participate or not in the annual formative assessment (administered in grade 6) (Maldonado and De Witte, 2022).

During this first wave of the pandemic, education was seriously disrupted for several reasons. First, the instruction time had been limited to half of a school day and little (or no) new material was covered in parts of the country. Second, as ICT was rarely integrated by teachers in pre-pandemic lectures or used for homework outside school hours, there was little to no preparedness for online learning (De Witte and Smet, 2021), which resulted in poor emergency implementation of ICT in schools across Belgium. Third, notwithstanding the high broadband connection coverage in Belgium (Eurostat, 2022), not all students could be reached, in any of the communities (Duroisin et al., 2021; Maldonado and De Witte, 2022; OECD, 2022a). For example, up to a third of primary school students in the city of Antwerp were not reached (Grymonprez, 2020).

To mitigate the negative effects of the disruption on students, a series of emergency policies were implemented during the school closures. Studies that were conducted pre-pandemic on the use of ICT resources in schools reported varying degrees of usage by teachers and showed that many students lacked laptops at home in all three communities (Agence du Numérique, 2018; Heymans et al., 2018). For this reason, additional funding was devoted to providing vulnerable students with laptops and to expanding internet connectivity. In the German-speaking Community, efforts were also made to strengthen ICT capacity by hiring additional personnel responsible for ICT support. As a consequence, by September 2021, every secondary school in the German-speaking Community should have had an in-house ICT staff member (OECD, 2022a). In the Flemish Community, additional funding was also devoted to hiring and/

or training teachers, as well as counselling and/or assistance for students (Gambi and De Witte, 2021).

During the 2020/2021 school year, the second and third waves of the pandemic led the government to close schools for another two short periods of time: 1 week in November (extending the traditional autumn break) and 1 week in April (extending the traditional Easter holidays). Face masks remained mandatory for all students from the fifth grade of primary education upwards, and classes (or entire schools) could be also placed in quarantine once a cluster of infections was found. Moreover, all extracurricular activities were forbidden until June 2021. Most COVID-19 restrictions were finally removed on 22 March 2022, among which was the face mask requirement in schools.

In higher education, we present the COVID-19 response of KU Leuven as an example. As the largest university of the region, KU Leuven is representative of the Flemish Region. Almost 40 % of all Flemish students in academic-oriented programmes are studying at this comprehensive university. It has about 60 000 students, of whom 21 % are international students. There are about 26 000 bachelor students, 21 000 master students and 3 400 master-after-master students, and the remainder are in graduate programmes. KU Leuven implemented various measures to address the well-being of its students in the 2020/2021 academic year, who faced exceptional circumstances due to the COVID-19 pandemic. The university expanded its support for students by offering online sessions on mental well-being, covering themes such as stress, self-care, addiction and the body (sleep, breathing, moving and listening). More than 400 students participated in these sessions. The Student Health Centre, in collaboration with KU Leuven's main student organisations, provides online resilience training for students. KU Leuven student support staff also offer an anonymous online chat service three times a week. Students who are experiencing hardship and international students who are new to KU Leuven can access designated study places in libraries and learning centres on the different campuses of the university. An emergency subsidy regulation was launched for students who have lost their student jobs, and they can seek financial advice from a specialised student office. The university also facilitates informal social networking between students through the online community 'MindMates chillzone'. Tailor-made English-language support on mental well-being is provided for international students, and the intercultural meeting centre Pangea provides a platform for online conversation groups, informal coffee breaks and meditation sessions.

Impact of the pandemic based on national administrative data

As there is no standardised national assessment in Belgium – each language community assesses its students' progress differently – comparison between the communities is difficult. To evaluate the impact of school closures during the pandemic and to determine the extent of the learning deficit experienced, this chapter relies on

recently published research that utilises standardised test scores data from the Flemish Community. These studies draw on a unique dataset comprising administrative data at the school level and data on standardised formative tests that are administered annually in the final year (sixth grade) of primary school in the Flemish Region. As we write this chapter, the data cover a large ([20]) sample of Flemish primary schools over a period of 8 years from 2015 to 2022. The exact same test version was administered between 2019 and 2022 ([21]), making the analysis of these test scores, and related inferences, especially robust (Gambi and De Witte, 2023).

The first study, based on data collected at the end of June 2020, shows that a significant learning deficit in three out of the five tested subjects was experienced by students in 2020 compared with previous cohorts, with declines in the school averages of the mathematics score (0.17 standard deviations) and the Dutch language score (0.19 standard deviations). At the same time, not all students and schools were affected in the same way, as schools with a more disadvantaged student population (as measured by the mother's education level and the financial support received) experienced a larger learning deficit, with mathematics and Dutch language scores declining by up to 0.6 standard deviations in schools with a proportion of low socioeconomic status (SES) students close to 1. Moreover, the inequality both within and across schools rose by 7 % for mathematics and 8 % for the Dutch language. Another study based on the same data investigated the 'marginal' effect of an extra day of school closure on test scores, observing a negative effect of extra closing days on the Dutch language scores, but not on mathematics scores. Specifically, the Dutch language score decreased by 10 % of a standard deviation after 5 additional days of school closure (Chénier et al., 2021).

Data collected by the second-largest school network provider in the Flemish Region for sixth graders (the Flemish public institution for community education GO!) point in the same direction. These figures show an increase in inequality between students and that about one in two pupils has fallen behind in learning. This attainment deficit is qualified as very large for 25 % of pupils in primary education, compared with 20 % in secondary education (FPB, 2022).

Data collected more than a year after the start of the pandemic show poor resiliency in test scores. Specifically, the school averages in both the Dutch language and the French (foreign) language decreased between June 2020 and June 2021 (Gambi and De Witte, 2021). In contrast, the June 2020 learning deficit for mathematics, science

([20]) Standardised test data are provided by the network of Flemish Catholic schools (Katholiek Onderwijs Vlaanderen), which is by far the largest education provider in Flanders (providing education to about 70 % of all Flemish pupils (Ministry of Education and Training, 2022)). While participation in these tests is voluntary, 80–90 % of schools participate every year. School-level participation rates dropped to 31 % only in 2020, just after the COVID-19-related school closures (Gambi and De Witte, 2021).

([21]) Since 2019, the same version of the test has been administered either as the main test (in 2019 and 2020) or as an additional test taken along with the official test version (in 2021 and 2022). Thanks to the administration of both tests (the 2019 test version and the new official test), test-equating techniques were performed to enable direct comparability between the scores of the 2019/2020 and 2021/2022 school years. As exactly the same test was administered in 2019 and 2020, cheating and other forms of opportunistic behaviour were prevented by keeping the test items secret until the day of administration of the test.

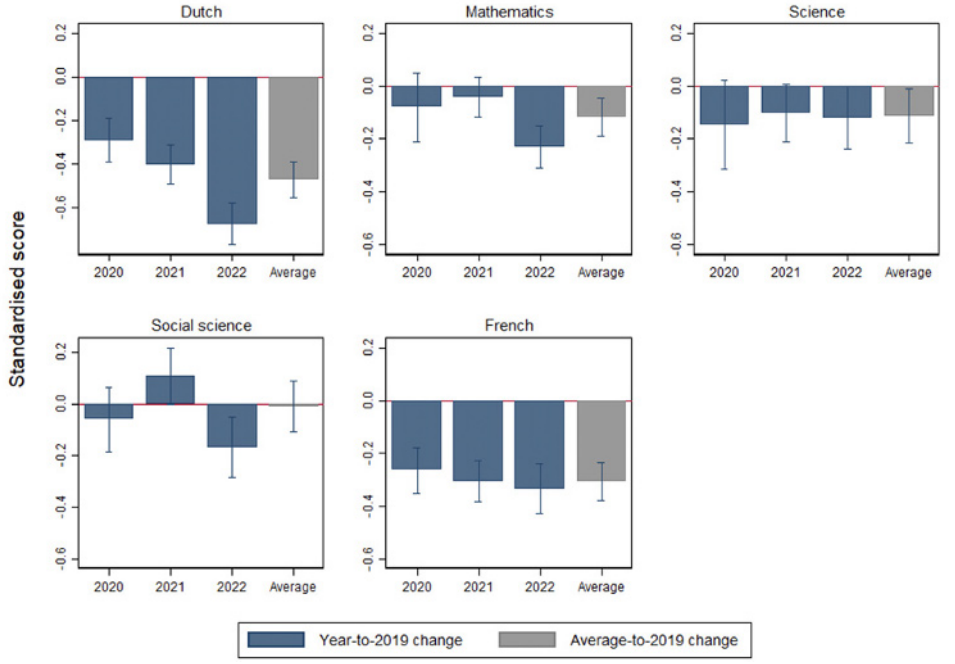
and social science remained stable, showing no catch-up effect in any of the study domains analysed 1 year after the COVID-19-related school closures ([22]).

Finally, 2 years after the pandemic, the results of Gambi and De Witte (2023) confirm the overall decline in test scores observed in previous years (Figure 7.1) ([23]). The investigation of the trend in education outcomes before and after the school closures shows an existing downward pattern in the evolution of the test scores (in all domains, that is, the Dutch language, mathematics, science and social science) since 2017. On top of this, since the outbreak of the pandemic, an even more pronounced downward trend is seen for the Dutch language and mathematics. In contrast with the previous studies outlined above, Gambi and De Witte (2023) put the evolution of the test scores in context by highlighting the challenges that the Flemish education system (and many others around the world) were facing. First, the learning deficit in mathematics and the Dutch language seemed to accelerate over time (i.e. a 'strengthened' negative trend). In 2022, the accelerated downward trend in the Dutch language was partly driven by the weakening performance of the best-performing students. At the same time, the within-school inequality in test scores has not reduced since the start of the pandemic, while the between-school inequality in test scores slowed down its rate of increase in both 2021 and 2022. Second, when considering the classroom level, Gambi and De Witte (2023) observed that schools with high rates of teacher shortages reported a higher average learning deficit. Using a school fixed-effects regression and controlling for time-varying variables, a 1 percentage-point increase in unfilled teacher vacancies was associated with a decline of – 0.04 standard deviations in the Dutch language, and – 0.05 standard deviations in mathematics. Furthermore, schools with a higher proportion of young (i.e. less experienced) teachers showed a greater average drop in test scores, while the opposite was true for schools with more experienced teachers. As mitigating the learning deficits after the COVID-19 pandemic requires significant teacher effort (e.g. for small-scale tutoring), this observation is worrisome. Finally, with regard to remediation actions, summer schools seem to have mitigated part of the learning deficit (see later section 'Impact analysis of policy interventions' for further details).

([22]) The catch-up effect refers to schools' score averages going back to (i.e. catching up with) pre-COVID-19 levels. While, in all three studies (Gambi and De Witte, 2021, 2023; Maldonado and De Witte, 2022), the data on standardised test scores were collected at the individual level (from students attending the final year of primary school, that is, grade 6), these were then aggregated at the school level to allow longitudinal analysis. Given the study design, the authors did not follow the same students across the years but evaluated how schools' average performance of sixth graders changed over time (i.e. how does the achievement of students in grade 6 who experienced the school closures (during their fifth grade) compare with the results of sixth graders in the years before the COVID-19 pandemic?).

([23]) From a methodological standpoint, the low level of participation in the standardised tests observed in 2020 (31 % of the eligible schools) creates an unbalanced panel, which can be problematic if observations are not missing at random. The empirical strategy was adapted to account for this potential challenge by including three dummies in the model, one for each year after 2019. Thus, the dummy estimates can be interpreted as the change in the outcome of interest in 2020/2021/2022 relative to pre-pandemic levels. Furthermore, a robustness test excluded the 2020 test scores from the sample, mimicking a situation in which the standardised tests were never administered in 2020. The main findings are robust to this alternative specification.

Figure 7.1: Main results by subject



Source: Gambi and De Witte (2023).

These findings confirm the evidence from earlier education disruptions (Belot and Webbink, 2010; Jaume and Willén, 2019) that learning performance is not as resilient as is often hoped and that school closures or long teacher strikes have a longer effect, resulting in increased levels of school dropout, reduced participation in higher education and lower income. Notwithstanding the significant investments in targeted remedial actions, significant learning deficits remain after COVID-19 in most education systems (De Witte and François, 2023).

Next, we consider secondary education, for which only limited data are available. It is impossible to estimate students' learning deficit, as no educational assessment data are available for secondary schools (in any of the language communities). However, indications of the impact of the school closures on Flemish secondary schools can be observed in the increasing number of reorientations of students to lower study tracks after the 2020 school closures (about 12 % more students were reoriented from a general education study track to a technical, vocational or arts study track in the 2021–2022 school year) (De Witte, 2021; De Witte and Smet, 2021).

With respect to higher education, the little evidence that is available for higher education shows that more bachelor students obtained all credits and improved their study progress in 2020–2021 than in pre-pandemic years in both the Flemish (Vermeersch, 2020) and Walloon regions. François and De Witte (2024) studied the impact of the pandemic on PhD students in the Flemish Region. In particular, they investigated the influence of the COVID-19 pandemic on graduation time, dropout

rates and PhD student enrolment at KU Leuven. Using a panel dataset of 17 476 PhD students and 2 042 supervisors from 2010 to 2022, the study used a fixed-effects model to control for both observable and unobservable supervisor characteristics. Their results show a 12 % decrease in diploma attainment in 2020, followed by an increase in 2021. The pandemic also led to a 2-month extension of the average time to graduation in 2021 and a 25 % reduction in scholarship discontinuations before returning to previous levels. New PhD student enrolment did not significantly change in 2020 but rebounded in 2021 with a 22.5 % increase. Heterogeneity analyses indicate that the previous findings are mainly driven by the field of biomedical sciences, as biomedical students who graduated in 2021 took about 6 months longer than those in other research areas. Non-EU students have a tendency to graduate sooner than EU students by 4–10 months. No significant differences were found between genders.

In contrast with the Flemish Community and other OECD countries, the French and German-speaking communities have limited access to data on educational quality and have inadequate evaluation capacity at both the central and school levels. The data collected from central examinations, if conducted, are available only to schools, and the tests are not standardised, which prevents national or international comparisons. This is the case of the *évaluations externes certificatives* taken in the final years of primary and secondary school in the Walloon Region ([24]) (Communauté française de Belgique, 2004). Instead, schools participate in large-scale student assessments. In particular, the French Community participates in various international assessments, such as PISA, PIRLS and the European Survey on Language Competences. Additionally, the community took part in the TIMSS assessment for the first time in 2023 (TIMSS, 2023). Students enrolled in the German-speaking Community participate in PISA in a test for the diploma in French language studies (*Diplôme d'études en langue française*) and, alongside students in Germany, in comparative assessments (*Vergleichsarbeiten* (VERA)) in year 3 of primary education (VERA-3) and in year 2 of secondary education (VERA-8). They do not participate in international assessments at the primary level (i.e. TIMSS and PIRLS assessments) (OECD, 2022a).

The lack of comparable data on educational performance and resources in the French and German-speaking communities prevents us from drawing a complete picture of the situation in Belgium. However, there are indications that the drop in educational attainment for French-speaking students could be even greater. First, according to the results of the latest PISA survey, the level of education of French-speaking students is lower on average that of other Belgian students (OECD, 2019), and the studies cited in this chapter show that the pandemic has had a proportionally greater impact on students with lower school results. Subsequently, unlike in the Flemish Community, no new topics were addressed via distance learning during the first lockdown in the French and German-speaking communities (Fédération Wallonie-Bruxelles, 2021). There were also no large-scale catch-up lessons for students in difficulty in the summer of 2020 in the French and German-speaking communities (Gambi and De Witte, 2021).

([24]) By scoring at least 50 % in each of the subjects assessed during these common external assessments (organised at the same time in all schools and with identical examination conditions and correction methods), students obtain their primary (*certificat d'études de base*) and secondary (*certificat d'études secondaires supérieures*) school official certificates.

Education policy reforms in Belgium

In this section, we provide an overview of the policy interventions and targeted remedial actions enacted in Belgium to support students coming back to face-to-face learning after the school closures. While a shared responsibility approach between the federal and regional governments was followed during the first wave of the pandemic (as further detailed in the introduction), regional and community policies started diverging from the federal policies as governments moved to ease restrictions (Desson et al., 2020). For this reason, we explicitly distinguish between remedial actions taken at the different regional (or community) levels.

In the Flemish Community, considerable more government expenditure on education has been set out in response to the COVID-19 school closures (De Witte and Smet, 2021; European Commission, 2022). First, additional spending amounting to EUR 353 million was allocated in 2021 and 2022 for the digitalisation of education (i.e. the Digisprong project, funded by NextGenerationEU). As part of this extra funding, schools in primary education received EUR 15 million for shared devices (EUR 25 per student up to the fourth grade) and EUR 45 million for individual devices (EUR 290 per student in the fifth and sixth grades). Secondary schools received EUR 232 million for individual devices (EUR 510 per student), while special needs education and dual learning schools received EUR 10 million for individual devices (EUR 552 per student). A final EUR 50 million was also allocated to ICT infrastructure (EUR 42 per student) (Ministry of Education and Training, 2021). Second, additional spending amounting to about EUR 147 million (or EUR 155 per student in compulsory education) was granted to hire additional teachers in an effort to mitigate the learning deficit, while EUR 27 million was granted to reinforce the Flemish Centre for Student Counselling (Centrum voor leerlingenbegeleiding (CLB)), which offers support services on various areas (career guidance, socio-emotional development, preventive healthcare, tutoring, etc.) to students enrolled in the Flemish Region. Next, EUR 21.8 million was allocated to summer schools organised during the summers of 2020 and 2021 (De Witte and Smet, 2021) (see the next section, 'Impact analysis of policy interventions', for more details), and a further EUR 10 million was provided for the organisation of summer schools during the summer of 2022 (Beheydt, 2022). Finally, in response to the COVID-19 crisis, the *Together against School Dropout* action plan (2016) was updated (OECD, 2022c). As part of this new action plan, a transition pathway initiative (2022) and an early school-leaving monitoring action were included. The former provides students in secondary vocational and technical education with (education) career guidance and (on-the-job) training to ensure a smooth transition into the labour market, while the latter is aimed at tracking the outcomes, socioeconomic characteristics and study progression of early school-leavers (OECD, 2022c).

In the French Community, further government expenditure on education has been granted to provide enhanced educational and psychosocial support, mainly to students in secondary schools. Specifically, additional resources were granted amounting to EUR 19 million to mitigate the impact of the pandemic in upper secondary education (De Witte and Smet, 2021) and EUR 9 million to strengthen the Centres for Psychological, Medical and Social Services (Les Centres Psycho-Médico-Sociaux

(CPMS)) (Fédération Wallonie-Bruxelles, 2021). Secondary schools were allocated a budget (EUR 500 per computer) for purchasing laptops equivalent to at least 5 % of their student population. Additionally, the community government provides support to students in grades 3–7 to acquire a computer by either purchasing or renting from a pre-established list of providers identified by the school. The support includes EUR 75 for purchase or EUR 25 per year for a 3-year rental or EUR 18.75 per year for a 4-year rental (Duroisin et al., 2021). Moreover, budget for additional teachers (0.25 full-time equivalent per 100 students) was set out (De Witte and Smet, 2021). Finally, in an effort to mitigate the increase in educational inequality caused by the 'summer slide' (i.e. the learning loss during summer holidays) and the negative impact of the COVID-19 school closures, the school calendar was reformed ([25]) in 2022. Specifically, as of the 2022/2023 school year, the start of the school year in the French Community is on the final Monday of August (no longer on 1 September). At the same time, the school year also no longer ends on 30 June, but instead ends on the first Friday in July. In practice, summer holidays have been shortened by 2 weeks in exchange for longer (extended to 2 weeks) autumn and carnival holidays.

The ministry in the German-speaking Community of Belgium has pledged to offer laptops to all teachers who express interest in obtaining one, as well as to all secondary school students. The distribution commenced with students in the first 2 years of secondary education in Q1 2022, followed by those in years 3 and 4 in Q3 2022 and concluding with the remaining years by Q3 2023. Moreover, the German-speaking Free Subsidised Education system (Freies subventioniertes Unterrichtswesen) launched an initiative focused on teacher well-being, namely a virtual platform called It's Teacher Time through which teachers could share experiences and practices during the COVID-19 pandemic (OECD, 2022a).

Interestingly, we observe that, in both the Flemish and French communities, additional resources were devoted to strengthening their centres for student counselling (CLB and CPMS, respectively), demonstrating a prompt response to several worrying results from studies undertaken in both regions on students' mental health during the COVID-19 crisis (Baudoin et al., 2020; De Man et al., 2021; Mazrekaj and De Witte, 2023) and the importance of personality traits in students' responses to the school closures (Iterbeke and De Witte, 2022).

Impact analysis of policy interventions

A comprehensive impact analysis of all of the policy interventions implemented in Belgium since the beginning of the pandemic is not available, and it is improbable that a thorough investigation will be conducted, given various constraints such as limited resources, data availability and the presence of multiple confounding factors related

([25]) While this initiative is part of a wider reform, launched in 2015, of the French-speaking school system aimed at raising the quality of education – the Pacte pour un Enseignement d'excellence (pact for excellence in education) – the reform of the school calendar gained traction in the aftermath of the COVID-19 school closures.

to each intervention. As far as the authors are aware, the summer schools in the Flemish Region – a targeted remedial action conducted during the summer holidays – are the only remedial measure that has been comprehensively evaluated both qualitatively and quantitatively (see the previous section, 'Education policy reforms in Belgium', for further information on policy interventions).

The Flemish government provided full funding for the summer schools, with the aim of addressing the adverse consequences of school closures. The decision was based on evidence supported by the literature regarding the prevention of the summer slide. In the Flemish Region, the summer schools involved a shortening of the summer holidays for a selected group of students, while their classmates experienced business-as-usual holidays of 9 weeks. However, the broad consensus in the literature is that a summer holiday of 8 to 9 weeks has a detrimental effect on students' learning (e.g. Paechter et al., 2015; Shinwell and Defeyter, 2017). In particular, the negative effect of a school-free period is, on average, stronger for children with a low SES, leading to a gap ([26]) of roughly 3 months in academic achievement (see, for example, Alexander et al., 2007; Quinn et al., 2016) ([27]).

In 2020 (i.e. during the summer holidays in the aftermath of the COVID-19 school closures) and 2021, a summer school was organised in approximately 20 % of the schools or municipalities in the Flemish Region (De Witte and Gambi, 2023). Although students' participation was voluntary, summer schools mainly targeted students with a low SES ([28]). Specifically, 7 521 students attended a summer school in the summer of 2020 and 7 719 students did so in the summer of 2021 (i.e. 2 % of the Flemish student population attending compulsory education participated in a summer school in each year). The summer schools were organised by local authorities and several education providers (schools, school communities and other education stakeholders) and were mainly organised in primary education (6 out of 10 summer schools). Every summer school had a remedial (i.e. mitigating the attainment deficits) or preparatory (i.e. specifically preparing students for the next school year) objective and could offer one or more study domains. The most frequently chosen domains were mathematics and the Dutch language (Gambi and De Witte, 2021, 2023; Verachtert et al., 2020).

The initial round of summer schools, held during the summer break of 2020, underwent a qualitative assessment that included detailed description. The report indicated that the bulk of these summer schools took place in the final 3 weeks of August, just before the beginning of the academic year. Additionally, the evaluation revealed that the programmes were conducted in small groups (with a maximum of 14 students) and lasted at least 10 full days or 20 half-days. Following interviews with multiple stakeholders (including summer school coordinators, parents and

([26]) This gap has been referred to as the summer slide, back slide or summer learning loss (see, for example, Alexander et al., 2007; Meyer et al., 2017; Paechter et al., 2015).

([27]) In the French Community of Belgium, a reform was approved in 2022 that shortened the summer holidays from 9 to 7 weeks.

([28]) Teachers, the CLB and local partners, such as social welfare organisations, teamed up in an effort to encourage low-SES students to participate in summer schools in 2020 (Verachtert et al., 2020). In 2021, summer schools targeted a broader audience, although vulnerable students remained the main target (Gambi and De Witte, 2023).

students), a series of strengths and weaknesses were identified. On the one hand, parents and students positively evaluated the contribution of the summer schools to children's learning. Furthermore, both coordinators and staff reported high satisfaction with the summer school they participated in. On the other hand, the difficulty of recruiting suitable employees was highlighted and, because of this challenge, the employees of about one in five summer schools were not pedagogically trained (Verachtert et al., 2020).

While the qualitative assessment provided useful descriptive information, it did not explore the correlation between attending summer school and students' academic performance. Given this, a series of quantitative evaluations were conducted to address this gap. Gambi and De Witte (2021, 2023) examined whether participation in a summer school correlated with an improved average school performance in the standardised test taken in the school year following the summer school ([29]). First, the evaluation showed that the summer schools were effectively organised in the most disadvantaged areas (i.e. where the COVID-19-related learning deficit was the greatest in June 2020). Second, splitting the sample according to participation in a summer school, the results suggest that the learning deficit in both the Dutch language and mathematics in areas with summer schools was reduced in June 2021 compared with June 2020. This is in contrast with the areas where no summer school was organised: there, compared with June 2020 results, the learning deficit had increased significantly for the Dutch language and insignificantly for mathematics (Gambi and De Witte, 2021). Similarly, in June 2022, Gambi and De Witte (2023) observed that, in schools that engaged in this remedial intervention during the summers of both 2020 and 2021, test scores for the Dutch language declined less than in schools that did not offer summer schools. At the same time, the 2022 test scores for mathematics were no longer lower than those in 2019 for those schools that offered a summer school during the summers of both 2020 and 2021. Finally, the investigation of the distribution of test scores within schools (by percentile) showed that the test-score change in the Dutch language in 2022 compared with 2019 was stable for the students in percentiles 25–35 (i.e. the worst-performing students in a school) within schools with a summer school. Students in percentiles 65–100 (i.e. the best-performing students) also seemed to benefit from their school offering a summer school. By contrast, in schools that did not offer a summer school, the test scores from all students decreased more than in schools with summer schools, and the learning deficit of the students in percentiles 65–100 especially stands out, as it reduced significantly in 2022 compared with previous years (Gambi and De Witte, 2023).

The findings indicate that summer schools were successful in preventing further learning deficits among the most at-risk students. The positive impact is likely to be

([29]) The sample of test-participating schools was split into two groups according to whether or not the school participated in a summer school during the 2020 and 2021 summer breaks. The correlation between summer school participation and average school performance was then investigated by looking at the students' standardised test results (averaged at the school level) of the school year following the summer school (i.e. 2021 and 2022, respectively). Owing to the likely presence of (some) selection bias due to, for example, only those schools with highly motivated teachers potentially organising summer schools, the study does not claim causation. However, thanks to an empirical specification, including school fixed effects and a series of controls, the bias in the estimates is likely to have been limited considerably.

attributable to the intensive supervision in small groups (i.e. tutoring) provided by dedicated instructors ([30]), a curriculum that prioritised essential skills and knowledge, and additional instructional time. By participating in summer schools, students were better prepared for the start of the academic year, resulting in less time and attention lost for the teacher. Moreover, the results demonstrate that the benefits of summer school extended beyond individual students and had a positive effect on the entire class (De Witte and Gambi, 2023). While both studies show the positive role that summer schools play for students' performance, further research should examine the underlying mechanisms (e.g. small class size and extra instruction time) and the causality of the findings.

Conclusions

The evidence reviewed from Belgium on the influence of the COVID-19 pandemic on education has brought to light the significant learning deficits that exist within education systems, despite substantial investments in targeted remedial actions. These deficits have the potential to accumulate over time, leading to long-term consequences for students. Drawing from the Flemish evidence reported by Gambi and De Witte (2021, 2023), as well as insights from existing literature, it is recommended that these deficits be carefully monitored over time. However, it should be acknowledged that, as time passes, it becomes increasingly difficult to distinguish between the effects of the COVID-19 pandemic and other (negative) influences on education outcomes, such as the teacher shortage, the existing trends in education systems or (sudden) migration. Nevertheless, given the important role that education plays in shaping individual and collective welfare, remedial actions need to be maintained. For example, our findings suggest that shortening the duration of summer holidays and providing extra instruction time are effective strategies to mitigate the impact of learning loss. By reducing the length of the summer break, students can have more continuous engagement with educational activities, which may help in recovering lost learning. Additionally, offering supplementary instruction can provide targeted support to students in areas where they have fallen behind. These measures can contribute to minimising the learning deficits that were experienced during the pandemic and supporting students' educational progress in the long run.

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([30]) These were not necessarily fully qualified teachers. However, as indicated in a literature overview, lower-qualified teaching personnel have been shown to be (cost-)effective for small-group tutoring (De Witte et al., 2023).

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CHAPTER 8

The pandemic, socioeconomic disadvantage and learning outcomes in Hungary

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Abstract

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

Introduction

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

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

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

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

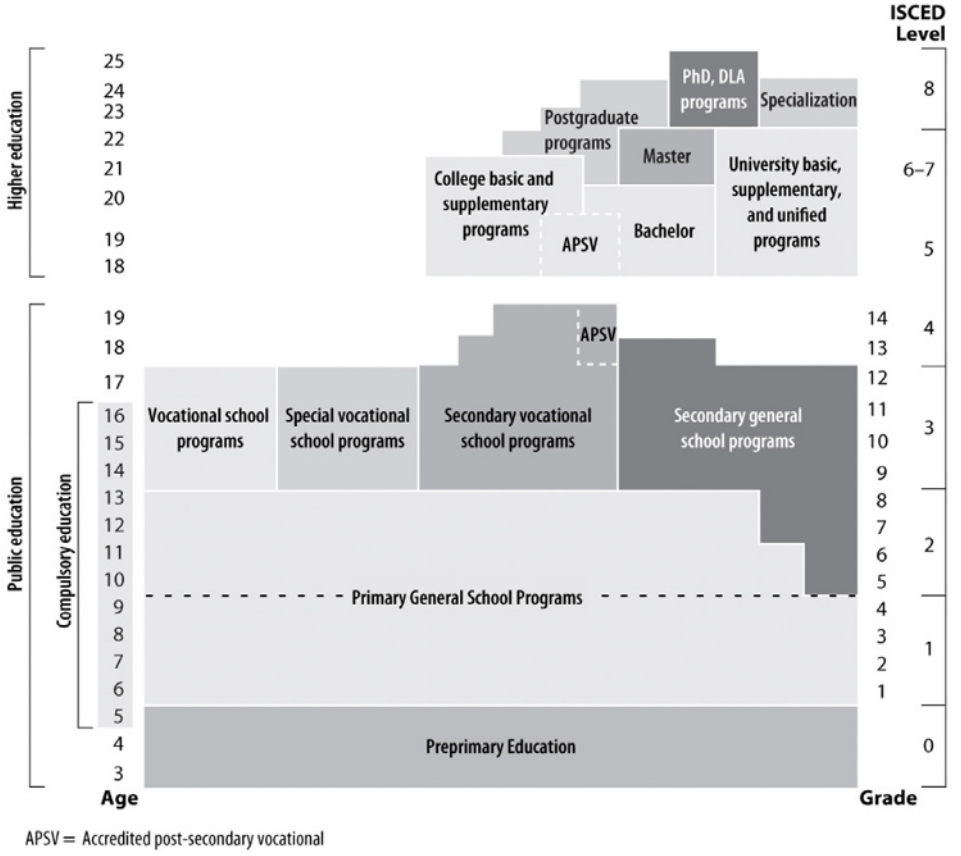
Similarly to previous research, our analysis in this chapter reveals a notable decline in test scores among grade 6 students, indicating a significant learning loss during this period. However, there was no clear decline in student performance among grade 10 or 8 students. Interestingly, the most substantial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

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

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

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

Figure 8.1: The Hungarian education system



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

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

National administrative data

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

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

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

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

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

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

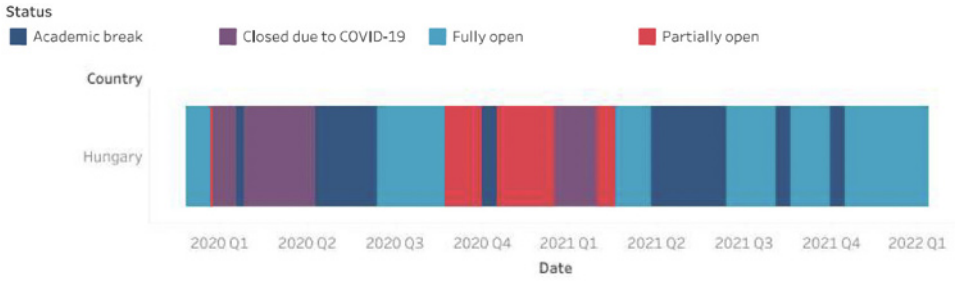
([31]) For the generation of the SES index, see Hermann et al. (2023).

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

Education policy

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

Figure 8.2: Timeline of school closures in Hungary



Source: UNESCO (2022).

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

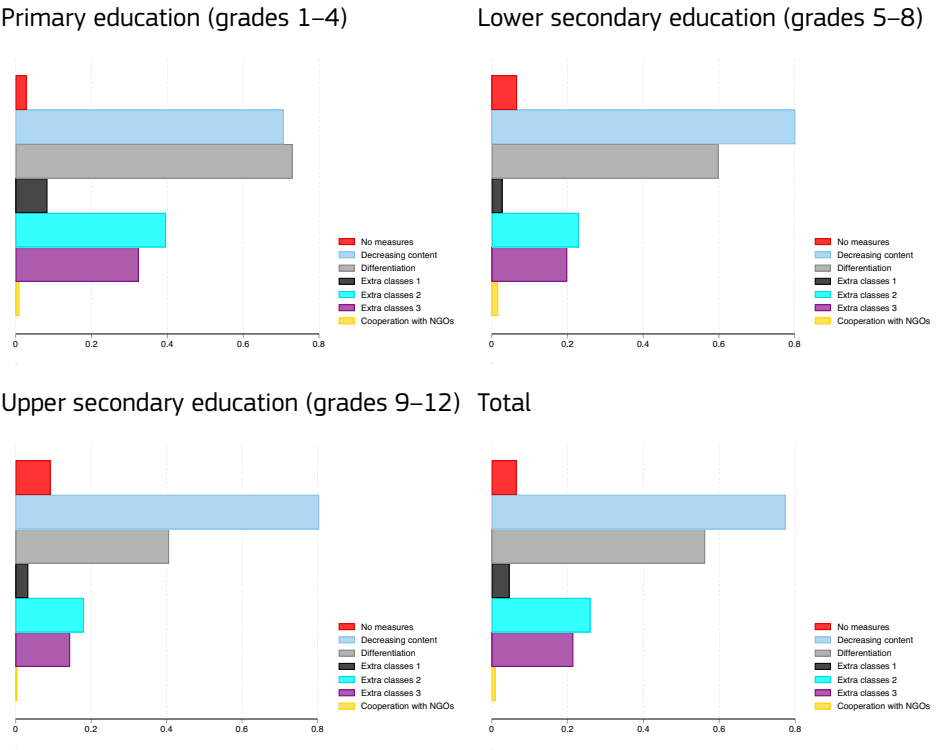
School-level responses to mitigate learning loss

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

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

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

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



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

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

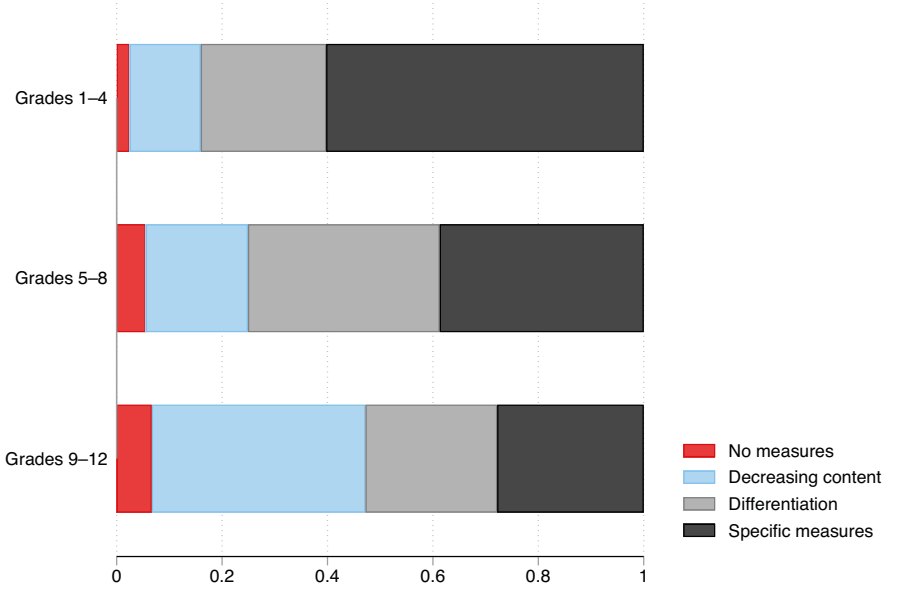
It is notable that a significant majority of teachers, regardless of the educational level, opted to reduce the curriculum content to some degree in their efforts to address learning loss. The second most frequently employed strategy involved differentiated teaching, with a particular emphasis on students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

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

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

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

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

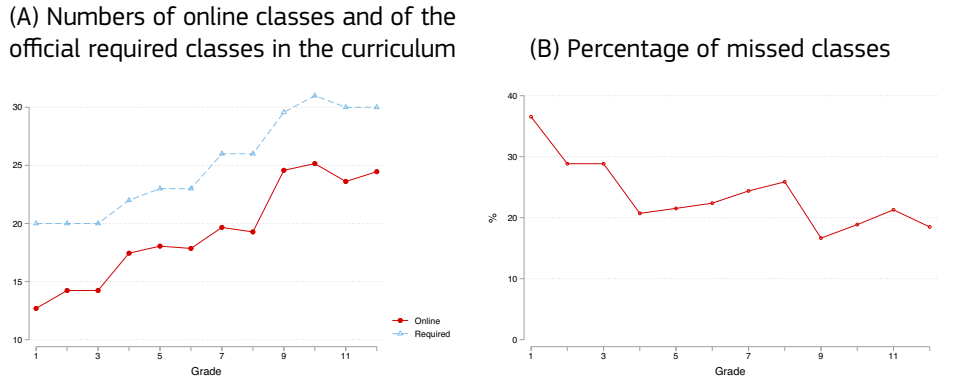


Source: Authors' calculations based on the teacher–principal survey (see Holb et al., 2022).

Parental views of distance learning

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

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



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

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

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

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

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

Results

Average learning loss

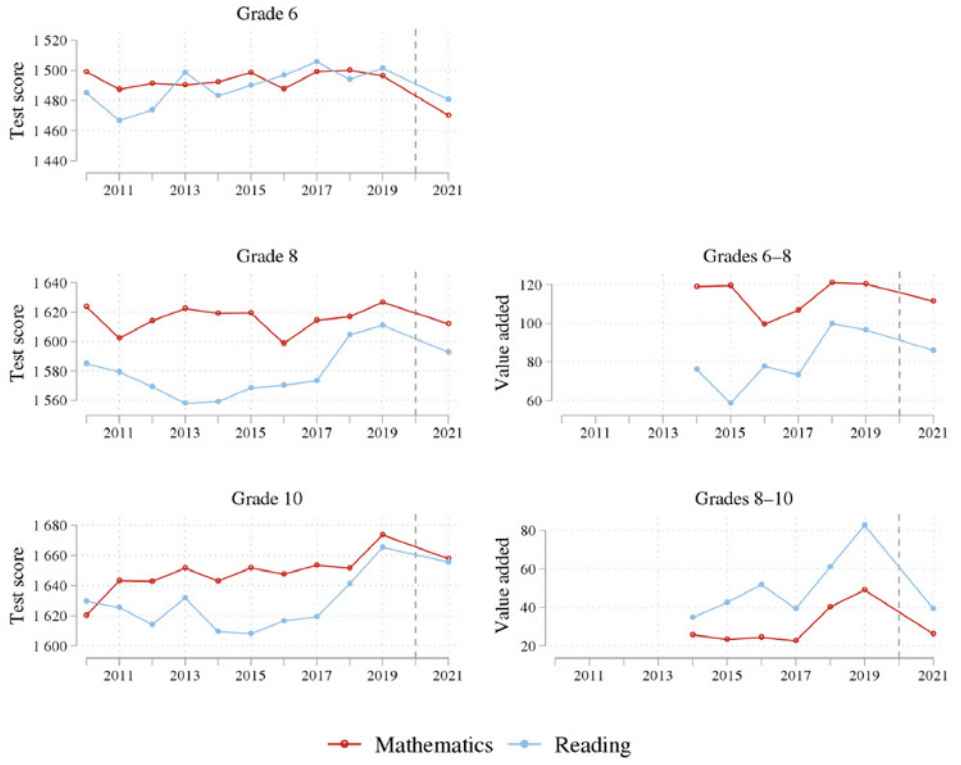
Initially, we examined the changes in raw test-score averages over the decade preceding the COVID-19 outbreak and in 2021. Figure 8.6 illustrates the trends in both mathematics and reading scores for all three grades surveyed. The second column of the figure displays the average individual score growth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

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

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

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

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



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

Source: Authors' calculations based on the NABC dataset.

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

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

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

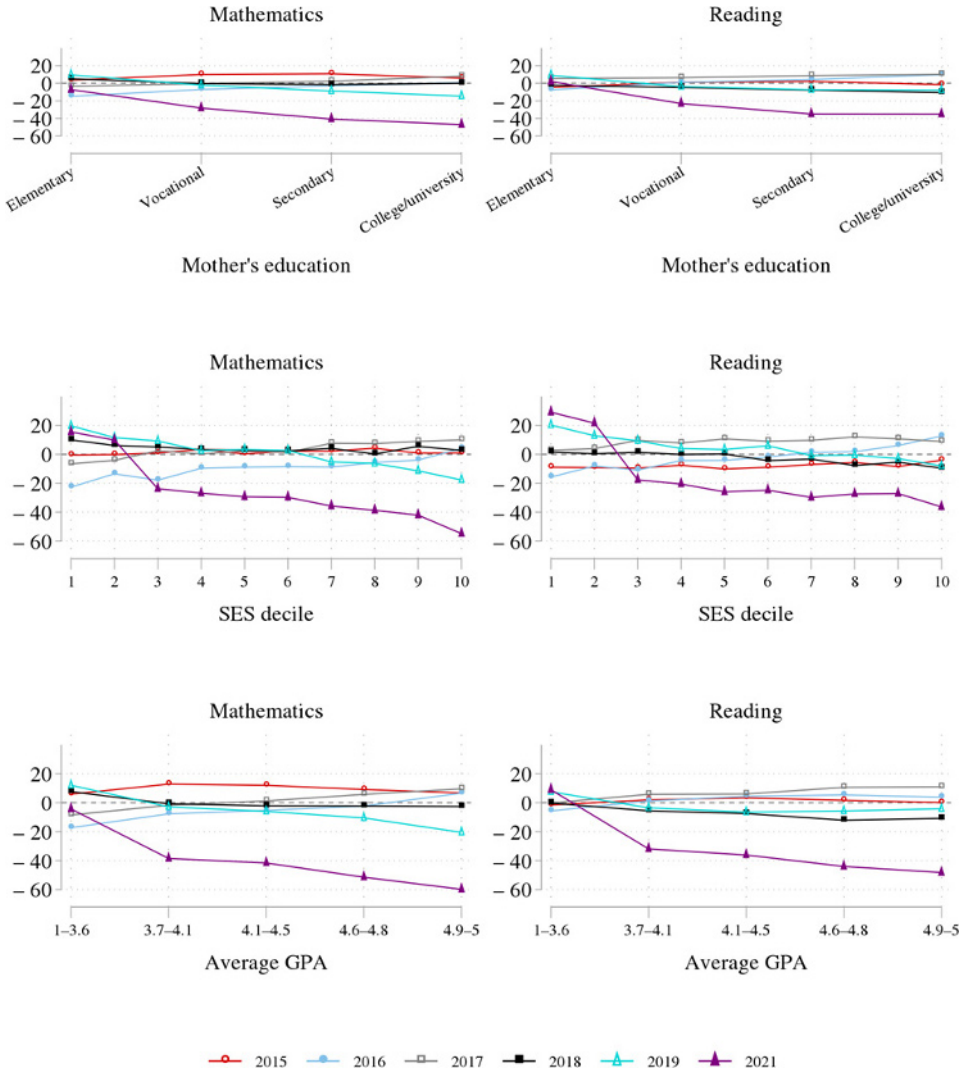
NB: The control variables included the following: gender, SEN status, mother's education, father's education, number of books in household, student-owned books, SES index decile, class size, GPA, type of education and school fixed effects. Standard errors clustered at the school level are in parentheses.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

Source: Authors' calculations based on the NABC dataset.

Learning losses among different groups of students

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

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



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

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

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

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

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

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

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

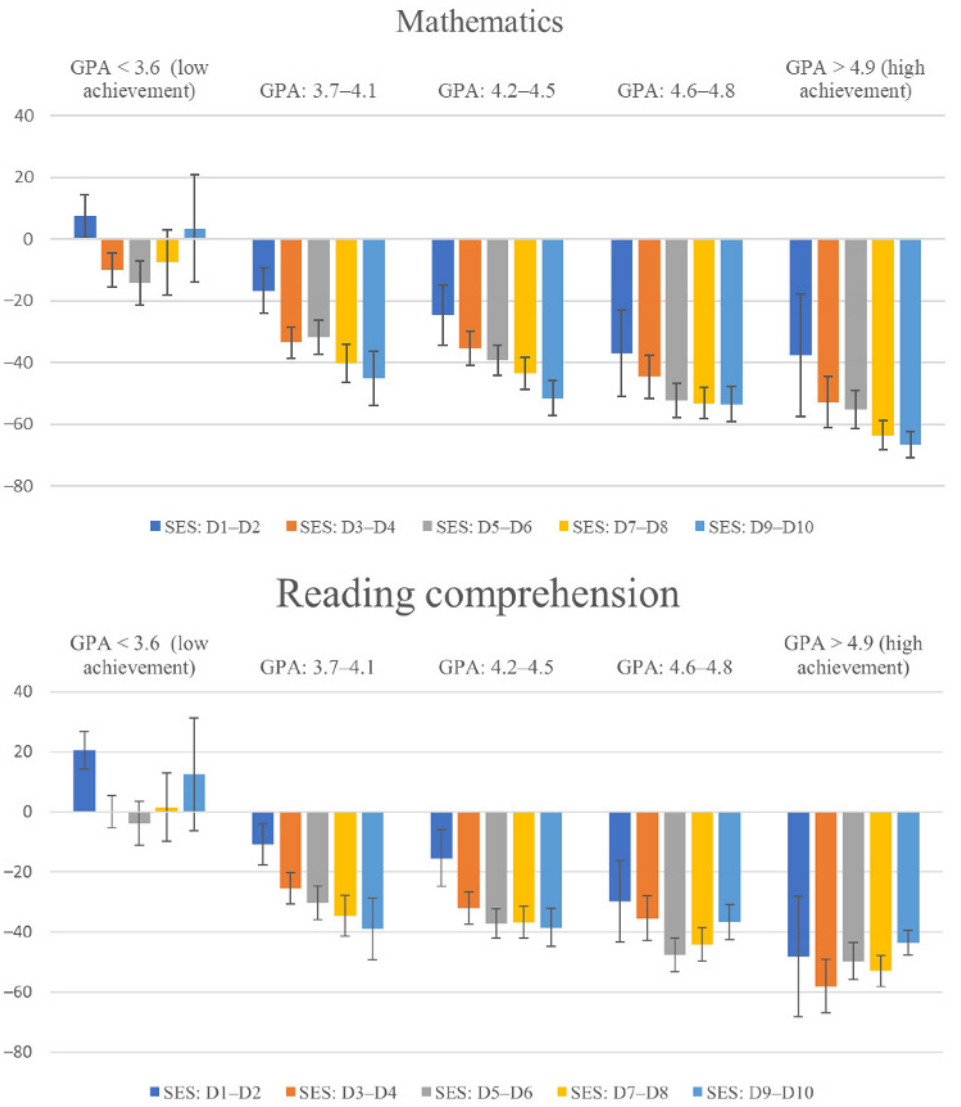
NB: The first line is the coefficient for the dummy for 2021. Below this are the coefficients for the interactions of individual characteristics and the 2021 dummy. The control variables in all models were as follows: gender, SEN status, mother's education, father's education, number of books in the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

Source: Authors' calculations based on the NABC dataset.

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

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

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



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

Source: Authors' calculations based on the NABC dataset.

Learning losses in different groups of schools

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

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

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

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

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

Source: Authors' calculations based on the NABC dataset.

Conclusions

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

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

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

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Appendix

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

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

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

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

Part III:

Conclusion

CHAPTER 9

Taking stock of the trajectories of pandemic-related education reforms

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Abstract

This chapter covers and summarises a range of COVID-19-related topics, from school closures and remote learning to gradual returns to in-class instruction and from contingency strategies and remedial policies to catch-up schemes and education provisions for the most affected and disadvantaged students in the countries included in this volume. Cross-national reflections on these topics are drawn from previous chapters to share policy suggestions in conclusion. Analyses take a step back to consider key factors in preparedness that affected the extent to which policies that were intended to mitigate learning loss were successful and the ways that governments and education systems handled the impact of the pandemic on educational structures. We compare different policy arrangements covering schooling and teaching methods during COVID-19 periods. We then point out the type, magnitude and domain of the major learning deficits found at both the country level and the educational stage. Finally, we look at innovative policy reforms that have been and are soon to be implemented aimed at overcoming COVID-19-induced learning deficits and reducing the resulting educational inequalities between disadvantaged and advantaged students.

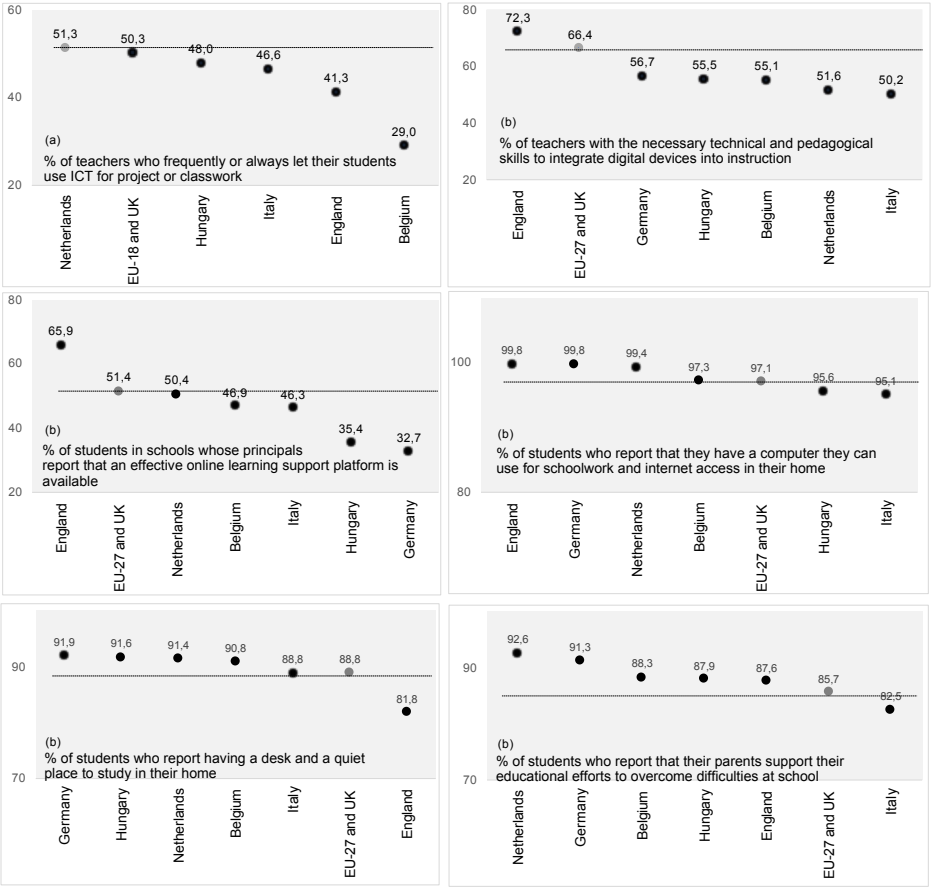
Preparedness and national education systems

Before the outbreak of the pandemic, no one could have imagined that digital learning and alternatives to in-person schooling would become crucial for students' learning. The problem is that in-person schooling by means of physical classroom interactions has a balancing effect, with collective lessons and exercises provided for all in a quite similar way (Betthäuser et al., 2023; Donnelly and Patrinos, 2022; Schult et al., 2022a). Therefore, when schools were closed or face-to-face education was disrupted, unequal conditions in learning settings exacerbated educational inequalities among students from different cultural, economic and social backgrounds (Blaskó et al., 2022; Gambi and De Witte, 2021; König and Frey, 2022). Additionally, multiple factors negatively affected students' achievements during physical school closures and after the reopening of schools besides the obvious issues of less teaching and unequal conditions in learning: (1) the quarantine of teachers and students during the periods in which the schools were reopened; (2) the psychological and relational discomforts and distress of students – and in part of teachers – due to anxiety, the panic of contagion and long-COVID pathologies; (3) the low degree of effectiveness of remote teaching per se, as both teachers and students generally struggle to rely fully on remote classes, and the lack of proper spaces at home dedicated to learning (remote learning was found to be less effective than in-person learning in numerous pre-pandemic studies for these reasons and because of high rates of distraction, which reduce students' attention spans during online classes); (4) the lack of essential peer-to-peer and cooperative learning that is typical of the classroom learning setting of in-person education; (5) the general decrease in face-to-face socialisation in the ordinary day-to-day life of pupils, which limits the development of basic socio-emotional skills; and (6) the difficult situation of parents who, in some cases, have faced economic difficulties, challenges to their work–life balance and increased pressures on their time as a result of the restrictions, meaning they have less time to follow or support their children's studies (Agostinelli et al., 2022; Pedrosa et al., 2020; Racine et al., 2021; Schult et al., 2022a; Zaccoletti et al., 2020).

Given all of these disruptive factors related to school closures and the sudden switch to distance learning, it is worth considering to what extent each national education system, broadly speaking, was prepared for the new educational environment and was able to minimise the risks of learning loss. This is relevant because, as school closures and distance learning aggravate learning gaps, these gaps may have widened if schools, teachers, students and parents were unprepared for the new educational environment. To analyse how prepared teachers, students and schools were before the pandemic, we used the 2018 data from the Teaching and Learning International Survey (TALIS) and the programme for international student assessment (PISA) and considered six key indicators for the countries covered in this volume: (1) the percentage of teachers who were accustomed to students frequently using ICT, (2) the percentage of teachers with the necessary technical and pedagogical skills to integrate digital devices into their instruction, (3) the availability of online learning support platforms in schools, (4) the percentage of students who had a computer that they could use for school work and internet access in their homes, (5) the percentage of

students with a desk and a quiet place to study in their homes and (6) the percentage of students whose parents supported their educational efforts to overcome difficulties at school (Figure 9.1).

Figure 9.1: Key factors of preparedness for using digital devices, remote learning and parental support before the COVID-19 pandemic (TALIS and PISA 2018 data)



NB: The horizontal line in the graphs displays the EU average, which, in graph (a), is calculated based on 18 EU Member States – Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Latvia, Portugal, Romania, Slovakia, Spain and Sweden – plus the United Kingdom – while, in all of the (b) graphs, it is calculated based on 27 EU Member States plus the United Kingdom.

Source: Authors' processing of Organisation for Economic Co-operation and Development (OECD) TALIS 2018 data for graph (a) and OECD PISA 2018 data for all (b) graphs.

In terms of teachers' preparedness and schools' previous capability of using online platforms, the countries we covered in this volume were below or slightly below the European average in 2018. Belgian, English and Italian teachers who frequently let their students use ICT for educational purposes accounted for only 30 % to 45 % of

the whole teaching population, with only Spanish teachers reaching the European average based on the European countries that participated in TALIS.

According to school principals who took part in the 2018 round of PISA, the proportion of teachers with the necessary technical and pedagogical skills to integrate digital devices into instruction slightly exceeded half of the teaching population in five of the six countries examined (ranging from 50 % in Italy to 57 % in Germany) and only England was above the EU-27 average (65 %) with two out of three teachers having such skills. A very similar level of readiness was found in terms of schools' and students' familiarity with online educational platforms to facilitate learning activities: England (66 % of schools) was above the European average (51.5 %), the Netherlands was around this average, but Belgium and Italy were below the average (47 % and 46 %, respectively) and Hungary and Germany were far below it (36 % and 22 %, respectively).

Conversely, considering students' habits and resources, much more favourable conditions for online learning at home emerged. In the six countries considered in this book, at least 95 % of 15-year-old students in 2018 had their own computer for studying and had internet access in their home, about 90 % had a quiet and comfortable place to study and, importantly, at least 85 % had parental support in tackling difficult school issues.

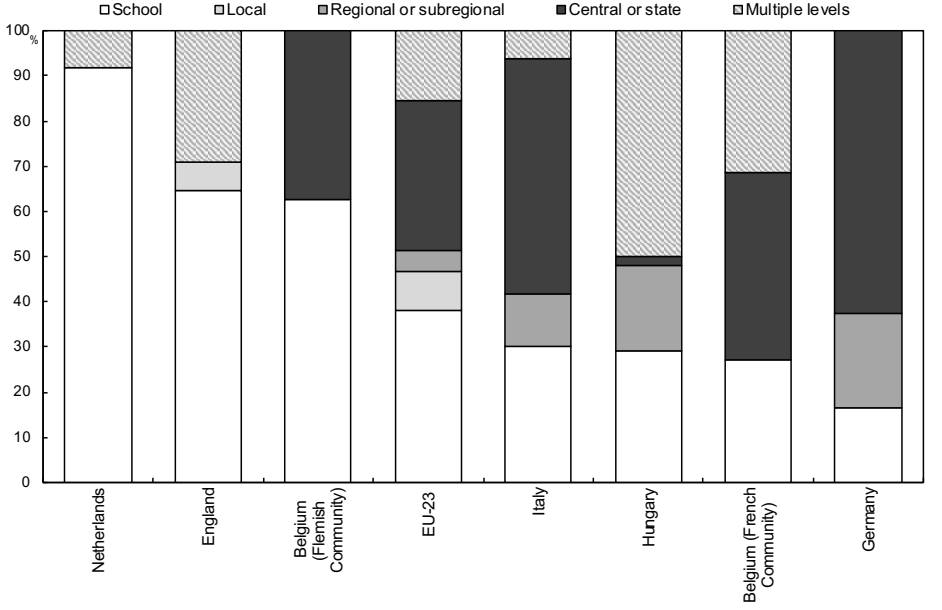
Nevertheless, the percentage of Italian students who could not count on parental help to cope with educational difficulties was much higher than the European average, as was the percentage of English students who did not have a proper place at home to study. A prerequisite for any type of online learning is that students have easy access to a connected computer in an appropriate physical space for learning at home and experience an adequate climate for home schooling (Boys, 2022; Di Pietro et al., 2020). A lack of such materials, motivation and support is perhaps one of the main reasons why educational achievement was so dependent on socioeconomic and cultural inequalities during the pandemic. In the remote teaching and learning environment during the pandemic, and especially for pupils in primary schools, parents often became key figures for education provision and served as both motivators of children's engagement and technical facilitators of remote learning (Ribeiro et al., 2021; Weber et al., 2021).

Previous digitalisation cannot be the only predictor of the effectiveness of remote learning, as in-person teaching and learning and collective school activities that integrate digital devices differ significantly from remote teaching and learning (Capone and Lepore, 2022; Nortvig et al., 2018; Powell et al., 2015). Additionally, other than digital (un)preparedness, other factors might have affected the magnitude and intensity of learning loss: one of the most significant is the length of school disruption (i.e. the actual number of in-person schooling days, weeks and months missed by students) (Engzell et al., 2021; Maldonado and De Witte, 2022; Tomasik et al., 2021). Equally significant are the alternative teaching solutions implemented at the national and subnational levels (the choice of which is an education policy decision), the levels of proficiency and school inequalities before the pandemic in each country and the different features of national education systems.

When faced with a crisis of vast and unprecedented proportions such as the first wave of the COVID-19 pandemic, central state institutions were forced to take emergency measures: the full closure of schools was an approach taken almost everywhere in Europe. Nevertheless, the levels of decentralisation in decision-making and of local school autonomy played an important role in the return to regular school activities in the 2020/2021 and 2021/2022 academic years, although this may have led to inequalities in in-person education between regions and even between schools (Gouëdard et al., 2020).

Using information provided by the PISA 2018 survey, we can get a rough picture of the level of school autonomy in each of the national education systems prior to the pandemic (Figure 9.2). In 2017, the educational systems that granted the most decision-making autonomy to individual schools were the education systems in England, the Flemish Community of Belgium and the Netherlands. In contrast, the education systems in the French Community of Belgium, Hungary and Italy traditionally afforded little room for manoeuvring to individual local schools. Germany stands out among the countries considered in this book, as there education organisation is mainly the responsibility of the 16 federal states. Consequently, school closures were handled differently in the different federal states in Germany.

Figure 9.2: Percentage of decisions taken at each level of government in public lower secondary education (2017)



Source: Authors' processing of the OECD 2018 indicators (OECD, 2018).

In the cases of Italy, Hungary and, in part, Germany, we found a tradition of some autonomy being granted to schools while choices relating to school closures and alternative teaching modes were centralised, although the choice of remote learning

tools and applications was often left to the discretion of individual schools or even individual teachers. In Italy, the organisation of schooling for all grades is managed centrally, but there were regional differences based on the pandemic risk and on regional emergency legislation, as reported in Chapter 5. Hungary employed an even more centralised decision-making process, as reported in Chapter 8.

In contrast, a tradition of decentralisation in England and the Netherlands appears to have corresponded to less central interventionism, at least in the periods following the first pandemic wave, as schools were able to put in place measures adapted to the specific conditions of contagion in their territories, without prejudice to guidelines established at the governmental level (see Chapters 3 and 6). It should also be noted that, in England and the Netherlands, more than 50 % of students are enrolled in government-dependent and independent private schools, a percentage that is much higher than in the other countries considered in this book (OECD, 2020, Table V.B1.7.1). We do not have data concerning the proportion of non-public schools in Belgium, but we know that private but publicly funded schools are quite common in the Flemish Community, where many decisions are usually taken at the school level (see Chapter 7).

The organisation of primary and lower secondary education (International Standard Classification of Education (ISCED) levels 1 and 2) differs significantly among the countries. In Germany and the Netherlands, students are placed into different secondary education cycles depending on their performance. In Hungary, students are also placed into tracks relatively early. This is not the case in Belgium, Italy or the United Kingdom, where comprehensive schooling reaches far into secondary schooling. Over the last 30 years, an extensive body of literature has focused on the effects that school tracking can have on influencing the widening of learning inequalities among students. The general conclusion is that early tracking increases inequalities in educational achievement, especially in those countries where the education system is rigid and the school tracking is irreversible (Hanushek and Wößmann, 2006; Reichelt et al., 2019; Van de Werfhorst, 2019). In terms of the learning loss due to the pandemic, one of the most significant factors is the extent to which school tracks reflect the socioeconomic and cultural stratification among students. As noted for Italy in Chapter 5, this relationship between students' social origin and school track is robust and the gaps in post-pandemic learning loss have widened precisely along school-track lines. Elsewhere, besides school track, other factors play a decisive role in explaining inequalities in learning and educational success. For example, tracking takes place relatively late in Belgium, but educational inequalities in Belgium measured in terms of score variations are similar to or higher than those in Germany and the Netherlands, where tracking takes place relatively early. Similarly, looking at proficiency in mathematics, the level of disparity among Italian students is similar to that among Dutch students, although tracking in Italy occurs later than in the Netherlands (Table 9.1).

Table 9.1: Mean score and variation in reading and mathematics performances

	Standard deviation		Percentiles							
			10th		Median (50th)		90th		95th	
Reading	**SD**	**SE**	**Score**	**SE**	**Score**	**SE**	**Score**	**SE**	**Score**	**SE**
Italy	97	(1.7)	345	(4.6)	481	(2.9)	598	(3.4)	628	(3.5)
Hungary	98	(1.3)	346	(4.0)	479	(3.1)	602	(3.7)	631	(4.1)
United Kingdom	100	(1.3)	372	(4.3)	506	(2.7)	632	(3.5)	664	(3.8)
Belgium	103	(1.3)	352	(3.8)	498	(2.7)	623	(2.6)	653	(2.8)
Netherlands*	105	(1.7)	344	(4.4)	486	(3.7)	621	(3.3)	651	(3.4)
Germany	106	(1.5)	354	(4.5)	504	(4.1)	632	(3.5)	663	(3.6)
Mathematics										
Hungary	91	(1.6)	360	(4.0)	484	(2.9)	597	(3.7)	626	(4.7)
United Kingdom	93	(1.4)	381	(4.0)	504	(2.7)	620	(3.3)	651	(4.2)
Netherlands	93	(1.8)	394	(4.8)	524	(3.0)	638	(3.6)	664	(3.7)
Italy	94	(1.8)	363	(4.7)	490	(3.5)	605	(3.9)	635	(4.9)
Belgium	95	(1.7)	377	(4.1)	514	(2.5)	628	(3.4)	656	(3.7)
Germany	95	(1.5)	373	(4.2)	504	(3.5)	621	(3.2)	650	(3.4)

NB: SD, standard deviation; SE, standard error. SEs were computed using replicate weights and plausible values for performance scores. For all figures, the standard error ranges between 3 and 6 PISA score points. (*) Data did not meet the PISA technical standards for the Netherlands but were accepted in the OECD PISA as largely comparable.

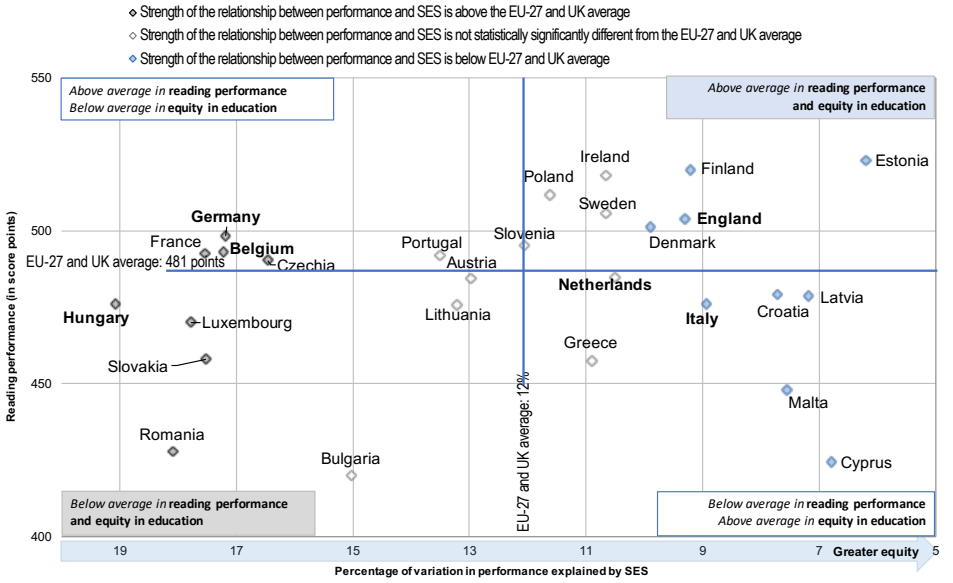
Source: Authors' processing of OECD data (OECD, 2019a, Tables I.B1.4 and I.B1.5).

Students' socioeconomic and cultural backgrounds are significantly correlated with learning outcomes (Azevedo et al., 2022; Berkowitz et al., 2017; Eriksson et al., 2021; Jerrim et al., 2019). The intensity of the correlation varies among countries. The variation in students' PISA 2018 scores in reading can be explained by socioeconomic and cultural background, with this variation being quite high in Belgium, Germany and Hungary, but below the EU average in England and Italy. Figure 9.3 displays the average reading performance achieved by 15-year-old students for each European country against the percentage of variation in this score depending on the PISA index of economic, social and cultural status (ESCS), which is a proxy for social background. Thus, the more a country's position in the figure is towards the right and top, the higher is its average performance and equity in education, regardless of students' social background ([32]). The right-hand bottom quadrant contains countries in which students tend to perform equally, but poorly. On the left-hand side, relations are reversed: the left-hand bottom quadrant contains countries in which students tend to

([32]) The ESCS index is derived from three variables related to students' family background: parents' highest level of education, parents' highest occupational status, and home possessions, which includes cultural resources available in the home, such as the number of books.

perform poorly and their social origin explains between 12 % and 20 % of educational inequalities. The left-hand top quadrant contains countries in which performance is good but there is less equity.

Figure 9.3: Strength of the socioeconomic gradient and reading performance



NB: SES, socioeconomic status. SES is measured by the PISA ESCS index, which is a composite, standardised and averaged value of three variables: (1) parents' highest occupational status, (2) parents' highest educational level and (3) home possessions. Home possessions are based on a set of 25 items that PISA subdivides further into four variables: wealth possessions, cultural possessions, home educational resources and the number of books in the home.

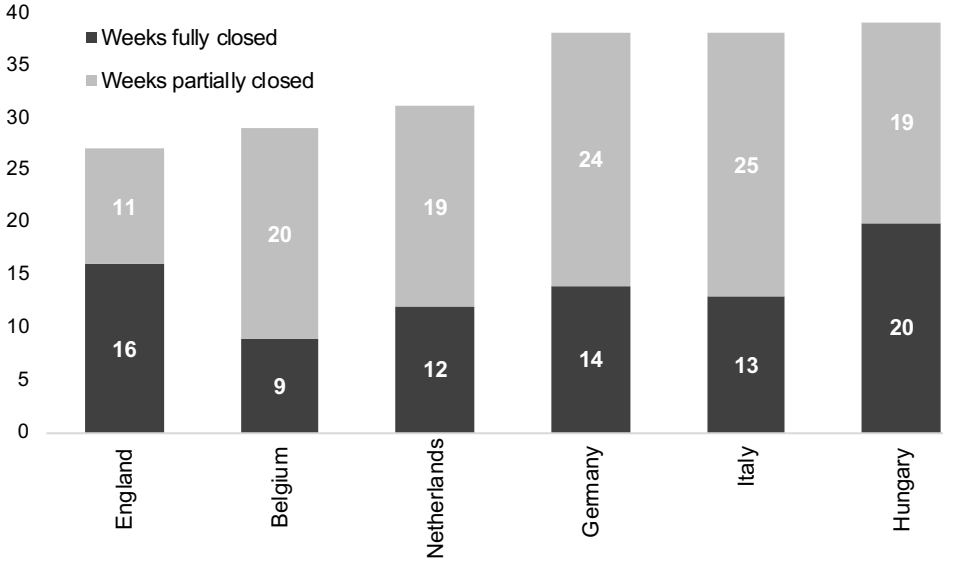
Source: Authors' processing of OECD data (OECD, 2019b, Table II.B1.2.3).

School closures: alternative learning modes and compensatory policies

Among the countries in this volume, Hungary had the largest number of weeks of school closures, including times when schools were only partially open (39 weeks in total), followed by Germany and Italy (38 weeks). This is in comparison with 27–31 weeks in Belgium, England and the Netherlands. When considering only times of full school closures, in England and Hungary, schools were closed for 16 and 20 weeks, respectively – some of the most extensive periods of full closure in Europe. The concept of partial closure must be understood here as a broad category covering a heterogeneity of situations and options that differed from country to country and within each country. Furthermore, the national periods of restrictions do not capture the full extent of disruption to schooling that was experienced across the crisis. This is

because the second half of 2021 and the first half of 2022 were marked not only by persistent challenges due to the COVID-19 pandemic, but also by a gradual and then fragmented return to normality (Figures 9.4 and 9.5); and teacher and student absences, whether due to COVID-19 infections or to quarantine periods, continued to disrupt the learning process.

Figure 9.4: Total weeks of school closures and partial closures

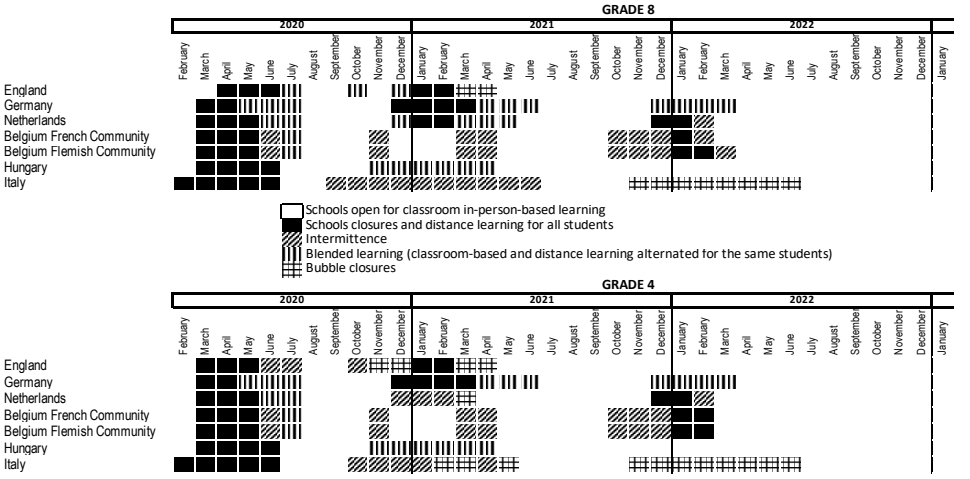


NB: The time period considered ranges from the pandemic outbreak until 28 February 2022.
Source: Authors' processing of UNESCO data (UNESCO, 2022).

School closures forced many governments and school authorities to think outside the box to make remote teaching and online learning as effective as possible. Nevertheless, no standardised practice for online teaching was implemented in most of the national education systems in Europe during the first pandemic wave. As a result, schools and teachers within schools adopted different online platforms, different online methodologies and different teaching schedules (William and Stéphan, 2021).

During the first phase of the pandemic at the beginning of 2020, national choices were made with the primary goal of containing contagions as much as possible, with public health considered more important than school continuity in all European countries except Sweden (Giuliani, 2023; William and Stéphan, 2021). The immediate national strategies that were adopted to provide alternative learning options for primary and secondary school students varied between countries. In England, during the first lockdown, schools were permanently closed, and unprepared teachers had to develop a virtual classroom through videoconferencing overnight (see Chapter 3). Only two thirds of young people in publicly funded (state) schools reported receiving live online lessons (Cullinane et al., 2022). Similarly, schools in Italy conducted online classes over videoconferencing software without standardised national provisions or guidelines and with teachers mainly being responsible for the choice of software,

Figure 9.5: Timeline of countries' school closures and alternative learning regimes during the COVID-19 pandemic for eighth and fourth graders



NB: Since the unit of time is months, the lengths of closures and open periods, the types of alternatives to school in-person learning and the levels of national homogeneity are approximate.

Source: Authors' processing of data from Eurydice et al. (2022). Data for England refer to years 10 and 12 students and are based on Department for Education (2021).

digital content preparation and communication with the students about connection modalities (Bertoletti et al., 2023; Mascheroni et al., 2021). Additionally, different conditions in schools and at home between Italian municipalities led to dramatically different experiences for students (see Chapter 5). The German school closure policy also led to a variety of remote learning modes, primarily due to education governance at the federal state level. Moreover, we know from Chapter 4 that German teachers used multiple digital devices, software and apps at the beginning of the school closures to try to reverse adverse conditions such as slow internet connections, insufficient computer equipment and a lack of tested solutions (see Schneider et al., 2021). In the Netherlands, especially during the first-round lockdowns, school closures were shorter than in the majority of European countries. In addition, the Netherlands' equitable system of school funding and the fact that it has one of the world's highest rates of broadband access facilitated remote learning efficacy (Engzell et al., 2021). Nevertheless, Dutch schools and teachers struggled to adopt online-based solutions for instruction, let alone for assessment and accountability (see Chapter 6). When schools partially reopened, the Dutch policy allowed small groups of students to go into school alternately. On days that children did not attend physical education, they followed online classes from home. Like the Netherlands, Belgium has a highly decentralised school system and therefore adopted a collaborative strategy among the federal, regional and community authorities. The three Belgian regions implemented similar schedules of social restrictions, progressively escalating measures in response to the surging case numbers during the first pandemic wave. However, the Belgium response differed from that of the Netherlands. First, Belgian

distance learning measures differed much more significantly between schools, as they were based only on guidelines released by each language community (Maldonado and De Witte, 2022). Teachers in the French Community were instructed to review previously covered material, whereas Flemish-speaking schools were encouraged to teach new material through distance digital interactions, which would be repeated once schools reopened. While the French Community cancelled the external certification examinations for all students (Duroisin et al., 2021), primary schools in the Flemish Community could choose whether to participate or not in the annual formative assessment (administered in the sixth grade). Second, unlike the Netherlands, a sizeable proportion of students in Belgium did not have internet access, across all communities (Duroisin et al., 2021; OECD, 2021). In Hungary, all levels of education and training were closed until just 1 week before the end of the 2020/2021 school year, and authorities opted to allow schools to organise on-site supervision and provide limited in-person teaching to separate classes a few times a week (see Chapter 8). During the closure, students were provided with distance learning methods, primarily online teaching (Széll et al., 2022).

In summary, country variations during the first wave of COVID-19 depended on schools' level of autonomy in adopting alternative strategies to in-person teaching. In Italy in particular, teachers seemed to suffer from the lack of national and standardised support in terms of infrastructure, software and platforms for remote learning. In Belgium (Flemish Community) and in the Netherlands, predefined decentralised school systems adopted specific strategies, including alternative modes that did not rely on remote learning exclusively. That was also the case in Hungary, even though the Hungarian education system did not have a strong tradition of local school autonomy. In England, state schools heavily relied on videoconferencing modes, and the responsibility seemed to transfer to parents. Certainly, this was a common experience across other Member States. However, parent involvement at home was particularly significant in the case of pupils in English primary schools.

As the focus shifted from crisis management to recovery, returning to the lost 'normal' and mitigating the consequences of closures became a priority during the 2020/2021 and 2021/2022 school years. Almost all Member States provided and implemented remedial support for students to alleviate the effects of the pandemic, including psychological and socio-emotional assistance for vulnerable students at the primary and secondary levels (UNESCO et al., 2022). As of mid 2022, the impact of the global COVID-19 pandemic had receded, and health-related restrictions to education provision had been eased or lifted entirely in Europe (Vincent-Lancrin et al., 2022). Nevertheless, the 2020/2021 and 2021/2022 school years were still heavily affected by the pandemic, with individual temporary school closures and teacher absences occurring in most of the Member States. During the 2020/2021 academic year, school closures were not generally mandatory in most of the countries studied in this volume and depended on the level of absenteeism in schools. Consequently, some students frequently shifted between remote and face-to-face learning due to shortages of teachers or the degree of contamination in the school or in a local district. Even though this situation was less disruptive than full school closures, the absence of a stable and

regular learning framework has also been indicated as a cause of educational delays (Agostinelli et al., 2022; Angrist et al., 2022; Donnelly and Patrinos, 2022).

Looking back at the 2020/2021 and 2021/2022 school years, in England school closures were more constrained than during lockdown 1, with in-person school disruptions due to bubble closures during this time. In those periods, more effective and pre-established remote teaching measures were widely used. In Germany and the Netherlands, the second round of lockdowns caused total closures for considerable periods of time, during which teachers migrated back to videoconferencing, especially because of high rates of contagion among both teachers and students. In Germany, a patchwork approach was evident, as each federal state had different school closure rulings, leading to a variety of remote learning modes. Italy underwent intermittent closures in numerous schools, and students often went back to remote learning from home. Intermittent closures and disruptions forged the new normal on a daily basis for primary and lower secondary schools, while alternating between classroom teaching and distance learning modes became the new routine for students in upper secondary schools. Hungarian schools and teachers adopted a variety of online platforms, and no standardised practice for online teaching was implemented for school closures during the 2020/2021 academic year. However, Hungarian schools often organised on-site supervision and provided limited in-person teaching to separate classes a few times a week. In the French Community of Belgium, primary and secondary schools were entirely closed for just 10 days in 2020/2021 and stayed open in 2021/2022, but there were partial closures of up to 79 days in 2020/2021. During the reopening of schools, students were permitted to attend in-person and face-to-face classrooms for up to 2 full days or 4 half-days per week, while distance learning measures resumed for the days that students were at home.

Learning loss and inequalities

Several studies have been carried out that have highlighted the accumulation of substantial learning losses among cohorts of students who experienced school disruption due to COVID-19 (e.g. Betthäuser et al., 2023; Blaskó et al., 2022; De Witte and François, 2022; Hammerstein et al., 2021; Kennedy and Strietholt, 2023; König and Frey, 2022), and national analyses by the authors of the previous six chapters of this book have generally confirmed that accumulation. For the reasons discussed in Chapter 2, it is difficult to estimate the impact of COVID-19 on learning loss and compare the results of country-specific impact evaluation studies. A major impediment is that, while COVID-19 has no doubt resulted in school closures and learning loss, it is equally true that the resulting learning deficits are mixed with an unusual general European decline in learning outcomes that has been observed over the past 5 years. As illustrated in Chapter 2, the decline in reading performance in recent years has been slightly more severe for the countries in this volume than for other European countries.

It is worth noting that, while there was variation in learning losses among the six countries included in this volume, the losses were more severe for mathematics than for reading skills. As described in Chapter 3, in England the slowdown in learning is evident even when considering only the first lockdown: attainment deficits in both mathematics and language corresponded to a gap in learning of around 2 to 4 months for students in primary schools compared with a previous (2017) cohort. Secondary school students lost 1.7 months of reading skills after the disruption of lockdown 1, while, after lockdown 2, larger learning loss and slower recovery were found for children from disadvantaged backgrounds than for their more advantaged peers. In mathematics, there was a statistically significant deficit for secondary school students, probably because of schools remaining physically closed for a long period in England, which might explain the larger learning deficits among older students. It is also likely that parents were less able to effectively help their secondary school-aged children with mathematics than their primary-aged children during the lockdown periods. Moreover, secondary school classes were divided, and some groups went to school while others had to stay at home, to prevent the spread of the virus. Thus, secondary school students were more affected by the pandemic in 2020–2021 than primary school students. At the secondary level, learning losses in reading in 2020 were estimated to be 1.8 months in the overall student population, but 2.2 months among disadvantaged students (EPI, 2021).

Chapter 4 describes a moderate learning loss for German students in the wake of the pandemic. Reading skills were reduced by 0.14 standard deviations for 2021 fourth-grade students compared with 2016 scores. Furthermore, a negative pre-pandemic trend was reinforced by the pandemic-related learning deficit. In terms of the at-risk student populations, learning losses were twice as large for students from households with lower socioeconomic status. Compared with other students, these disadvantaged students reported less interaction with their peers while participating in remote learning. This is a very crucial point, as it seems that, considering the relatively smooth German implementation of remote learning, positive outcomes resulted from the use of distance learning among the digitally skilled (Förster et al., 2022; Wößmann et al., 2021). Most schools provided additional educational support for low-achieving students to facilitate students' social skills (Helbig et al., 2022) but the evidence suggests that this was not sufficient to reduce the gap. German students with sufficient space and technical resources achieved significantly higher competence scores, on average, than students who did not have such resources at their disposal (Stanat et al., 2022). The substantial correlations between spatial/technical resources and the competences achieved show that these resources are relevant prerequisites for learning at home, but these resources are not fully captured by either socioeconomic status or families' cultural capital.

In the Netherlands (see Chapter 6), a sharp learning loss due to the first lockdown occurred for mathematics, comprehensive reading and spelling among students in primary schools. Nonetheless, 2.5 years into the pandemic, the learning loss of Dutch students had almost entirely been recovered in reading and comprehension skills, but less so in mathematics. Concerning social inequalities and learning loss, an impressive recovery has also been detected. Losses were up to 60 % larger among students with

less-educated parents, confirming the unequal negative pandemic effect among children from different social strata. However, Chapter 6 reports that the differences between students with low-educated parents and students with medium- and high-educated parents lessened over time. Even though learning loss for mathematics is still 1.5 times larger for students with low-educated parents than for students with high-educated parents (Haelermans et al., 2022), the catch-up among disadvantaged students has been substantial so far.

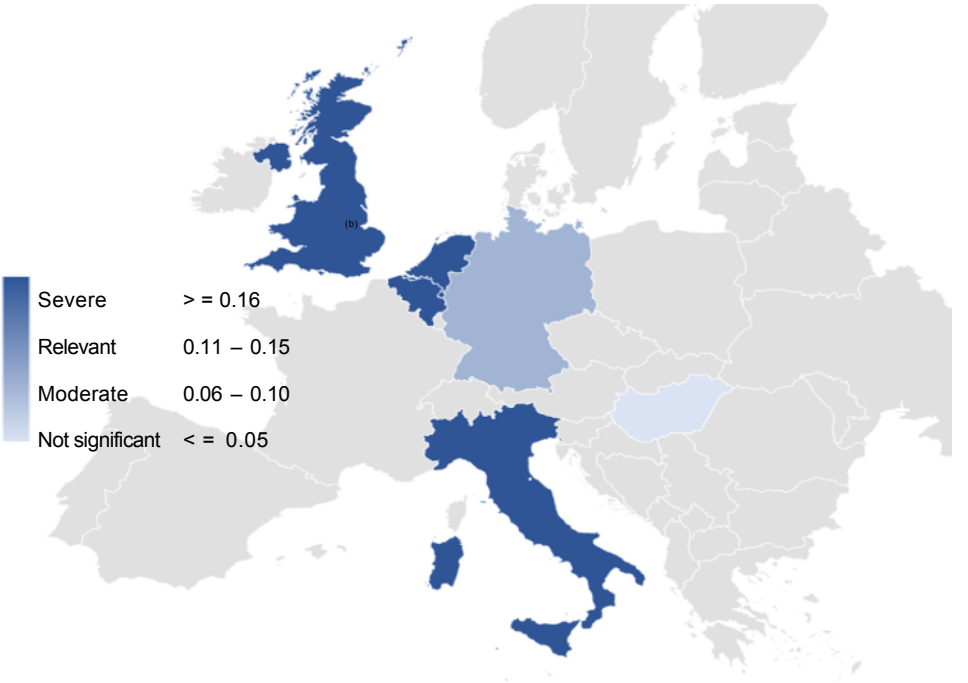
While the level of education in Belgium had already been falling before the pandemic (as described in Chapter 2) for primary school children and for 15-year-old students (OECD, 2019a), the results of several studies suggest that COVID-19 led to a further drop in the level of education and an increase in inequality between students. As described in Chapter 7, primary students suffered considerable learning deficits: the 2020 school-year cohort of students from the Flemish Community of Belgium showed a marked decline in mathematics and language proficiency. These accumulated losses seem to have accelerated over time. Unfortunately, no large-scale administrative assessment data are currently available for students in primary and secondary schools in the French Community of Belgium. Nevertheless, considering that schools in the community had no large-scale catch-up lessons for students in difficulty in the summer of 2020, we might expect an even more intense learning loss stemming from COVID-19 disruptions in this community. In addition, while educational assessment data are not available for secondary schools in any of the Belgian language communities, the increase in the proportion of students changing to lower study tracks after the 2020 school closures indicates a substantial impact of COVID-19 on students' learning trajectories.

The health crisis hit Italy more severely than many other Member States. Chapter 5 highlights that Italian students have suffered severe learning losses. Contrary to the findings in other European countries, it seems that students from lower and upper secondary schools were affected more intensely than younger students in primary schools. As the authors explain, primary schools might have been slightly better equipped to cope with remote learning. Relying on data from the Italian national standardised tests and including multiple cohorts of students, Chapter 5 stresses that, in both primary and lower secondary schools, the loss was much greater in mathematics than in the Italian language and also that the loss increased steeply with grades. Factors that were associated with this large learning gap were prior skills, lower-skilled students experiencing the largest losses, and socioeconomic and cultural inequalities across schools.

In Hungary, as reported in Chapter 8, a notable decline in test scores occurred among sixth-grade students, indicating a significant learning loss during this period (losses of 0.11–0.15 and 0.05–0.15 standard deviations, respectively, in mathematics and reading literacy). However, there was no clear decline in student performance among 8th- or 10th-grade students. In contrast with most other European countries, the most substantial decline in test scores among sixth-grade students occurred among those from higher socioeconomic backgrounds and those who were high achievers before the pandemic.

Figure 9.6 portrays the rough magnitude of primary school students' learning losses in mathematics. Despite the caution that is required when comparing different national administrative data produced using different methodologies and with great variance in the referring initial academic year for calculations, we can infer that the learning losses ranged from a severity of 'relevant' to 'severe' in four out of the six countries considered in this volume. Countries with longer full school closures (England and Italy, as well Hungary (although not for 8th and 10th graders)) paid a higher price in terms of learning loss (see De Witte and François, 2022; Patrinos et al., 2022).

Figure 9.6: Estimation of the magnitude of students' learning losses in mathematics point scores after the school disruptions during the pandemic



NB: 'Moderate' learning loss refers to a standard deviation decline of 0.10 or below, 'relevant' covers standard deviation declines from 0.11 to 0.15 and 'severe' covers standard deviation declines equal or above 0.16.

Source: Authors' processing of data from multiple sources. For Belgium, see Chapter 7 of this volume (sixth graders, 2020–2021 scores compared with 2019–2020 scores). For Germany, see Schult et al. (2022b; grades 1–4, 2020 scores compared with 2015–2019 scores). For Hungary, see Chapter 8 of this volume (eighth graders, 2021 scores compared with 2010–2019 scores). For Italy, see Contini et al. (2021; third graders, 2019–2020 scores compared with 2018–2019 scores). For the Netherlands, see Chapter 6 of this volume (grades 1–3, 2021–2022 scores compared with 2018–2019 scores). For the United Kingdom, see EPI (2021a; grades 1–6, 2020–2021 scores compared with 2018–2019 scores).

The overall European learning decline is mainly an effect of low performers falling considerably further behind the minimum learning threshold in basic skills, especially numeracy. Consistently, the learning loss attributable to physical school closure has

widened inequalities in educational performance among students from different social, economic and cultural backgrounds. As discussed in Chapter 2, after the COVID-19 pandemic, family background has become an even greater determinant of learning outcomes than before the pandemic. The one exception appears to be in Hungary, where advantaged students suffered learning losses of a much greater magnitude than disadvantaged students. Finally, school closures had more deleterious impacts on the learning outcomes of younger students than on those of older students in all of the countries discussed in this volume except Italy.

Policies and interventions to mitigate the COVID-19-induced learning loss

National educational authorities implemented policies and remedial schemes for providing additional support aimed at mitigating the learning loss suffered, especially by disadvantaged students. These measures had mixed results in the countries included in this volume. After initial steps to fund and sustain, as much as possible, the regular activities of schools by providing sanitation guidelines, establishing anti-contagion rules, promoting social distancing and, in some cases, transforming the school organisation of spaces, additional measures and extra funds to recover the learning loss quickly became the top priority.

The most common response to newly emerging learning difficulties was to organise or provide students with additional small-group tutoring or in-person lessons tailored to specific groups of students. The support typically took place either during school holidays or after school, but in some cases also during formal schooling time. These measures were implemented and funded in Belgium (French and Flemish Communities) and Italy. Chapter 6 states that Dutch authorities adopted a new, comprehensive, top-level framework programme to provide support through dedicated extracurricular activities to low-achieving students. Participation was generally on a voluntary basis, with priority for students from lower socioeconomic backgrounds. Funding was granted so that children's enrolment was free, and this was also the case in both the German and Flemish communities of Belgium. Extra tuition in smaller classes also required the provision of additional teachers, which occurred in Belgium (Flemish Community) and the Netherlands and partially in Italy.

In England, the government introduced a COVID-19 catch-up premium and a national tutoring programme to support pupils affected by disruption to their education. The English fund covered GBP 1 billion, which was divided as follows: GBP 350 million to ensure that the most disadvantaged pupils could access tutors over the year and GBP 650 million for primary and secondary schools, which could choose to provide additional one-to-one or group tutoring for pupils in need (see Chapter 3 and Robinson et al., 2021).

German authorities (see Chapter 4) managed to implement better-functioning blended learning methods in the second and subsequent lockdowns than in the spring of 2020.

Consequently, federal-state school systems succeeded in adapting to the new situation. Additional courses during the summer holidays and well-supported remote learning sessions during further school closures led to some encouraging catch-up of learning deficits. A federal government action programme costing EUR 2 billion was set up to help children to catch up on the learning losses that they experienced during the pandemic. Besides promoting early childhood education, leisure and sporting activities, the programme has led to multiple uses of the funds allocated to each federal state, especially for summer camps and learning workshops during the holiday breaks and remedial activities in core subjects such as literacy and mathematics, all in parallel with regular teaching during the academic year. Disadvantaged children and young people have been targeted by the 'culture makes us strong' programme run by the Federal Ministry of Education, which aims to use extracurricular cultural education to foster pupils' creativity, personal development and social skills.

The Dutch government not only made EUR 2.5 million available to support online learning, namely through the provision of laptops and internet access for 7 000 students, but also channelled another EUR 3.8 million into supporting vulnerable children (see Chapter 6). Most crucially, in the Netherlands, the national education programme was created, with a focus on helping students to mitigate the learning loss experienced. The programme started in the 2020/2021 school year with a budget of EUR 5.8 billion and included evidence-based measures and a support structure.

When schools reopened, Belgian authorities in the French Community recommended the use of teaching tailored to specific groups of students and remedial learning support during the school day in both primary and secondary education (see Chapter 7). In the Flemish Community, a special recovery plan implemented extra schooling during the summer, autumn and winter breaks for lower secondary students. In the German-speaking Community, efforts were made to strengthen ICT capacity by hiring additional personnel responsible for ICT support. At the lower secondary level, the French Community of Belgium responded to schools reopening with enhanced provision of digital tools at school, hybrid learning, in-service and pre-service digital training for teachers and digital training for students. The Flemish Community fully subsidised more than 100 summer schools organised by local authorities in collaboration with education providers, which targeted students from disadvantaged areas and families of lower socioeconomic status (Gambi and De Witte, 2021). In these summer schools, students were distributed into groups of a maximum of 14 pupils, and the initiative covered at least 10 full days (or 20 half-days) in August 2020. The learning loss in the Dutch language increased in those postcode areas where no summer school took place, indicating that the measures worked (De Witte and Smet, 2021). To provide the adequate human resources for additional tutoring and for reinforced counselling and psychological support, the Flemish Community made additional funding available for the temporary recruitment of supplementary staff – educators, psychologists, social workers, etc. – to enable schools to rapidly respond to students' needs. Incentives were put in place for teachers to take on remedial classes in 2019/2020 and 2020/2021 for every educational level from primary to upper secondary.

The Italian and Hungarian chapters in this volume (Chapters 5 and 8, respectively) lack in-depth information on education policies implemented to counteract learning loss during the pandemic. For both countries, the authors struggled to identify information on centralised government initiatives in the education sector to tackle learning declines. For Hungary, it is noted that, during the compulsory closures, schools were allowed to organise on-site supervision and provide limited in-person teaching to separate classes a few times a week. In 2020, Italy made a significant investment of EUR 1 billion, starting a plan over 2 years to adapt education, support parents and children, and hire new teachers. Extracurricular small-group tutoring for students who were at risk of school failure was also organised in 2020 in Italy.

Impact of education policies to counteract learning loss during the pandemic

It is difficult to quantify the degree to which the policies discussed above helped in mitigating pandemic-related learning losses. One reason for this is the time span in question. It is still relatively early for estimating and assessing the impact of recovery programmes intended to catch up the learning loss, as many of these programmes are still ongoing. Nevertheless, some studies were implemented early during the pandemic. The biggest problem encountered by the chapter authors in examining the impact of mitigating policies was data availability. Many policies were implemented ad hoc without reflecting on the need for policy evaluation. In addition, in some countries, such as the Netherlands, schools could choose how to use the extra funding, so not much is actually known about the precise support that was implemented. Consequently, policy implementation was, in general, not accompanied by data collection on the students who were and were not benefiting from the programmes. Without these data, it is impossible to analyse the impact of the education policies implemented on student learning outcomes.

While, to some degree, the emergency of the situation might have led to implementation that was less focused on the evaluation of 'what works', the lack of planning of the evaluation of mitigation policies reflects a lost opportunity during and after the pandemic. As described above, the COVID-19 pandemic featured the sudden implementation of numerous education policies aimed at counteracting low educational achievement in many European countries. However, the implementation of these policies was normally the result of discursive policymaking processes, rather than detailed analyses that were grounded in the documented needs of teachers, students and families. Therefore, policy implementation without data collection cannot benefit from measuring the effectiveness of these different policies.

Furthermore, during the pandemic, different digital and remote learning practices were put in place, as discussed in the country chapters, but there seems to be a lack of data available for measuring and comparing the impact of these different strategies. Digital learning is generally considered a possible ongoing and future opportunity, and so any kind of data on the different strategies used during the pandemic to teach children

could have advanced digital learning initiatives more rapidly and successfully, particularly regarding distinguishing between positive effects and counterproductive effects.

Nevertheless, some country chapters provided details on successful mitigation policies. Over a third of primary schools (over 6 500 schools) in England employed the Nuffield Early Language Intervention (NELI) scheme as part of the national COVID-19 catch-up package (see Chapter 3). Originally tested as an evidence-based oral language intervention for children in nursery and reception classes who showed weaknesses in their oral language skills, the NELI scheme now provides a 20-week intervention for pupils in primary school. Training and resources are provided to teachers free of charge, and are intended to help them deliver one-to-one and small-group support for 5-year-olds whose early development in spoken language skills was disrupted by COVID-19. The roll-out of NELI is targeted at schools in priority order based on the proportion of disadvantaged pupils eligible for free school meals. The intriguing feature of this intervention is that an independent evaluation has been progressively run by the UK Education Endowment Foundation.

Remediation schemes often require additional teaching staff. In England, the national tutoring programme provided schools with flexibility in choosing among existing staff or external tutors familiar with their school. There was also mandatory online training for non-qualified teaching staff, although inadequate funding resulted in this being derailed in many of the schools in demand. In the Netherlands, a national programme that provided schools with additional money for remediation policies for vulnerable children has been evaluated. Chapter 6 highlights that small-scale and targeted tutoring and extra-teaching support for vulnerable and low-performing students have been effective in partially reversing the accumulated learning deficit. The remedial scheme of summer schools in the Flemish Region has been systematically assessed. According to Chapter 7, by shortening the summer holidays for targeted groups of students from low socioeconomic backgrounds (who voluntarily took part in the scheme), the learning gaps in both reading and mathematics that had existed in June 2020 had disappeared by June 2021. Conversely, in the areas where no summer schools were organised, the learning gaps did not decline.

Efforts to evaluate the impact of policy interventions to counteract learning losses have increased over time. With the creation of the Recovery and Resilience Facility – a temporary instrument that forms a core part of the NextGenerationEU plan for emerging stronger from the pandemic – more focus has been dedicated to the assessment of recovery policies in the education sector. Many countries received special funding from the facility for education policies, which are well documented on the European data portal ([33]), and therefore provide the possibility of impact evaluation. Germany will profit from funding granted to its national plan, as it is a considerable investor in digital education, with EUR 1 435 million provided to

([33]) On the Recovery and Resilience Facility web page (https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en), one can select 'Country Pages' and then a Member State; then one needs to scroll down and select 'Assessment of the recovery and resilience plan' to see which education policies are funded by the initiative.

implement various measures, including establishing a single digital platform that gives all levels of institutional and autonomous teaching and learning access to education materials and equipping teachers with digital devices for end users. Italy, the biggest investor in education in absolute figures from the Recovery and Resilience Facility (up to EUR 19 436 million), intends to reform teachers' recruitment procedures, outfit schools with digital equipment, tackle early school-leaving and evaluate the positive effects eventually triggered by these investments in reducing educational inequalities.

Considerations for the future

Physical school closures significantly affected learning outcomes in Europe, leading to greater educational inequalities, as disadvantaged students lost out more. Even though we know that learning deficits are the outcome of a mix of instruction loss due to COVID-19, the falling European performance trends and unmeasurable national policy changes, we can cautiously deduce a series of conclusions about the educational reforms needed to recover the learning loss. It seems that further schemes are required: summer schools and tutoring programmes, if specifically addressed and personalised to students who have been longitudinally followed by schools in their learning loss evolution, could constitute a relevant and effective policy. However, if there is a scarcity of government funds, additional schooling and tutoring interventions should firstly focus on those students who, no matter their grade, display severe learning deficits in basic skills (reading, writing, mathematics and digital literacy).

As highlighted in Italy, great inequalities in learning loss can appear within a single country. In such cases, the targeting of catch-up policies to schools located in the most affected areas can ensure the effectiveness of recovery policies. A geo-referenced continuously updated map could help to locate the schools and students most in need.

While school autonomy may allow for greater agility in addressing specific learning gaps or in tailoring strategies to students' opportunities to catch up, it may also mean that the quality of the strategies implemented between schools may differ. Therefore, individual schools should have the flexibility to adapt national or regional recovery funding to the specific needs emerging in relation to both the type of learning loss and the specific solutions that these schools identify. Nonetheless, the implementation and monitoring of specific interventions cannot be left totally up to individual schools, not only because this would require more work for schools, but also because independent accountability principles can improve the effectiveness of programmes on the spot and contribute to fixing problems when they emerge.

It is now clear that distance learning weakens the ability of schools and teachers to ensure 'peer effects' (Hoxby, 2000). Schools and classrooms are places of relative social and cultural heterogeneity, but they provide a collective physical learning environment where one-to-many relationships (one teacher and many students in the classroom) and peer-to-peer relationships (between students and between teachers) ensure that students of different origins and social backgrounds can mix and learn

together, thanks to both the equaliser effect of the teacher and the group effect of students learning from each other (Agostinelli et al., 2022). These effects are lost or significantly weakened when schools are physically closed, and remote learning increases the level of distraction. Physical school closure decreases 'school inputs' (Werner and Wößmann, 2023), which leads to a loss of equalising effects and increases the importance of parental involvement and home cultural resources to learning during the pandemic. This results in inequalities among students from different socioeconomic backgrounds in terms of both the amount of learning loss suffered and a widening of pre-existing educational inequalities (Patrinos et al., 2022). Remedial actions may mitigate accumulated learning losses, but they may not be able to wholly reverse accumulated gaps before students complete compulsory schooling. Therefore, extracurricular schemes aiming to support socially and culturally disadvantaged students may contribute to reducing inequalities in educational attainment throughout students' school careers, whether such inequalities are attributable to the pandemic period or to other factors. In this sense, the programmes of education put in place by each Member State prior to COVID-19 to reduce these inequalities and to improve students' overall educational attainment should be strengthened, extended and made consistent over time.

The analysis of the COVID-19-induced learning gaps is just one, albeit important, approach to ascertaining the full and complex picture of education in the aftermath of the pandemic. Addressing stress, psychological burdens, socio-emotional attitudes and the well-being of students (which together are often referred to as non-cognitive skills) also needs to be central to the research and policy efforts of national ministries of education. Collectively, education systems will need to develop and implement policies to address the adverse effects of the pandemic on long-term cognitive and non-cognitive student outcomes. Policy development and monitoring processes are integral components of the European education space and are critical for maintaining robust education systems for the future (Volante et al., 2022).

The experience of teachers and educators should also be considered in the context of education policy reforms after the pandemic. Teachers have been under increasing pressure to address the growing and heterogeneous demands resulting from the rapidly changing conditions in the field of teaching and the recovery needs after COVID-19. Additionally, as many teachers have school-aged children themselves, their work–life balance was significantly challenged during the pandemic by both the loosening of work–family boundaries and the digitalisation of the profession. Teachers deserve to be empowered through both continuous training and fewer administrative burdens. In addition, the teaching profession needs higher esteem in European societies. Without such recognition, it will be difficult to increase the number of teachers, which will be a critical part of coping with the additional recovery measures for disadvantaged pupils and providing high-quality education in the future. Since teachers are most familiar with students' learning recovery needs, they are also in the best position to help address students' vulnerabilities caused by the pandemic. Additional structural investments in teaching staff could improve national education systems by providing less crowded classrooms, increasing the teacher–student ratio

and allowing greater use of instruction provided in small groups, not only in extra school time, but also as part of regular school-day activities.

Tutoring, whether in the form of one-to-one or small-group instruction, appears to be one of the most effective education strategies in bridging the learning deficits between students with various skill levels. Policies based on the recruitment of additional tutors and educators have so far been anecdotally evaluated as quite effective in England, Italy and the Netherlands. However, the time given to personalised tutoring for disadvantaged small groups of students needs to be balanced with the time given to teaching in traditional larger class groups, in which the presence of students with different proficiency levels ignites the peer effect. Focusing too much on small groups of disadvantaged students by separating them can generate stigmatisation, disintegration and discrimination, which weakens the peer effect in mixed classes and increases socio-emotional vulnerability.

Increasing the length of instruction through longer school days is another strategy that countries relied on during the COVID-19 pandemic to support the acceleration of learning for students. This strategy could be maintained to recover the persistent learning losses that are present. However, the literature on the topic suggests that extending school time per se will not automatically translate into better learning outcomes, unless measures that extend school days include specific provisions tailored to schools' student profiles, the magnitude of learning loss and the effective use of additional tailored time/materials to ensure quality in the activities implemented. Strategies for learning recovery are not mutually exclusive, and education authorities can rely on a combination of different approaches. Education systems are facing heightened pressure to become ever more resilient, enhance the efficiency of public spending and address emerging learning gaps.

Now that schools have fully reopened, it is also essential to continue to improve communication and cooperation between teachers and parents. Doing so would facilitate the identification of socio-emotional vulnerabilities among students; help to enact bottom-up initiatives aiming to improve the mental and physical well-being of students, their engagement and their motivation; and contribute to a more cohesive community in which each schools are pivotal. Ultimately, policymakers within and outside Europe will need to carefully consider policy interventions that deal with the vast array of cognitive and non-cognitive needs among students.

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COVID-19 led to school disruptions and in most cases successive weeks of closures. Parents, educators and policymakers around the world are concerned about the negative impact associated with the loss of face-to-face instruction and social isolation measures. Hardships associated with COVID-19 and school closures have varied significantly between countries. This volume examines the impact of school closures on learning losses as well as the effectiveness of country policies utilised to help kindergarten to grade 12 students catch up within the following nations: Belgium, England, Germany, Hungary, Italy and the Netherlands.

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