# Impacts of COVID-19 on school education

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# Foreword


The Covid-19 pandemic was a sudden shock and affected the normal functioning of our societies, our economies and our schools.

Schools are a place of learning, but also of social interaction. They bring children from diverse socioeconomic backgrounds together, and help the citizens of tomorrow lay the foundations for a fair and inclusive society. Our future prosperity is intrinsically intertwined with well-functioning education systems.

This report looks at the impact of the pandemic on school education. It provides an overview of research examining the effects of school disruptions on student well-being, educational achievements and possible long-term impact. The well-being of most students was adversely affected. The findings show that learning outcomes also suffered, yet more recent research suggests that the legacy of the pandemic may not have such negative effects as originally expected. To a large extent, this is due to considerable remedial actions that have been taken by Member States. Education systems have proven to be flexible and resilient. This should be a source of hope and inspiration to continue our joint efforts in ensuring that the pandemic does not leave a lasting effect on a generation of students.

From the start of the pandemic, the European Commission has worked closely with Member States to mitigate its effects. The European Education Area (EEA) has facilitated this as it sets out a clear vision and priorities for education in Europe and provides a reinforced framework for cooperation with and between Member States and stakeholders of the education community. Initiatives under the European Education Area and the Digital Education Action plan, including the Recommendation on blended learning for high quality and inclusive primary and secondary education, are important tools in mitigating the impact of the pandemic, boosting innovation, promoting equity and inclusion, and contributing to Europe's recovery and resilience strategy. Significant support for reforms and investment in education and skills is available through the Recovery and Resilience Facility (RRF), amounting to more than €60 billion to Member States, 13% of the total RRF envelope. In addition, cohesion policy funding will contribute considerably to investments in education in the next years.

Furthermore and with regard to a quick recovery from the pandemic, education and skills remain important topics in the European Semester. Education is strongly linked to social cohesion, economic growth and the twin digital and green transition. In 2022, country specific recommendations on education and skills highlighted inequalities in education, teacher shortages and persisting skill mismatches. EEA initiatives support Member States in tackling these challenges, and guide reforms and investments in the modernisation of education and training systems under the RRF and cohesion policy funding.

The report shows that pre-existing inequalities have often been exacerbated by the pandemic. Inclusive and equal opportunities for all learners is a priority of the European Education Area and key in addressing inequalities. The Pathways to School Success initiative is a step in this direction as it provides comprehensive policy guidance to reduce early leaving from education and training, to help all pupils reach the necessary level of proficiency in basic skills, and to complete upper secondary education

Mariya Gabriel

Commissioner for Innovation, Research, Culture, Education and Youth

# Executive summary

The Covid-19 pandemic led to physical school closures and a transition to online learning. While such closures were common across the EU, their duration was different across and within countries. The transition to online learning found school systems ill-prepared. Students, teachers but also parents were not ready for the sudden shift to online education. In part, this was due to low levels of digitalisation, including both the availability of and access to digital solutions for online and blended education and the digital skills of teachers and students. The adopted solutions differed considerably depending on variables such as students' age, students' and teachers' digital competences, and school resources.

In addition to digital issues, the home environment of children influenced strongly the learning conditions. Elements such as parental situation (e.g. employment status, remote or essential worker status, availability and ability to support children) and housing conditions (e.g. space, sound, and comfort) were important factors influencing learning.

Evidence from research carried out in the first stages of the pandemic pointed to negative results, rising inequalities, and potential long-term gaps in learning. Studies found evidence of an increase in the attainment gap between students from different socioeconomic backgrounds, differences in results between public and private schools, and that children from lower socioeconomic backgrounds had fewer opportunities to engage in learning activities. The early research findings indicated that in the absence of any remedial measures and catching up, the pandemic would leave a permanent effect on the educational achievements of a whole generation and, amongst other negative effects, lead to worse future job prospects and lower earnings.

As the pandemic developed, education systems around the EU implemented remedial actions to help educational communities navigate the transition. Such actions included funding to support the digital transition, hiring additional teaching staff, and providing health and sanitary measures. This support often paid special attention to students from disadvantaged backgrounds and special needs. Furthermore, several countries organised summer camps to close learning gaps amongst students and to mitigate expected learning losses.

The findings from research carried out in the later stages of the pandemic paint a more nuanced picture on any lasting legacy of Covid-19 school disruptions. Evidence suggests than remedial actions can help address overall learning gaps. Nevertheless, inequalities remained and in specific cases were widened.

Education systems have shown to be adaptive and resilient, and have reminded everyone of their central role in societies. It is important to continue monitoring an evolving situation, and to implement remedial actions and structural changes, which are especially targeted to support the most disadvantaged and address pre-existing educational inequalities that have been exacerbated by the pandemic.

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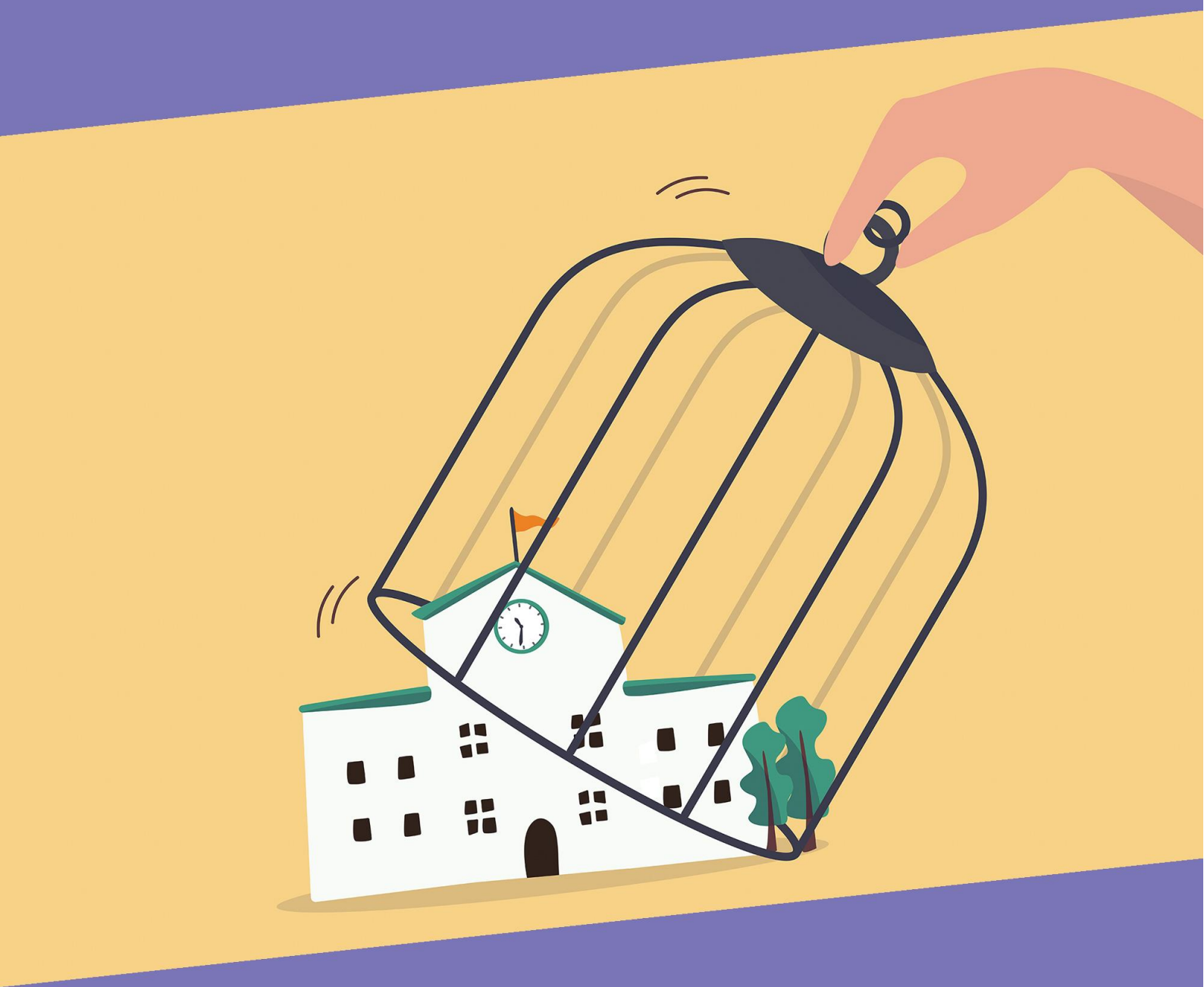
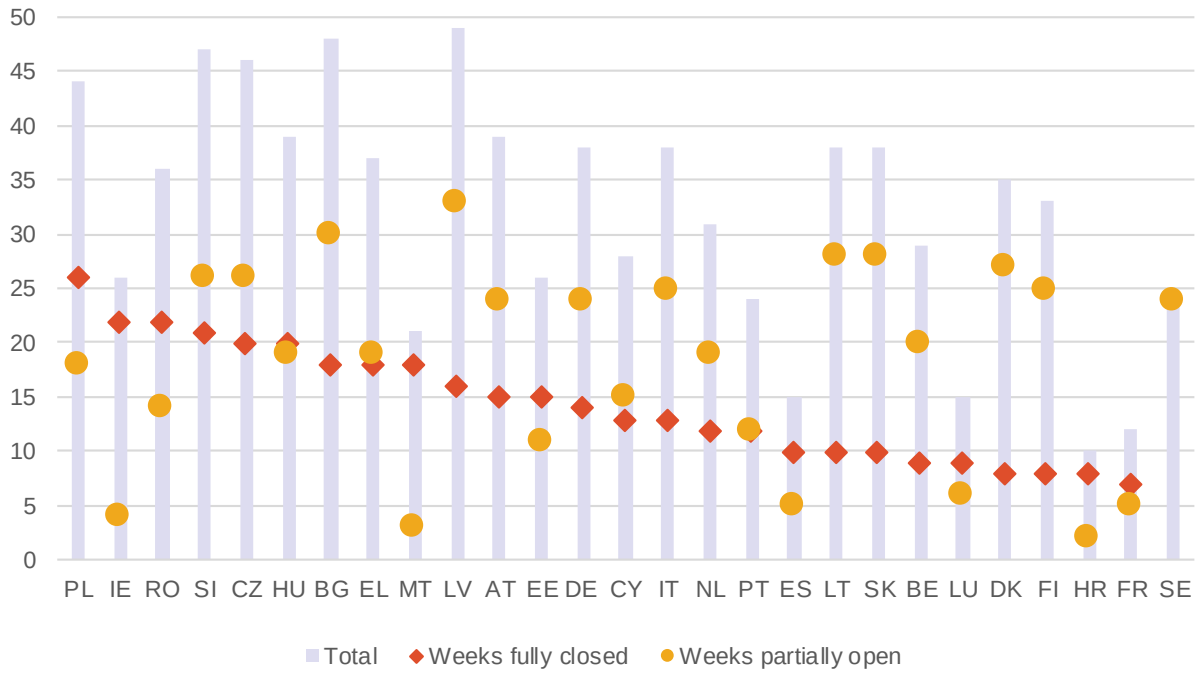


# Introduction

The outbreak of the COVID-19 pandemic in early 2020 forced schools all over the world to remain physically closed and to move to online learning for at least several weeks. Unlike previous school disruptions tied to natural disasters, strikes or violent conflicts, the school closures during the COVID-19-related lockdowns have been simultaneous in multiple countries. During the varying, but in general relatively long periods of school disruption, various forms of online and remote learning were the norm.

**Figure 1: School closures duration**




*Source:* UNESCO-UIS Education Database.

*Note:* The countries are sorted in descending order according to the duration of full closure. Schools in Sweden remained partially open throughout the pandemic. Academic breaks are excluded from calculations.

The pandemic outbreak has revealed the relative unpreparedness of school systems to a rapid switch to remote modes of teaching, in part due to low levels of digitalisation, including both the availability of and access to digital solutions for online and blended education and the digital skills of teachers and students (Donnelly and Patrinos, 2021). At home, situations varied greatly as some parents were considered "essential workers" and were not able to telework. This affected the support children could get with their online learning.

Since the start of the pandemic, researchers have studied the effects of school disruptions on students, covering their learning opportunities and education achievement, as well as their access to technology and their psychological well-being. This represents an opportunity to have comparable data across countries, regarding teaching practices and learning outcomes, as well as student and teacher well-being, and public responses to school disruption. The body of research on the impacts of the pandemic has been steadily growing since its start. While research results based on data collected during the first wave of lockdowns in 2020 were overwhelmingly negative and pointed out to increases in inequalities between students and to potential long-term learning gaps, later studies allow to draw a more nuanced

picture of the lasting legacy of the COVID-19 pandemic related school disruptions. More recent studies show the resilience of students and ultimately of the European school systems.

This paper presents an overview of research on the impacts of COVID-19 on school education, focusing on studies about learning gaps and the widening of inequalities between students resulting from the sudden switch to online learning, that have been published up to April 2022. The final chapter highlights remedial actions put in place by authorities across EU Member States to counterbalance the negative effects of school disruptions and the switch to distance and blended learning. Serving as a source of "practices" to be further developed, this last section aims to inform future policy making in the area of equity and inclusion in education.

# The “great equaliser” put on hold

The consideration of school as the "great equaliser" traces back to the 19th century. Horace Mann in the United States or Jules Ferry in France count among the advocates for a public school system that guarantees access to education for all children. While public education systems have been developed across European countries in the last two centuries (Benavot and Resnik, 2007), inequalities persist and have a direct impact on learning outcomes. For example, results of PISA 2018 show that differences in socioeconomic status are a major underlying determinant of the disadvantages observed in education. The school disruptions related to the outbreak of the COVID-19 pandemic have given visibility to pre-existent inequalities and have even contributed to their widening. Studies focusing on the effects of recent school disruptions on learning outcomes align with previous research results that show how students' achievements are affected when schools stop functioning normally (Marcotte and Hemelt, 2007). Even when all children are barred from regular instruction, children from lower socioeconomic backgrounds appear to be more negatively affected by school disruption than the children from higher socioeconomic status families.

Remote learning makes it harder for schools to be the territory where "peer effects" flourish (Hoxby, 2000). Schools are spaces of relative social diversity, where children from different backgrounds can mix and learn from each other, thus being able to compensate for the inequalities determined by their families' socioeconomic status (Agostinelli et al., 2020). This effect is lost when schools are physically closed. Remote schooling does not provide for the separation of home and learning environments. The reduction of "school inputs" (Werner and Woessmann, 2021), expressed as shortened instruction time and less learning support from teachers, increased the weight of parental involvement required to maintain the learning dynamics (Champeaux et al., 2020). Part of the inequalities exacerbated by the pandemic are related to the children's home environment and the response from parents. Some parents can compensate for the changed environment through their own efforts, while others are unable to do so. All this leads to the finding that school closures have a large, persistent, and unequal effect on human capital accumulation (Patrinos et al., 2022).

In this context, the parental working status can affect the learning experiences of children, even more so considering the consequences of the pandemic in the labour market. Increased levels of stress at home related to job loss, the combination of home schooling and parents' remote working, their prolonged absences if considered "essential workers", and their availability to help with learning activities are some of the factors having an impact on children's ability to pursue their education during school closures. Furthermore, some parents with lower education may be less capable of supporting children in learning (Azevedo et al., 2020; Engzell et al., 2021). All of the above means that COVID-19 has a strong potential for increasing the performance gap along the socio-economic background of the families.

Socioeconomic inequalities can also manifest themselves through overcrowding at home, connectivity issues and poor access to digital devices needed to follow online learning. The availability of a quiet space to study, either alone or as part of an online class, and of a personal computer or tablet for educational use have enormously influenced the chances of children to continue learning during the COVID-19 related school disruptions. A research project focusing on the Catalan region in Spain studied children's opportunities to participate in formal, non-formal and informal education during lockdown, according to the economic background of their families (Bonal and González, 2020). Based on a survey administered to 35 400 families, the results suggest that the sudden switch to remote schooling increased the attainment gap between students from different socioeconomic backgrounds. Learning opportunities of children from different backgrounds varied significantly, with children from socially disadvantaged families having few learning opportunities both in terms of time and learning experiences (schoolwork and maintenance of after-school activities). On the other hand, middle-class families were

able to maintain higher standards of education quality under lockdown. The study identified that the ability to cope with remote schooling differed by the type of school the children attended (public versus private), families' economic, social and cultural capital, and overall living conditions.

The digital divide, understood as the availability of digital devices for distance learning at home and as the ability to use different technologies, combined with parental involvement in education, count among the most important factors of inequality between students. The researchers find differences in the remote teaching methods between publicly and privately subsidised schools, including teachers' experience in delivering high-quality online lessons and support to students (Duroisin et al., 2021), and in the continuation of after-school, extracurricular activities that students were able to follow during lockdown. Overall, children from lower socioeconomic backgrounds had fewer opportunities to engage in learning activities (Bonal and González, 2020). The results of this study also draw attention to the intersection of axes of inequality including economic, cultural, ethnic, and gender dimensions. The combination of such factors accounts for variations between populations, meaning that boys and girls may be affected by the pandemic-related school disruptions in different ways linked to their socio-economic and ethnic backgrounds. However, disaggregated data are not always available and such intersections are often overlooked.

The KiDiCoTi project by the European Commission's Joint Research Center, conducted in 11 countries (9 EU Member States plus Norway and Switzerland) during the spring of 2020, shows a great variation of "emergency remote teaching"[1] practices (Lobe et al., 2020) across countries and according to students' age, type of school, teachers' digital competence, workload, and organisation of remote schooling at home (Cachia et al., 2021). The study brings up the struggles that families faced during lockdown, including the conflicting uses of time and space at home, the shifting of parents' role from guardians to improvised teachers, and the stress put on parents' attitudes towards technology by the switch to distance learning. In addition to the inequality factors mentioned above, parents and children with low digital skills faced more difficulties when engaging in online schooling. However, the results of the KiDiCoTi project show that children were able to engage in different types of learning activities and to develop competences despite the challenging conditions. Furthermore, some German studies (Woesmann et al., 2021 and Helm et al., 2021) indicate a better functioning of blended learning methods in the second and subsequent (if any) lockdowns than in the spring of 2020, proving that European school systems strived to adapt to the new situation and to improve the support given to students and teachers.

[1] "Emergency remote teaching" refers to the sudden transition to online schooling forced by the COVID-19 pandemic outbreak in the spring of 2020. As the KiDiCoTi report states, many schools were ill-prepared for such an unprecedented situation and did not know what technology and methodology were the most appropriate for instruction (Cachia et al., 2021).

***Box 1: School meals***

Worldwide evidence shows that inequality has also been deepened through food insecurity during the pandemic when school meals could not be provided especially to vulnerable students. According to the World Food Programme (2021), about 388 million children across the world received daily meals in schools prior to the pandemic, whereas at the height of school closure in early 2020, 370 million children were missing out on school meals. This may have resulted in a decrease in student enrolment, and lower attendance and retention.

Prior to the pandemic, 20% of income-poor school-aged children in European OECD countries lacked good quality nutrition. This was around three times higher than among non-income poor children. (OECD, 2020). Evidence from Europe also shows various challenges in ensuring food security among children and students during the pandemic. For example, vulnerable children in Romania, especially those with low socio-economic status, have been affected by the lack of provision of school meals due to repetitive school closures (Florian and Toc, 2020). More evidence of the pandemic impacts on school meals is needed for an in-depth analysis at the EU level.

# Evidence of learning gaps and potential negative long term effects

The conditions that led to the various periods of school closures during the years 2020 and 2021 were extraordinary by all means. At the start of the COVID-19 pandemic outbreak, governments were hesitating whether to close schools and, if so, for how long they had to remain physically closed. This fact partly explains that school systems in different countries reacted differently to the disruption, some not offering online classes and learning support for children from the very beginning of the lockdown, but waiting several weeks before putting in place an online schooling scheme. The solutions adopted differed among countries, within countries and even within schools (Champeaux et al., 2020), according to students' age, schools' resources and teachers' digital competences (Duroisin et al., 2021). Research teams across Europe started following and monitoring the development of blended modes of schooling as soon as closures were announced, paying attention to inequalities of access to education from home and to the potential learning gaps that could result from the pandemic (Hammerstein et al., 2021). These are not easy to grasp, since the abnormal situation also disrupted the regular administration of standardised tests to students (if those were administered at all). For example, the OECD's 2021 Programme for International Student Assessment (PISA) was postponed by one year and became PISA 2022, with field trials that had started in early 2020 being postponed. Yet, researchers have found ways to measure competence acquisition in different areas of education in order to assess achievement gaps and help to conceive remedial actions.

The available studies depend on the subject tested, previous performance, age and social background. Research conducted in the Netherlands among primary school students after the first 2020 pandemic wave (Engzell et al., 2021) draws on exceptionally rich data. Based on the results of national standardised tests examining achievement in core subjects (mathematics, spelling and reading) administered to students annually, the study estimates the achievement gap related to the COVID-19 school disruptions in spring 2020 to be equivalent to the duration of the physical school closures in the Netherlands (8 weeks). The estimation of the learning gap arises from the comparison of the cohort affected by the school closures to the two previous ones. The results confirm that school disruptions during the pandemic were disproportionally detrimental for the learning of children from lower socioeconomic backgrounds, who generally performed worse than their peers from more advantaged groups. With the same objective, but relying on data collected through a survey at local level, a study conducted in the province of Turin, Italy, evaluates the impact of the school closures on the achievement in mathematics of primary school students (Contini et al., 2021). In this case, researchers compared pre- and post-COVID-19 cohorts from a selection of schools to assess the direct and indirect effects of the pandemic on students' educational outcomes. The results of this study show a heterogeneous impact of the spring 2020 physical school closures on children, the greatest detrimental effect being observed among children who normally benefit the most from attending school, such as those from low educated families. As for secondary schools, students' results at standardised tests for reading and mathematics in the German region of Baden-Württemberg were slightly lower for the year 2020 than the average score of the three previous years (Schult et al., 2022a). Fifth graders that appear to be more negatively affected by the school closures are low-achieving students.

National tests administered in the Flemish Community of Belgium among six-graders in the early stages of the pandemic show marked learning losses in the native language (Dutch), mathematics, natural sciences and the second language (French), but not in social sciences (Gambi and De Witte, 2021). Then, in the second year of the pandemic, the learning losses in the Dutch language increased further while in mathematics they stabilised at the 2020 level. The losses for science recovered moderately from 2020 while the scores for social sciences improved decisively. However, not all students and schools were

affected in the same way: perhaps unexpectedly, schools with the prevalence of students from more advantaged neighbourhoods, speaking Dutch at home[2], and more elevated maternal educational attainment, experienced higher learning losses one year after the pandemic. This may be explained by overrepresentation of such schools in the study, as well as by a lower share of students considered slow learners before the pandemic.

The results from these and various other studies conducted in 2020 sparked an alarm and calls for remedial action, the question behind it being if the pandemic would have a lasting legacy on the educational achievements of a whole generation, leading to worse future job prospects and lower earnings. In spite of fragmented data and sometimes inconclusive results, some researchers have developed models to assess the impact of the pandemic on missing skills and on lost human capital required for future participation in the labour market. Such models are based on estimations of the relationship between cognitive skills and income, usually using longitudinal data on students' skills measured towards the end of secondary education and their later employment, or surveying the cognitive skills of adults and linking them to their labour income. Hanushek and Woessmann (2020) apply the second approach to data from the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) survey of adults' literacy and numeracy skills. They estimate the income loss of students affected by the COVID-19 related school disruptions at an average of 2.6% over a lifetime, assuming a scenario in which there are no policy changes, and indicating that the length of school closures and their conditions in other countries may lead to different estimations. The researchers also provide projections of the impact of the school closures during the pandemic on the gross domestic product of states, linking to prior research on how student achievements in mathematics and science determine long-term economic growth. They project that the cost of learning losses equivalent to one-third of a school year, if not remedied, would have a macroeconomic impact of "enormous magnitude" (Werner and Woessmann, 2021). While economic projections of this type can spark interest from a wider audience and serve as a call for action for policymakers, results from studies that take into account students' learning achievements measured in 2021 provide a more nuanced picture of the possible long-term impacts of the pandemic-related school disruptions. For example, in contrast to the outcomes of standardised tests in Baden-Württemberg, there is no significant achievement gap among fifth graders in Hamburg, Germany (Depping et al., 2021). The KiDiCoTi project by the European Commission's Joint Research Centre also points out to skills that children were able to develop while being at home on lockdown that, at least to some extent, can counterbalance the narrative of an important learning gap resulting from the pandemic. Digital skills, ability to self-learn and to look for information, creativity, time management, and resilience are some of the competences acquired and exercised during school closures that should be considered when assessing the impacts of the pandemic on learning.

In Italy, the negative effects of the pandemic were generally greater for previously low-achieving students, of whom most were from low socio-economic background. Borgonovi and Ferrara (2022) compared mathematics and reading achievement of Italian students in grades 5 and 8 in the academic year of 2020/21 with the academic year of 2018/19. They observed a negative effect on older children (who completed lower-secondary school). On the other hand, they did not observe such effect on younger children (who completed primary school).

[2] In the case of students with a migrant background, the language spoken at home may differ from the language of instruction at school. This may constitute a disadvantage for the student, particularly if combined with lower educational attainment of the parents, scarce learning resources at home or material deprivation.

A set of German results in reading (Ludewig et al., 2022) shows a substantial decline in mean reading achievement corresponding to a one-third of a year of learning, but with no statistically significant changes of achievement gaps between student subgroups (immigrant background, gender, special needs, age). This is consistent with Borgonovi and Ferrara (2022) that did not find evidence of widening of the performance gap between the students from low and high socio-economic backgrounds.

In the Spanish region of the Basque Country, evidence shows a 20% learning loss of a regular year in mathematics among primary and lower secondary school students (Arenas and Gortazar, 2022). Also, the study found a loss of 11% of annual learning in the Basque language. Interestingly, no learning loss was found in the Spanish language. The learning loss effects are much larger in public schools, which represent 50% of the school network in question. The effects in private schools were small in general on average, yet they depend heavily on the pre-pandemic performance. While high-performing private schools[3] show no learning loss under the pandemic, the low-performing private schools demonstrated considerable learning losses, controlled by students' socio-economic status, sex, language spoken at home and migration status, characteristics which do not seem to influence learning losses in this study. Also, students who reported larger well-being deterioration during lockdown, demonstrated considerably bigger learning losses. Another take-away point from the study is that the pandemic has augmented the gap between schools with previously high and low performance.

Jakubowski et al. (2022) demonstrated considerable learning losses among 15-year-olds in Warsaw in a study designed to simulate PISA (autumn 2021). It should be noted that the results are confounded by a sweeping education reform introduced in 2016.

Results from national tests in French and mathematics in the early parts of the primary school curriculum demonstrated the resilience of the system against the pandemic (Andreu et al., 2022b). The results, measured as a percentage of students reaching satisfying results in the last pre-school year and the first primary school year are reassuring: the slight decrease in performance observed in autumn 2020 against 2019 was reversed and in most cases improved beyond the baseline in 2021. Andreu et al (2022a) carried out a similar evaluation of national tests in France among sixth-graders. Here as well, the results are reassuring: the percentage of students with sufficient results in mathematic remained stable between 2021 (71.9%), 2020 (71.8%) and improved since 2019 (69.0%). The results for the French language were 88.9% in 2021 and 89.2% in 2019 and 83.5%[4].

While remote learning is likely to remain an imperfect substitute for face-to-face instruction, the digital skills of learners and teachers are a crucial element of preparedness for such crisis. Thus, a high degree of teachers' use of ICT prior to the pandemic could limit the damage. Another strong signal of systemic resilience comes from Denmark, where ICT use at school was widespread before the pandemic, which saw little or no learning losses (Birkelund and Karlson. 2021). Only among older students (8th grade) there was a learning loss in reading performance detected, which corresponded to 7 weeks of learning. Interestingly, no such loss was detected in grade 6, which spent the same amount of time in remote learning. If anything, students in grade 6 experienced a small learning gain, so did grades 2 and 4. This surprising result can be perhaps explained by a successful remedial strategy implemented by Danish authorities: a teaching scheme upon return to school after lockdown where only a few, familiar teachers

[3] Schools are considered private for the purpose of this study if they charge an additional fee to parents and are privately managed. They usually receive public funding none the less.

[4] Differently from the other reviewed studies mentioned here they simply refer to the variation in performance between different years without any computational corrections.

were covering all the subjects. This scheme had a double purpose of reducing COVID-19 transmission and lowering stress in students. The knock-on effect of the scheme was that it was in many cases the teacher of Danish doing most of the teaching with more time being spent on reading.

In general, it appears from the first large global meta-analysis of April 2022 that countries representing very different levels of development and social cohesion tend to share the following threads (Betthäuser et al., 2022):

- The effects of closures persisted even after schools nominally reopened because classes sometimes continued in hybrid format and many teachers or students had to quarantine or were missing classes.

- Learning deficits are larger in mathematics than in reading as learning progress in mathematics is more dependent on formal instruction than is reading. This might be due to parents being better equipped to help their children with reading, and children advancing their reading skills (but not their mathematics skills) when reading for enjoyment outside of school.

- Learning deficits are larger in countries of lower income, on the global level. The pandemic can be expected to have exacerbated not only the educational gap between children from different socioeconomic backgrounds, but also between richer and poorer countries.

# Remedial actions across the EU and policy implications

During and especially after the first wave of COVID-19 related physical school closures, education systems across the EU implemented remedial actions to tackle the declining tendency resulting from the disruption. This section presents in more detail initiatives engaged in different countries to support students and professionals involved in education at achieving their best in such challenging times.

Several reports (De Witte and Smet, 2021; Thorn and Vincent-Lancrin, 2021) state that most EU countries implemented exceptional measures since the beginning of the pandemic outbreak. Besides the full or partial school closures and the switch to online learning, governments allocated additional funding to help educational communities overcome the difficulties of the sudden changes. Funds supported the regular activities of schools in challenging times and covered the additional costs of hygiene and sanitation of educational spaces. In many cases, part of the extra funds went to the acquisition of IT equipment such as computers and tablets, for both schools and individual users at all education levels, with special attention to students from disadvantaged backgrounds and with special needs (De Witte and Smet, 2021). In Romania, for example, funding covered also the provision of access to the internet of children from lower socio-economic status families.

After the school disruptions in the spring of 2020, some countries implemented broader measures to support the digitalisation of education, which included teacher training, and to mitigate the negative effects of the pandemic outbreak in learning. In addition, some developed actions aimed at developing educational digital content (e.g. Portugal) or even national learning platforms (e.g. Germany) (Zancajo, Verger and Bolea, 2022). Hiring additional teachers and tutors for students struggling with online and blended modes of learning, reinforcing student counselling centres, and providing funding for extra-curricular artistic and physical activity centres were also part of such measures.

In the wake of the pandemic's first wave, one policy priority of governments across European countries was the design and implementation of plans for reopening schools. The main challenge of the reopening plans was to balance the need to reopen schools, the potential adverse health effects, and the financial and human resources available (Reimers and Schleicher, 2020). In some countries, reopening plans were faced with resistance from family organisations, teacher unions, and public opinion more broadly. In Romania, in July 2020, the Ministry of Education gathered experts, students, teachers and parents' representatives, health and local authorities to develop several scenarios for school reopening in autumn 2020, which were then translated into operational guidelines used by institutions at all levels of education across the country (Leyton and Sava, 2020).

To compensate for expected learning losses and the closing of learning gaps between students, several EU Member States promoted the organisation of summer programmes in 2020. The participation in these activities generally took place on a voluntary basis, but in most cases, students from disadvantaged backgrounds were prioritised and specific funding was reserved to support their enrolment without cost for their families. These summer programmes sometimes focused on specific contents of school curricula in order to prepare students for the new school year, or simply provided a friendly environment for children to socialise that included both formal and non-formal learning, as well as physical and artistic activities. An example of the former type is the summer Lernferien programme organised in Hamburg, Germany, with 381 learning groups taking place in August 2020, most of them in disadvantaged areas. This programme focused on consolidating the basics of German language and mathematics before the start of the new school year, with courses taught in a variety of media, including digital devices, to strengthen students' digital skills (Depping et al., 2021). With similar objectives, the Flemish Community of Belgium fully subsidised 138 summer schools organised by local authorities in collaboration with education providers, targeting students from disadvantaged areas and

lower socio-economic status families (Gambi and Witte, 2021). Around 7 500 children, distributed in groups of maximum 14 students each, benefited from the initiative that covered at least 10 full days (or 20 half days) in August 2020. The learning loss observed in the postcode areas with a summer school available, did not increase in either the Dutch language or mathematics. At the same time, the learning loss in Dutch increased in those postcode areas where no summer school took place. Summer bridging programmes were also organised in Italy, Lithuania, Spain and France (De Witte and Smet, 2021). In all cases, summer camps covered primary and secondary education and gave priority to the enrolment of students from disadvantaged backgrounds.

***Box 2: Examples of activities aiming at reducing early school leaving in Romania***

Prevention

- Actions promoting a positive and inclusive school climate, including addressing violence, bullying, purchase of modern and age-appropriate furniture;
- Implementing teaching practices fostering active learning, facilitation of learning, critical thinking, peer mentoring and support, developing socio-emotional skills, carrying out team project-based learning and work;
- Teacher training courses and coaching aiming at improving teaching practices, development of an adequate learning environment.

Intervention

- Remedial education (Romanian language, mathematics and ICT) to recover learning losses as result of the pandemic;
- Implementing after-school programme targeting students from low socioeconomic status, including provision of a daily school meal;
- Extra-curricular activities, provision of social benefits for vulnerable children.

Compensation

- Carrying out community census to identify and register out-of-school/training children and youth;
- Providing school reintegration programmes either in mainstream education or in second-chance education, targeted vocational courses to obtain a qualification level to enter the labour market, accelerated learning/recovery programmes;
- Providing quality professional career guidance and counselling.

*Source:* Ministry of National Education of Romania, 2022

Similar measures have been proposed by Italy and Spain, mainly based on allocating additional economic and educational resources to those schools with higher concentrations of vulnerable students.

Three European countries with high rates of early school leaving and youth unemployment (Spain, Portugal, and Malta) have included investments and reforms in their national systems of vocational education and training, as part of the measures to address the effects of the pandemic for socially disadvantaged students. The policy responses consisted of strengthening and improving vocational education as a means of reducing early school leaving and providing educational opportunities to most socially disadvantaged youth.

Some studies discussed in the previous chapter suggest a link between such compensatory measures and the results of standardised testing in 2021 reaching levels similar to those from pre-pandemic times.

Findings from Gambi and de Witte (2021), while pointing to an increase of inequalities within schools, suggest that the remedial actions targeted at students from disadvantaged backgrounds have helped to halt achievement gaps.

In France, progress between 2020 and 2021 was stronger among students in priority education schools (most often located in disadvantaged areas), indicating a positive effect of compensatory measures. In addition to that, at primary school level, test results from 2021 were back to pre-pandemic standards, both regarding the different subjects and when looking at achievement gaps between schools, taking into account the socio-economic status of the students and whether they are located in disadvantaged areas or not (Andreu et al., 2022b).

Although more evidence is needed for accurately assessing the results of the remedial actions in closing learning gaps, the aforementioned results suggest that measures engaged by governments and education authorities in different countries can have positive effects.

On a global level, a joint framework by UNESCO, UNICEF, the World Bank, the World Food Programme, and UNHCR has called on education systems to implement large scale remedial programmes to mitigate learning losses that might have a long-lasting negative impact (UNESCO et al., 2021).

Such programmes should prioritise children's acquisition of essential competences and include teachers' continuing professional development to assess students' level and to adapt their teaching methods. Under the slogan "build back better", the joint framework advocates for the reorientation of curricula to focus more on "key competences" and resuming progress, instead of covering an often overambitious set of topics with little time allocated to each one. Another study based on a "pedagogical production function" model (Kaffenberger, 2021) estimates that the reorientation of curricula, combined with remedial actions such as reducing the pace of teaching and "meeting children where they are", can fully mitigate the learning losses due to COVID-19 related school disruptions. Even though the responses to the pandemic outbreak varied greatly between countries, also within the European Union, there is evidence of curricula and evaluations adapting the new situation. In Spain and France, for example, the national government gave explicit directions for it (Government of Spain, 2020).

# Conclusion

This paper has presented a literature review of research focusing on the impacts of the COVID-19 pandemic on school education. Studies conducted in various countries show that the sudden switch to online and blended learning forced by the pandemic outbreak in the spring of 2020 made pre-existing educational inequalities more visible, and even contributed to their widening.

Governments across EU Member States reacted differently to the pandemic. Schools were not uniformly prepared for the change to "emergency remote teaching", and families had to adapt to the situation and help their children with online learning relying on different types and levels of resources.

While some of the early assessments of the impacts of the pandemic on learning were strongly negative and gave way to pessimistic predictions, more recent research contributes to draw a more nuanced picture of the expected aftermath of COVID-19 in school education. Moreover, studies conducted in countries and regions that implemented remedial actions during the summer of 2020 show that learning gaps can be closed and achievement differences linked to social inequalities can be mitigated to a degree.

The short overview presented here shows the need for more research in this area, including regularly updated data on learning and educational achievement, as well as on support measures to reduce learning gaps and inequalities between students. As studies cited in this paper suggest that compensatory measures can help reduce achievement gaps between students, especially those that can be traced back to inequalities of socio-economic status and educational attainment of children's parents, more evidence is needed on the most effective actions in different contexts. Regarding the pre-existing inequalities made more visible during the COVID-19 pandemic, policies should ensure that all children have access to quality education in case of school disruptions. This includes not only providing the necessary devices to follow online courses, but also helping them to develop their digital skills, as well as training teachers and education professionals to be confident in increasingly digitalised learning environments. Such measures will allow school systems to be up to date with technologies useful for education and training and ultimately to be better prepared for eventual school disruptions in the future.

Additionally, the available evidence of the positive effects of remedial actions in closing the learning gaps resulting from the COVID-19 related switch to "emergency remote teaching" points to the need for policies ensuring equity in school. Summer courses, tutoring and counselling targeting lower achieving students and schools in disadvantaged areas, as well as non-formal and informal learning programmes during holidays appear to function as compensation measures for students from lower socio-economic backgrounds.

This paper has only focused on school education (both primary and secondary), but the need for more research on the impacts of COVID-19 in learning applies to early childhood education and care, to education for children with special needs, and to the higher education sector, as well.

The measurement of learning losses caused by the pandemic, should be seen as only one strand research needed to assess the full picture of the aftermath of the pandemic. For example, measuring the psychological cost and well-being of school children constitutes research topics worthy of further attention. Also, studying the long-term impacts on the development of children will likely emerge as a research topic when the pandemic cohorts of school children start coming of age and begin their professional careers. Another topic that should complement the picture of the education systems under the pandemic is the experience of teachers.

Access to quality education for all children means helping those from disadvantaged backgrounds thrive at school by implementing policies targeting them specifically and ensuring that school systems are equal and inclusive.

# Annexes

# ANNEX 1. Methodological considerations

Measuring the impacts of COVID-19 on learning has important limitations. The data typically available in measuring the impacts of COVID-19 belong, from the methodological point of view, to the category of "real world evidence". A randomised control trial (known as RCT) would be the most robust instrument to prove causality of COVID-19 on learning loss but it is not feasible (Styles and Torgerson, 2018).

Thus, when comparing pre- and post-COVID exam results there is no way of knowing what the result would have been, had there been no pandemic. Comparing the "before and after" test results does not isolate the impact of the pandemic and is always confounded by other immeasurable factors such as school reforms, changes in the socio-economic environment and its fluctuations, etc. Secondly, the two cohorts compared in two different points in time consist of different persons and may have a slightly different composition. That said, statistical techniques exist that, under certain assumptions, can correct for these factors, by exploiting the features of the so called "natural experiments": situations where casual events (like the Covid-19 pandemic) or policy changes lead to similar groups of people being treated differently.

The term "learning loss" is commonly used in the literature to describe declines in students' knowledge and skills. Historic data provides researchers with information regarding where student learning should be year over year and is often measured through regular testing. Learning loss occurs when educational progress does not occur at the same rate at which it has historically compared to previous years (Pier et al., 2021).

A common unit of measurement for learning loss is commonly expressed in literature in standard deviations, which provides for comparing test results that use different scales. Though differences exist in this matter, many researchers assume that under normal circumstances, students generally improve their performance by around 0.4 standard deviations per school year (Betthäuser et al, 2022; Azevedo et al., 2020). Therefore, the most intuitive measure to express the learning loss in is the equivalent of school duration lost. A year of schooling is, on average, associated with an 8–9% gain in future earnings (Psacharopoulos and Patrinos, 2018).

Regarding the territorial scope and international comparability, no studies exist to assess the learning loss across the EU. A comprehensive and comparable assessment of such losses becomes even harder if we take into account that the COVID-19-related school closures varied in duration across school systems. While in some, schools remained closed for months and years, in others, they were only closed for short periods. Also, the experience varied by grade level. Some countries kept primary schools open but closed secondary schools.

On the other hand, multiple studies have emerged that covered cities, regions or even entire EU Member States. These studies measured exam performance before and after the pandemic at different points in time and in different education levels.

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