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Catching up on lost learning opportunities: Research and policy evidence on key learning recovery strategies

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DIRECTORATE FOR EDUCATION AND SKILLS

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Abstract

Climate change and natural disasters, the COVID-19 pandemic, and geopolitical shocks have increasingly disrupted school education around the world in recent years. Whether leading to school closures, school destructions or repeated interruptions in students' learning experiences, these external shocks have translated into lost learning opportunities for students. In this context, education systems face heightened pressure to become ever more resilient, enhance the efficiency of public spending and address emerging learning gaps. This working paper highlights key education strategies for helping students catch up on lost learning opportunities and bridge learning gaps, based on a review of research and policy evidence from OECD and non-OECD countries. It examines a range of academic strategies to address learning gaps, including i) adapting instructional strategies and pedagogies to individual needs, ii) extending and adapting the time of instruction, and iii) providing curricular flexibility and enabling fluid learning pathways within the school system. It provides research evidence on the effectiveness of such strategies, together with examples of their large-scale implementation and cost-effectiveness considerations. While this paper presents programmes of general interest for all countries, a separate policy brief targets learning recovery strategies for students in Ukraine.

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1. Introduction

The COVID-19 pandemic, climate change and natural disasters, rising geopolitical uncertainties and disruptions, such as Russia's war of aggression against Ukraine, have and will increasingly challenge school education around the world. Despite large disparities between and within countries, school closures during the COVID-19 pandemic have affected almost all the world's student population, translating into varying learning deficits and still to be measured effects on students' mental health, socio-emotional skills and behaviours. But the pandemic is not an exceptional disruption in students' education. The ever more visible consequences of climate change reflected in more recurrent fires, floods, more frequent or intense drought and heat waves, are likely to generate large-scale localised crises with soaring frequency. Climate-related disasters can destroy schools or the infrastructure that enables students to reach schools, hurt students or teachers, resulting in their absence from schools, or translate into material hardship that can force students to interrupt learning and potentially drop out (UNICEF, 2019^[1]). Beyond climate change, humanitarian crises due to unpredictable conflicts and disaster displacements (e.g. earthquake-related) add further volatility to the environment in which education systems operate. Whether leading to school closures, school destructions, repeated interruptions in students' learning experiences or lower-quality instruction due to remote learning, these wide range of external shocks translate into lost learning opportunities for students and increased variation in students' skill levels. They thus put heightened pressure on education systems to become ever more resilient and able to address the learning gaps that emerge between students who are left out or left behind in their educational pathway.

Evidence from school closures before and during the pandemic, as well as students' absence from schools (e.g. due to weather, teacher strikes) provide insights on the size of the reduced learning students are likely to exhibit when instruction is disrupted for various durations and on an individual vs. collective level. Research focused on summer learning losses (due to the summer break) shows large variations in loss sizes across studies, although greater losses emerge in mathematics than reading (Blanden, Doepke and Stuhler, 2022^[2]) and a similar pattern could be observed during the recent pandemic (Betthäuser, Bach-Mortensen and Engzell, 2023^[3]). Unanticipated shocks to instruction time of varying lengths (e.g. several months of teacher strikes versus a few snow days) tend to find stronger negative effects due to individual absences rather than shocks that impact on an entire class. Such individual absences are also more penalising for socio-economically disadvantaged students, whereas evidence on inequalities in summer losses is more mixed (Blanden, Doepke and Stuhler, 2022^[2]). Evidence from the pandemic tends to show a small negative impact of early school closures on students' academic learning, although the size of the effects vary widely across countries (Thorn and Vincent-Lancrin, 2021^[4]): in countries for which information is available, school closures were remediated through remote learning arrangements. Children from low-income countries and those from low socio-economic backgrounds have, however, experienced stronger negative effects due to school closures or disruptions during the pandemic (Betthäuser, Bach-Mortensen and Engzell, 2023^[3]).

Learning recovery strategies can play a key role in reducing learning gaps and supporting equal opportunities in education systems. Accelerated education programmes, catch-up programmes or remedial education designate a range of programmes that seek to mitigate reduced academic learning and that vary by their target groups (e.g. out of school students or students whose learning experience has been disrupted varying period of time), students' learning experiences, age and/or prior skills. Already before the pandemic, learning recovery strategies had been used in a number of countries or contexts to reduce learning gaps between students or remediate for lost learning opportunities due to a variety of shocks (e.g. conflict). The pandemic has brought renewed attention to the potential of such

programmes. As almost all students around the world were affected by school closures, education systems had to implement strategies for continuing learning outside of formal school premises. While learning gaps have emerged and at varying degrees between students of different countries and within countries, evidence from the pandemic also shows that learning deficits can be remediated when effective catch-up strategies are put in place.

Learning recovery strategies thus become ever more critical as education systems seek to recover more quickly from external shocks, limit the economic costs of school disruptions and their negative effects on a range of social outcomes directly linked to education (e.g. health, crime behaviours, equity and social cohesion) (OECD, 2022^[5]). Beyond helping reduce the high economic costs of learning disruptions on long-term productivity and GDP levels (de la Maisonneuve, Égert and Turner, 2022^[6]), remediation strategies can also support more equity in and through education as educational inequalities translate in inequalities into subsequent life outcomes and tend to persist across several generations (Blanden, Doepke and Stuhler, 2022^[2]; OECD, 2022^[5]). They can thus support individual and education system-level resilience, while underpinning broader economic and recovery packages put in place by countries to address the consequences of unanticipated shocks to their economies and societies.

This working paper examines strategies for learning recovery from OECD and non-OECD countries at different stages of economic development (including low-middle-income countries), covering both the pre-COVID-19 pandemic and its aftermath. It puts the focus on academic interventions for catching up on lost learning opportunities and examines a range of strategies that have been shown or hold great potential to reduce learning gaps:

- adapting instructional strategies and pedagogies to individual needs, by tailoring instruction to students' needs, providing instruction in small groups (through tutoring or peer tutoring), leveraging technologies for personalised learning (through online tutoring or intelligent tutoring systems) and keeping students engaged, particularly in a context of remote learning;
- extending and adapting the time of instruction (through longer and/or more diversified school days, summer schools, etc.);
- providing curricular flexibility (by prioritising fundamental skills and knowledge and adapting the curriculum) and facilitating vertical transitions within the school system (by favouring conditional promotion over grade repetition or automatic promotion).

Research evidence on the effectiveness of such strategies is presented alongside with policy examples of their implementation (Table 1), costs and implementation challenges when such information is available. Policy examples refer in most cases to programmes implemented at large scale, or, when large-scale examples are not readily available (e.g. on the use of innovative digital tools), of programmes implemented at sufficient scale and that have undergone rigorous evaluation.

While these strategies for academic learning recovery are presented separately in the paper, they are not mutually exclusive, and countries have relied and can rely on a combination of approaches. It is often difficult, therefore, to disentangle the effects of specific strategies (e.g. increases in instructional time from more condensed curricula and the associated training teachers might receive). In addition, evaluations of support programmes for addressing learning gaps have often focused on students' cognitive outcomes. Evidence on programme effectiveness in terms of socio-emotional skill development remains more limited, despite increasing awareness of the importance of school attendance for students' socio-emotional skills, particularly in crisis or conflict contexts.

Finally, this paper presents programmes of general interest for all countries to the extent that external shocks that can disrupt students' learning experience can occur in all environments or geographic areas. At the same time, in the context of the Russian war of aggression against Ukraine, a separate policy brief (OECD, 2023^[7]) targets learning recovery strategies for students in Ukraine. The brief focuses on a range of academic strategies the ministry can implement in the short and medium-term to help students recover lost learning opportunities, and puts forward policy responses that can enhance the long-term effectiveness of learning recovery strategies in Ukraine.

Table 1. Learning recovery strategies: types and examples of large-scale implementation

Type of strategy	Sub-type of strategy	Example of implementation at a large-scale
Adapt instructional strategies and pedagogies to individual needs	Tailor instruction to students' learning needs	Escuela Nueva Learning Circles – Colombia (and other countries) Teaching at the Right Level – India (and other countries)
	Provide instruction in small groups: tutoring	National Tutoring Programme – United Kingdom Reading Recovery tutoring programme – United States
	Provide instruction in small groups: peer tutoring	Peer-Assisted Learning Strategies – United States
	Leverage technologies for personalised and more accessible learning	ASSISTments intelligent tutoring system – United States Tutoring Online Programme – Italy <i>Menttores</i> Online Tutoring – Spain
Adapt and extend the time of instruction		Longer and more varied school day – Denmark Learning vacation – France Summerschools – Luxembourg
Provide curricular flexibility and enable fluid learning pathways within the system	Adapt the curriculum to prioritise fundamental skills and knowledge	Curriculum Prioritisation – Chile New Curriculum Framework by Cycle of Education and Adjusted Objectives of Education – Slovak Republic
	Facilitate vertical transitions across school years	Remedial instruction in upper cycle or high school – Austria

2. Adapt instructional strategies and pedagogies to individual needs

Adapting teaching and learning strategies to students' needs is key helping children recover lost learning opportunities and bridge inequalities in students' outcomes. The following sections examine evidence on strategies to i) differentiate instruction through more individualised learning or more innovative pedagogies, ii) provide instruction in small groups (e.g. one-on-one, small group or peer tutoring) and iii) leverage digital technologies to personalise learning (e.g. intelligent tutoring systems) or deliver supplemental instruction to students (e.g. online tutoring), while maintaining student engagement, particularly in a context of remote learning.

2.1. Tailor instruction to students' learning needs

The provision of differentiated instruction adapted to students' learning needs can be a powerful strategy for catching up on least learning. A range of strategies can enable tailoring instruction to students' learning needs, including reorganising the class, seizing the potential of digital technologies for individualised learning, or training teachers in the use of more innovative pedagogies that enable learning personalisation (J-PAL, 2019^[8]). In a similar vein, teaching in small groups of students or one-on-one tutoring have also been shown to be particularly effective strategies (see section below).

Indeed, learner-centred pedagogies that put students' personal characteristics, needs and interests at the centre of the teaching and learning processes are crucial components of

accelerated or remedial learning strategies (USAID, 2020_[9]). While personalised learning approaches involve higher resource constraints and potentially costs, and may be more difficult to adopt in a conflict or crisis context (USAID, 2020_[9]), evidence from an analysis of 27 education interventions to raise student learning outcomes shows that tailoring instruction to student learning needs is a particularly cost-effective strategy (Bhula, Mahoney and Murphy, 2020_[10]). In addition, digital technologies can help address some of the resource constraints and ensure cost-effectiveness if they enable easier access to tutors or volunteers situated elsewhere (Carlana and La Ferrara, 2021_[11]), or embed learning personalisation features themselves (e.g. intelligent tutoring systems) (OECD, 2021_[12]) (see section below).

Evidence from OECD and non-OECD countries illustrates a range of differentiated instruction strategies that have been effective at bridging students' learning gaps and have equally proven easily scalable at the national level and transferable to different countries, particularly in contexts characterised by high heterogeneity in students' skill levels:

- In **Colombia**, the Escuela Nueva Learning Circles (ENLC) are based on the Escuela Nueva learner-centred approach and seek to provide quality education for children displaced by conflict, natural emergencies or for hard-to-reach children (Cerdan, Velez Bustillo and Colbert, 2020_[13]). The Escuela Nueva approach, designed by a Foundation, initially targeted disadvantaged children in rural areas, and focuses on collaborative learning and personalised teaching, with an emphasis on a strong relationship with the community and ongoing teacher training (Paniagua and Istance, 2018_[14]). The Ministry of Education took up the Escuela Nueva approach and scaled it up at the national level. As a result, more than 24 000 rural schools in Colombia have benefitted from the approach, and as of 2017, around 75% of rural primary schools were conceived as Escuela Nueva schools (USAID, 2020_[9]). In addition, the approach has been implemented in more than 20 countries, with around 12 countries introducing and adapting the model through government policy reform (hundrED, 2022_[15]). In 2001, the Escuela Nueva foundation that designed the Escuela Nueva approach created the ENLC to support the transition to the education system of children affected by emergencies and by 2006, the model was scaled up at the national policy level (USAID, 2020_[9]). The ENLC rely on the Escuela Nueva approach. They relate to regular schools through similar curricula, academic calendars, grading systems, etc. but they operate separately from the formal schools to which they are attached ("mother schools") (Cerdan, Velez Bustillo and Colbert, 2020_[13]; USAID, 2020_[9]). Groups of 16-20 students work with a tutor and children receive personalised attention, while also benefitting from strong relations with community institutions (e.g. churches, community centres; children also engage in community projects) until they are ready to enter the "mother school". ENLC and the Escuela Nueva approach equally focus on the provision of socio-emotional support to foster students' social skills, self-esteem, conflict management skills, etc. (Cerdan, Velez Bustillo and Colbert, 2020_[13]). A range of studies has provided positive assessments of both the ENLC and Escuela Nueva approaches (USAID, 2020_[9]). The ENLC were also adopted and adapted to address challenges arising from the COVID-19 pandemic as well as the migration crisis from Venezuela that led several thousand school-aged children to move to Colombia. In 2019, international organisations together with the foundation in charge of Escuela Nueva set up an ENLC programme in six cities in Colombia to enable more personalised learning for migrant children with a lighter curriculum and strong focus on life skills (Cerdan, Velez Bustillo and Colbert, 2020_[13]).

- In **India**, the “Teaching at the Right Level” (TaRL) approach designed by Pratham has proved to be particularly effective at enhancing students’ basic literacy and mathematics skills, particularly in the case of the lowest-skilled children. As of 2019, the approach was implemented through two methods: i) directly by Pratham team members in government primary schools (in around 5 000 schools and communities, with varying numbers of students and teachers in each school depending by stage) and ii) through Pratham-government partnerships whereby government teachers are trained to implement TaRL in their school (in 2018-2019, more than 250 000 schools and 15 million children across India were covered by such partnerships) (Pratham Resource Centre, 2020_[16]). Apart from being scaled up in many Indian states at the government level, the approach (or variations of it) has also been implemented across countries in Africa, South Asia and Latin America (USAID, 2020_[9]; Banerjee et al., 2017_[17]; Pratham Resource Centre, 2020_[16]) and in 2021, more than one million children in 12 African countries benefitted from the TaRL approach (J-PAL, 2020_[18]). The TaRL approach involves grouping students by skill level, rather than age or grade level (e.g. through supplementary lessons, or by dividing the class in smaller groups), and adapting teaching and teaching materials to students’ skill level. Covering the grade-level curriculum is not the purpose of the approach. Children are reassessed continuously throughout the programme and regrouped based on their skill level. A series of randomised evaluations in seven Indian states, as well as in programme implementations from other countries, showed that the TaRL approach has translated into sizeable learning gains (USAID, 2020_[9]; Banerjee et al., 2017_[17]; Banerjee et al., 2016_[19]). As part of the approach’s scale-up process and integration in the education system, different variations of the approach have been tested¹. The provision of dedicated time to relieve instructors from the pressure of covering the regular curriculum, coupled with support from government staff, was key to ensure the effectiveness of the approach when TaRL was introduced during the school day.

While the TaRL approach has provided particularly effective, it has mostly been implemented and assessed in developing countries contexts, characterised by larger class sizes, lower student skill levels and teacher quality. The approach might hence result in more limited impacts in countries where teachers already rely on strategies that enable them to teach at the right level and where evidence for the effectiveness of within-class attainment or skills grouping remains relatively less positive (EEF, 2021_[20]).

2.2. Provide instruction in small groups

2.2.1. Tutoring

Tutoring, whether in the shape of one-on-one or small-group instruction, appears as one of the most effective education interventions to bridge learning gaps between students with various skill levels, whether in high-income and developing economies, in crisis and conflict contexts (Nickow, Oreopoulos and Quan, 2020_[21]; Dietrichson et al., 2017_[22]; Pellegrini et al., 2021_[23]; USAID, 2020_[9]). Tutoring enables more personalised learning experiences, with more opportunities for engagement and feedback, all of which are particularly impactful particularly in contexts with large variations in students’ skills (Nickow, Oreopoulos and Quan, 2020_[24]; EEF, 2021_[25]). Tutoring can equally improve

¹ These included teaching during summer camps, teaching during the school year (with additional materials, teacher training, volunteer support or a combination of the latter), in-school learning camps (bursts of learning activities based on the TaRL approach and delivered by volunteers during school hours) or teaching by teachers in a dedicated hours (Banerjee et al., 2017_[17]), etc.

learning by increasing instruction time in the case when it supplements regular classroom hours. In addition, when tutoring translates into close student-tutor relationships, it can resemble a mentorship relationship and the latter has been shown to support enhanced social and emotional skills, such as pro-sociality (Kosse et al., 2020_[26])

Tutoring displays large, positive effects on the learning outcomes of students from preschool through the end of secondary education (Nickow, Oreopoulos and Quan, 2020_[21]). Tutoring interventions targeting socio-economically disadvantaged students display similar effect sizes (Dietrichson et al., 2017_[22]). In fact, small-group tuition appears as one of the most effective interventions for socio-economically disadvantaged students, along with feedback and progress monitoring², followed by cooperative (or peer-assisted) learning. Similar evidence on the effectiveness of tutoring and cooperative approaches emerges from reading programs for struggling secondary students (Baye et al., 2019_[27]).

Evidence from a meta-analysis of 96 randomised evaluations of tutoring programmes from pre-school to the end of secondary education shows consistent effects of tutoring across a wide range of program characteristics (Nickow, Oreopoulos and Quan, 2020_[24]). At the same time, tutoring is most effective when delivered by teachers or paraprofessionals (and during school time for paraprofessional-led tutoring), in a one-to-one format when it targets younger students and in small groups for older ones:

- While teacher-led tutoring programmes tend to be the most effective, interventions led by paraprofessional tutors (e.g. school staff members, education undergraduate students) also display large, consistent and time-persistent effects (Nickow, Oreopoulos and Quan, 2020_[21]; Guryan et al., 2023_[28]). Evidence from mathematics tutoring interventions also displays similar effect sizes for teacher-led tutoring and teaching assistant-led tutoring (Pellegrini et al., 2021_[23]). Tutoring conducted by paraprofessional or non-professional tutors (e.g. parents, volunteers) is more effective when it takes place during school time rather than through after school programmes, as it is probably easier to ensure its take-up and effective implementation.
- The effects of tutoring programmes vary by grade, subject, group size and frequency (Nickow, Oreopoulos and Quan, 2020_[21]). Students in earlier graders tend to benefit more from tutoring, and in particular from one-on-one instruction, although evidence from secondary level interventions is also promising. One-on-one tutoring is most effective for students up to the first grade, who are more likely to benefit from closer interaction with a tutor, whereas older students likely benefit more from exchanges with peers and hence, from small group tutoring. In terms of tutoring frequency, while students from all grades benefit from 3 sessions of tutoring per week (typically of around 30 minutes), higher-frequency tutoring (up to 5 sessions a week) is beneficial only to younger students (up to first grade) for whom repetition may play a larger role for skills development. Finally, tutoring effects also display variation by subject. In literacy, tutoring displays larger effects when conducted at younger ages. In contrast, mathematics-related tutoring becomes more effective as students get older.

Tutoring programmes involve however high costs and are dependent on the local supply of tutors that may be limited. Research evidence suggests some levers for enhancing the cost-effectiveness of tutoring interventions. In particular, paraprofessional-led tutoring can be a

² These interventions add a “specific feedback or progress monitoring component, where teachers or students received detailed information about the students’ development” in order to “customize instruction to students’ needs” (Dietrichson et al., 2017_[22]).

cost-effective solution for enhancing learning outcomes given the lower costs associated with the remuneration of such professionals relative to teachers, and their higher preparedness for teaching compared to volunteer or parent tutors (Nickow, Oreopoulos and Quan, 2020_[24]; Guryan et al., 2023_[28]). In addition, adapting the format of tutoring (one-on-one or small group) to the age of its beneficiary students can also enable containing the costs of tutoring since one-on-one sessions are more expensive (EEF, 2021_[25]). Finally, online tutoring can also be a cost-effective solution for providing personalised learning opportunities to students most in need (see section below).

The pandemic has brought renewed attention to tutoring interventions, although only a limited number of countries implemented the measure, most likely due to its high resource requirements relative to other learning recovery strategies (UNESCO / UNICEF / The World Bank, 2022_[29]). Among OECD countries, England (**United Kingdom**) introduced the National Tutoring Programme to provide tailored tuition support for pupils whose education was most affected by the COVID-19 pandemic (one-on-one or in small groups – usually one to three and in some specific cases, one to six) (Box 1). In the **United States**, the Reading Recovery intervention provides an example of a reading tutoring programme implemented and evaluated at large scale since its launch in the 1980s, with demonstrated cost-effective outcomes. The programme has an intensive training component for teachers (e.g. on-site coaching and support from teacher leaders) and consists of one-to-one tutoring that takes place daily, during the regular school day in the shape of supplemental instruction (Nickow, Oreopoulos and Quan, 2020_[24]; Sirinides, Gray and May, 2018_[30]).

Box 1. Large-scale tutoring programmes: evidence from the United Kingdom

The National Tutoring Programme in England (United Kingdom) was introduced in the 2020-2021 academic year and targets students in primary, secondary, Alternative Provision and special educational needs and disability schools. It comprises three routes, with an expectation that students benefit from 15-hour tutoring packages over an academic year and tutor/pupil ratios going from 1:1 to 1:6 (Lynch et al., 2022_[31]):

1. The “Academic mentors” route relies on salaried staff members who provide intensive support to students (e.g. subject-specific, lesson repetition, support outside of the school setting) (Department for Education, n.d._[32]; OECD, 2021_[33]). In the 2021-2022 academic year, academic mentors had to complete an online training with Liverpool Hope University (one week training for Qualified Teacher Status mentors and two weeks for non-qualified teacher staff).
2. In the “Tuition Partners” route, schools can choose among preapproved tuition providers known as Tuition Partners. In 2021-2022, all state-funded schools could access this route, although there was an expectation that around two thirds of the tutoring offer would target disadvantaged students. Tutoring could take place in person or on line.
3. In the “School-led Tutoring” route, schools have flexibility in choosing among existing staff or external tutors familiar with their school (e.g. private tutors or returning teachers). The route has also comprised mandatory online training for non-qualified teacher staff.

Schools can access all routes or a combination of them and decide autonomously on the selection of pupils in need of tutoring (Department for Education, n.d._[34]). All state-

funded schools can apply to the “Tuition Partners” route, whereas eligibility for the “Academic mentors” route and the “School-led Tutoring route” is determined using criteria related to the presence of socio-economically disadvantaged students in the school.

In the 2021-2022 academic year, the government subsidised costs to schools for all three types of tutoring routes, although at varying degrees – 95% of the salary costs of a mentor in the “Academic mentors route”; 70% of the costs for the “Tuition partners route” and 75% of costs for the “School-led Tutoring” route (Lynch et al., 2022_[31]). Schools had to allocate the remainder of the funds for the programme (e.g. through other budgets such as the pupil premium budget or the COVID-19 recovery premium budget). In the 2022-2023 academic year, the Department for Education provided core tutoring funding directly to schools to enhance their autonomy in selecting the best tutoring options for students. However, the amount of subsidies have been reduced relative to previous academic years (60% of tuition costs in 2022-2023) (Department for Education, 2022_[35]) and are expected to be further reduced, triggering questions about how these reductions will affect future take-up and impact of the programme (Lynch et al., 2022_[31]).

Since its start in November 2020 and by 2022, around 60% of schools had proposed tutoring sessions as part of the National Tutoring Programme, and regional disparities remained in schools’ take-up of the scheme (GOV.UK, 2022_[36]; UK Parliament, 2022_[37]). To enhance school participation in the programme, the Department of Education planned on contacting non-participating schools directly to discuss take-up support.

The National Foundation of Education Research, together with other partners, have carried out evaluations of the programme, in two stages: a first evaluation focused on the “Academic Mentors” and “Tuition Partners” routes in 2020-2021 (Lord, Poet and Styles, 2022_[38]), whereas a second study covered the implementation of the “School-led Tutoring” route in 2021-2022 (Lynch et al., 2022_[31]):

- Evaluations of the 2020-2021 “Tuition Partners” routes showed that tutoring was associated with better assessment scores in English in primary schools, and better teacher assessed grades for students at year 11 (Lord, Poet and Styles, 2022_[38]). However, the analysis was unable to detect positive effects on disadvantaged students (due to the low share of disadvantaged students who benefitted from tutoring): while it was expected that disadvantaged students would be the target of the route, schools had discretion in choosing students most in need of tutoring and fewer than half of recipient students were socio-economically disadvantaged students.
- Evidence on the implementation of the “School-led Tutoring” route showed that school staff relied on assessments and gap analysis to support the selection of pupils tutoring, as well as additional factors related to students’ interest in tutoring (Lynch et al., 2022_[31]). While the Department for Education had recommended the organisation of tutoring sessions during the school day, secondary schools were more likely to organise tutoring sessions outside the school day. Most schools used “School-led Tutoring” to fund internal staff to become tutors, with around two thirds of school leaders relying on qualified teachers employed by the school for delivering tutoring and the remainder relying mostly on external qualified teachers. Most surveyed school leaders reported being satisfied with the “School-led Tutoring” route and considered

that the route helped students catch up with peers, improved students' attainment and self-confidence.

Evidence from the implementation of the programme emphasized the need to ensure access to and quality of external tutors when schools lack capacity to rely on internal tutoring, as well as to provide flexibility when it comes to training engagement for previously qualified staff (Lynch et al., 2022^[31]).

2.2.2. Peer tutoring

Peer tutoring can be a cost-effective solution for delivering small group instruction. Research evidence points to the positive results of this approach on students' academic learning (particularly for low-skilled students), although estimated effect sizes are smaller than for regular tutoring (as defined in the previous sub-section) (Dietrichson et al., 2017^[22]). Peer tutoring is most effective when it focuses on reviewing already taught material rather than introducing new one, and when it is delivered in regular weekly sessions, for up to 10 weeks (Education Endowment Foundation, 2021^[39]). Training for tutors is critical to ensure the quality of peer tutoring, which is likely to translate into increased challenges for ensuring high-quality peer tutoring in a consistent manner (Nickow, Oreopoulos and Quan, 2020^[24]).

The Peer-Assisted Learning Strategies (PALS), a peer-mediated programme developed by researchers in the **United States**, provides an example of an effective peer tutoring approach. PALS relies on student pairing within the class, with each pair comprising a student with a higher skill level than the other (Nickow, Oreopoulos and Quan, 2020^[24]; The Fuchs Research Group, 2019^[40]). Within each pair, students take turns as tutor and tutee, and work on structured activities. Peer tutoring occurs during school time, for around three times a week, in 30-45 minutes sessions. Research evidence emphasizes the consistent positive effects of PALS on student achievement. The approach has also been implemented in a range of other countries (The Fuchs Research Group, 2019^[41]). Such peer tutoring approaches can also be combined with additional tutoring delivered by teachers or paraprofessionals as supplements to regular instruction time.

2.2.3. Leverage technologies for personalised and more accessible learning

Educational software and advanced technologies grant considerable opportunities for personalising instruction. They enable targeting students' specific needs and informing teachers about students' outcomes, thereby allowing them to adapt their own instruction practices. The use of computer-assisted instruction or educational software has yielded promising results on student academic achievement, particularly in mathematics (Bulman and Fairlie, 2016^[42]; Escueta et al., 2017^[43]; Abdul Latif Jameel Poverty Action Lab, 2019^[44]). Artificial Intelligence (AI) offers immense promise for the personalisation of instruction: AI Applications allow identifying materials and approaches in line with each student's needs and, using data from students, make predictions and recommendations about how to pursue learning activities (OECD, 2021^[12]).

A range of technologies are available to increase learning personalisation in instruction, with varying levels of automation depending on the level of teacher control of technology use in the classroom – for a more detailed review, see (OECD, 2021^[12]). At a relatively low level of automation of learning activities, digital technologies assist teachers and can provide them with more accurate information on learners' behaviours and specific needs. For instance, dashboards can provide an overview of students' progress and thereby support teachers in identifying students requiring additional instruction or feedback, and tailoring

further lessons to students' needs. Technology can take even greater control of tasks, selecting problems and providing feedback at each step of student engagement with the problem, while teachers get notified and take action when students do not evolve at the expected speed. More advanced types of intelligent tutoring systems require only a limited involvement of teachers and can support the learner in choosing learning goals, receiving personalised instruction and opportunities to practice, as well as feedback (OECD, 2021_[12]).

While the use of digital technologies to personalise learning has been shown to translate into enhanced student academic outcomes, few studies provide evidence that such adaptive technology translates into narrower gaps between students with different prior levels of knowledge. The use of the ASSISTments software provides one promising example in this respect:

- ASSISTments is a free educational tool for homework in mathematics released by the Worcester Polytechnic Institute in the **United States**, and that provides feedback assistance to students and assessment data to teachers, without any necessary adjustment in curriculum or textbooks (OECD, 2021_[12]; Escueta et al., 2017_[43]). Teachers assign mathematics homework and as students work through the problems, they receive feedback, while teachers receive reports about students' answers to the problems. A randomised controlled trial evaluation of the use of ASSISTments over 2 academic years in Maine has shown that in treatment schools where ASSISTments was used since the beginning, 7th grade students learned more compared to their peers in control schools where ASSISTments was introduced with a one-year delay (Murphy and Roschelle, 2020_[45]). In addition, students with lower prior mathematics achievement displayed larger gains from the use of the software. The evaluation leveraged the availability of personal devices at home and at school thanks to the one-to-one (computers to student) policy in Maine allowing all middle school students to take school computers home. Teachers in the study were also provided with professional development activities on formative assessment and coaching on the use of "short-cycle" learning data to perform instructional decisions.

Beyond intelligent tutoring systems that enable learning personalisation through automated solutions, technologies can also simply enable access to tutors located elsewhere. Online platforms but also more low-tech solutions such as phones (e.g. an individualised telephone tutoring programme in four Latin American countries (Bergamaschi, 2022_[46])) can bring together learners and qualified tutors from different locations. Examples from the COVID-19 pandemic show that online tutoring, whether provided by university volunteers or teachers, can be effective at increasing learning outcomes (Carlana and La Ferrara, 2021_[11]; Gortazar, Hupkau Claudia and Roldan, 2022_[47]; Kraft et al., 2022_[48]). Interventions relying on volunteering university tutors can appear as more cost-effective relative to those where qualified teachers act as tutors. At the same time, the availability of graduate volunteers may not be easily guaranteed outside of an exceptional crisis context and opting for a different profile of tutors or paying salaries to tutors increases substantially the costs of such tutoring schemes (Kraft et al., 2022_[48]). Access to Internet and digital devices also matters. In contexts with limited Internet or Internet-connected devices availability, tutorials or mentoring by phone have also proven effective (although evidence on the latter stems mostly from low-income countries) (Angrist, Bergman and Matsheng, 2022_[49]; Hassan et al., 2021_[50]).

Examples of online tutoring programmes unfolded during the COVID-19 pandemic in Italy (during school closures) and Spain (when schools had already reopened for a while) can

provide some insights on the implementation and effectiveness of online tutoring interventions:

- In **Italy**, researchers designed a “Tutoring Online Programme” (TOP) in response to school closures during the COVID-19 pandemic (Carlana and La Ferrara, 2021^[11]). All middle schools were contacted and informed about the programme that was designed as a free online individual tutoring service proposed to students who were struggling in Italian, English and/or mathematics. Tutors in TOP were volunteer university students who received training and support from pedagogical experts through regular group meetings and on-demand one-to-one sessions. Tutors were randomly assigned to 530 students among the 1 059 applicants (given that the number of tutors was limited) and provided tutoring for around 3 hours per week (with a median programme length of 5 weeks). TOP translated into enhanced student outcomes, including increased time devoted to homework and attendance to regular online classes, performance in standardised tests administered at endline and in teachers’ assessment of learning. In addition, students who benefitted from tutoring displayed higher educational aspirations (e.g. likelihood and perceived ability to attend university), higher measured levels of perseverance, grit and locus of control, and increased psychological well-being (students felt happier and less depressed). Heterogeneity in the type of technology with which students accessed tutoring (e.g. smartphone, PC or tablet) did not result in differences in student outcomes. In contrast, technical problems (e.g. related to Internet connection) appear to have negatively affected the impact of the intervention, although estimations remain imprecise. An adaptation of the “Tutoring Online Programme” has also been implemented in the **Dominican Republic** in the summer of 2021, targeting disadvantaged students in public secondary schools and building on partnerships with local universities by recruiting volunteer students (AEA RCT Registry, 2022^[51]). In a second phase of the implementation of this programme by J-PAL Latin America and the Caribbean (J-PAL LAC) and the Ministry of Education, an evaluation seeks to examine the conditions and formats (e.g. paired vs individual tutoring, tutor profiles) for effectively delivering tutoring at large scale. The project also seeks to develop an online platform that can become available across countries (AEA RCT Registry, 2022^[51]).
- In **Spain**, the *Menttores* tutoring intervention was also designed by researchers and implemented in Madrid and Catalonia towards the end of the 2020-2021 academic year, when schools had largely returned to normal functioning (Gortazar, Hupkau Claudia and Roldan, 2022^[47]). The intervention was implemented in partnership with an NGO specialised in training young teachers in schools with high shares of disadvantaged students. Tutoring was provided for 3 sessions of 50 minutes per week during an 8-week period to secondary school children aged 12 to 15 from disadvantaged backgrounds, by professional teachers in groups of 2 students. Tutors were paid and had passed a selection and training process. While initially researchers had sought to secure volunteer university students, the timing of the intervention (overlapping with the beginning of final university examinations and less stringent pandemic context) prevented them from securing a sufficient number of volunteers. The programme focused on mathematics and also provided psycho-social and emotional support to students. *Menttores* translated into positive and significant effects on end-of-year math grades and results in a standardised test, grade retention, self-reported effort and student educational aspirations. No effects were identified, however, on locus of control, grit, or overall well-being. Similarly to the Italy “Tutoring Online Programme” (TOP), Internet connection issues appear to have affected the effectiveness of the tutoring intervention (e.g. for final math

grade), although not across all types of outcomes (no effects on students' aspirations, effort or life satisfaction).

2.3. Keep students engaged, especially in a context of remote learning

Maintaining student engagement is critical in contexts of repeated or continuous schooling disruptions when remote learning becomes the only solution. Research evidence points to the importance of both proactive and reactive approaches for keeping students engaged (OECD, 2021^[12]; Vincent-Lancrin, Cobo Román and Reimers, 2022^[52]). Proactive approaches seek to maintain learning exciting, while reactive ones monitor student engagement and make interventions when learners are at risk of disengaging. During the COVID-19 pandemic, countries relied on both types of approaches to maintain student engagement, although reactive approaches remain more challenging to implement particularly in a context of school closures.

A range of strategies can foster stronger student engagement with learning when education is delivered remotely: making sure to stay in touch with students, either by tasking teachers or stimulating parental engagement in learning and communicating with teachers and education institutions, ensuring students receive feedback from remote learning, creating student and educational social media channels in which students can participate and exchange, etc. The format of learning resource students are provided with matters (e.g. short formats, quizzes) and digital designs can be leveraged also to stimulate engagement (e.g. educational games appear to be particularly effective) (OECD, 2021^[12]; Vincent-Lancrin, Cobo Román and Reimers, 2022^[52]). During the pandemic, some countries also involved well-known people (e.g. athletes, singers, actors) to support learning delivery through online platforms and making distance learning more attractive to students.

Finally, technology-enabled behavioural interventions targeted at parents can equally be effective in stimulating learning engagement and outcomes. For instance, text-messages with reminders, tips or goal-setting strategies targeted at increasing parental engagement in learning activates for younger children and school-to-parent information technologies have been shown to have a positive (albeit modest) impact on student learning outcomes while also being significantly less costly than other interventions (Abdul Latif Jameel Poverty Action Lab, 2019^[44]).

3. Adapt and extend the time of instruction

Increasing the time of instruction (e.g. through longer school days, extensions in the school year, summer classes) is another strategy countries have relied upon during the COVID-19 pandemic, but also before, to support the acceleration of learning for students:

- **Denmark** introduced a “longer and more varied school day” as part of a 2013 reform to enhance quality and equity in primary and lower secondary education (Radinger and Boeskens, 2021^[53]). The minimum number of lessons in a range of subjects, and particularly in Danish and mathematics, increased. The longer school day also included opportunities for supported learning and pedagogical innovation, as well as physical exercise and homework assistance. It relied on teachers for regular instruction, teachers and other types of staff for other types of activities by shifting resources from after-school programmes to schools. Municipalities benefitted from great freedom in implementing the school day reform, with the ministry providing guidance to support implementation and putting in place a national evaluation and monitoring programme for the reform. Evidence from a mixed-method study examining the effects of the longer and more varied school

day over 2014-2018 found that more time was needed for the implementation of all reform elements, although some positive effects were observed on students' well-being. While teachers were convinced of the potential of the reform to enhance student learning, they reported lacking the necessary preparation time to make the most of all reform element and effectively support subject-specific learning (Myrup Jensen, 2020^[54]).

- A number of countries have introduced summer schools to extend instruction time beyond the regular academic year. **France** introduced a free “learning vacation” (*vacances apprenantes*) remediation programme during the pandemic (UNESCO, 2020^[55]). Currently, the “learning vacation” programme relies on several schemes, ranging from open schools to summer camps in order to reinforce learning and contribute to the personal development of youth through cultural, sports and leisure activities supervised by professional staff (Ministère de l’Education Nationale et de la Jeunesse, 2022^[56]). In addition, academic success courses can be provided from primary to upper-secondary education during several school holidays throughout the year to consolidate learning or facilitate transitions to higher education levels. Teachers propose participation in a course to students’ families and enrolment is decided based on a dialogue with the students and parents. Students learn in small groups and the courses’ objective is to consolidate knowledge, particularly in French and mathematics, and fill in any knowledge gaps that may be detrimental to the pursuit of further education (Ministère de l’Education Nationale et de la Jeunesse, 2022^[57]). **Luxembourg** also put in place Summerschools at the end of the summer break of 2020 to support learning recovery in the context of the COVID-19 pandemic and repeated these in the summers of 2021 and 2022 (OCDE, 2022^[58]). Students attended Summerschools for a duration of two-week, with a few hours of instruction every day. However, only students whose parents requested attendance could participate in the Summerschools.

Research and policy-based evidence shows that extending the school day and adding instruction time might be an effective strategy for some education systems and schools, but not for others (Radinger and Boeskens, 2021^[53]). Indeed, while extended school days and increases in instruction time tend to generally translate in relatively modest effects on student outcomes, results vary widely based on contexts. In addition, research on the impact of extended school days on students’ socio-emotional skills and well-being remains limited and far from conclusive.

Hence, policymakers need to provide careful consideration of the costs and benefits of such approaches, including their effects students’ and teachers’ well-being. A range of conditions can support a more successful implementation of reforms that seek to extend and adapt school days, including: setting up clear goals and designing pedagogical models that underpin these goals through various activities, spaces and materials; ensuring adequate resources (including human resources), adjusting funding mechanisms and governance arrangements; including monitoring and evaluation provisions in the implementation plans (Radinger and Boeskens, 2021^[53]).

In addition, extending school time per se will not automatically translate into better learning outcomes, unless measures which extend school days include specific provision on the effective use of additional time to ensure quality in the additional activities proposed. Such measures can encompass adjusting physical spaces, regulating group sizes, providing professional development opportunities and ensuring attractive working conditions for teachers and school staff, supporting collaboration among staff involved in regular instruction and staff involved in additional activities (Radinger and Boeskens, 2021^[53]). In the case of voluntary programmes (e.g. after-school programmes, summer schools), strong

incentives for attendance need to be embedded in programme design (World Bank et al., 2022^[59]). For summer schools, a clear academic component matters for student learning gains, and intensive teaching components (including small group or one-to-one tutoring approaches) tend to be more effective (EEF, 2021^[60]).

4. Provide curricular flexibility and enable fluid learning pathways within the school system

Focusing teaching on what a system considers as the core skills and knowledge that students need to acquire is one of the key strategies for minimising learning gaps and ensuring students can resume their learning pathways effectively. Beyond curricular flexibility, ensuring smooth student transitions across the school years is key for successful progression through compulsory education and beyond, as well as subsequent life outcomes. Education systems need to strike a balance between imposing high standards for students' knowledge and skills, and adopting policies and practices that do not hinder students' vertical progression through education (OECD, 2018^[61]).

4.1. Adapt the curriculum to prioritise fundamental skills and knowledge

Strategies focused on the prioritisation of fundamental skills (primarily literacy and numeracy, but also increasingly social and emotional skills and critical digital skills) in teaching and learning have included adapting, revising or condensing the content of curricula, and adjusting regulatory structures (e.g. curriculum planning, curriculum hours) (OECD, 2021^[33]; UNESCO, 2020^[55]). During the pandemic, more than two thirds of the 90 countries that had implemented remediation programmes to mitigate learning loss (out of 120 surveyed) reported abbreviating or prioritising their curricula (UNESCO / UNICEF / The World Bank, 2022^[29]).

The following country examples illustrate approaches countries have relied upon in order to adapt their curricula and prioritise the teaching of key skills and knowledge in different contexts.

- The Ministry of Education of **Chile** designed Curriculum Prioritisation as a curriculum support tool for schools to help them address the consequences of the pandemic on student learning (OECD, 2021^[33]). The availability of Curriculum Prioritisation has replaced the regular curriculum that remains mandatory. The Ministry proposed Curriculum Prioritisation for all subjects, and for all levels of education from kindergarten to the 2nd year of high school secondary education and as part of the regular education track for the 3rd and 4th year of secondary education (Ayuda Mineduc, n.d.^[62]). It prioritises curricular objectives considered as essential for the continuity of students' educational process. The implementation of Curriculum Prioritisation has required schools to take a leading role in designing a plan for reducing learning gaps in line with their specific needs and context. The Ministry has provided schools and teachers with didactic orientations to guide teaching strategies, pedagogical resources, formative assessments, conferences, videos and digital platforms aligned to the Curricular Prioritization (Ayuda Mineduc, n.d.^[62]). The implementation of Curriculum Prioritisation was initially supposed to be done throughout a 2-year period (2020 and 2021), but has been extended until the end of 2022 (Ministerio de Educacion, 2021^[63]). Following a diagnostic review performed by the Ministry of Education, it has been maintained but adjusted for the 2023-2025 period.

- In the context of the pandemic, **Slovak Republic** has piloted a new Curriculum Framework by Cycle of Education and Adjusted Objectives of Education that enable primary schools to more freely allocate time for individual subjects in order to compensate for learning losses during the pandemic and support the transitions of students to secondary education (OECD, 2021_[33]). Primary schools can thus organise the curriculum in three multi-year cycles instead of grade levels and hold greater autonomy in allocating time for different subjects. They can thereby more easily adapt the pace of learning to learners' needs and address learning gaps.

Evidence from Accelerated Education Programmes targeting disadvantaged, over-age, out-of-school children and youth whose education was disrupted (e.g. due to conflict, crisis, poverty) in a range of low- and middle-income countries also puts forward strategies for better adapting the curricula to reduce learning losses (USAID, 2020_[9]; UNHCR, n.d._[64]). Such strategies include moving forward with grade-level content and teaching what students must learn rather than trying to fill all gaps when learning resumes, particularly after short disruptions. In addition, reducing repetition across subjects and encouraging integration of subjects can also be an effective approach (USAID, 2020_[9]). In the context of the pandemic, the Accelerated Education Working Group (AEWG)³ provided further guidance on how countries can condense curricula effectively: i) identify the key knowledge and skills students need to develop for reaching grade-level proficiency in a limited period of time, ii) modify the curriculum to focus on those essential skills and concepts (mainly literacy and numeracy), and iii) include an emphasis on the development of socio-emotional skills (Accelerated Education Working Group (AEWG), 2020_[65]).

Countries can thus consider a range of approaches when adapting curriculum to prioritise fundamental skills. Such approaches can include providing guidance, adapting curricular documents and resources to prioritise in all subjects (e.g. Chile), allowing for more time flexibility to reach curriculum objectives and leave room for personalisation (e.g. Slovak Republic), and deciding what the essential parts of the curriculum are and dropping the rest (e.g. as put forward by evidence from Accelerated Education Programmes). Evidence from the pandemic also shows that providing curricular flexibility did not require large-scale reforms but rather quick curricular and instructional adjustments (World Bank et al., 2022_[59]). Irrespective of the approach taken, consolidated or prioritised curricula require support and training for teachers and school leaders (particularly when schools are granted autonomy or flexibility over the implementation of prioritised curricula) to enable them to adapt to new requirements.

4.2. Facilitate vertical transitions across school years

The objective of grade repetition has often been to give students a second opportunity at acquiring grade-specific skills and knowledge by requiring them to remain in the same grade rather than move to the next grade with their same-age peers (OECD, 2022_[5]). However, high rates of grade repetition raise equity and efficiency concerns, as grade repetition is a costly practice for the education system and individuals (OECD, 2022_[5]). Evidence on the effectiveness of grade repetition remains largely unresponsive of the

³ The Accelerated Education Working Group, currently led by the UNHCR, brings together a range of education partners (including UNICEF, UNESCO, USAID, etc.) that work in the field of accelerated education. Accelerated education programmes are defined as “flexible, age-appropriate programmes, run in an accelerated timeframe, which aim to provide access to education for disadvantaged, over-age, out-of-school children and youth – particularly those who missed out on, or had their education interrupted due to poverty, marginalisation, conflict and crisis” (UNHCR, n.d._[64]).

measure, particularly since grade repetition is often unaccompanied by modified curriculum or additional instructional resources (OECD, 2018_[61]; OECD, 2022_[5]). At the system-level, countries and economies with lower rates of grade repetition tend to display higher mean performance in the Programme for International Student Assessment (PISA) and greater equity in education (OECD, 2020_[66]).

OECD countries have adopted a range of strategies to facilitate fluid vertical transitions across school years and minimise grade repetition. These have included the provision of individualised support to struggling students in order to target learning gaps as early as possible and the design of data-tracking systems to develop early warning indicators for students at risk of repeating years (and/or dropping out of school) (OECD, 2018_[61]). In **Austria**, the new upper cycle or high school⁴ comprises remedial instruction in the shape of individual learning support for students with learning deficits and/or learning disabilities (Bundesministerium für Bildung, n.d._[67]; OECD, 2022_[5]). Such support takes a holistic approach (focusing on the entire learning process), is time-limited, and involves an agreement between the tutor and the learner on learning goals, solutions and implementation strategies.

Finally, conditional promotion, whereby students may be required to retake a course, module or subject area at the higher education levels, often complemented with further opportunities for learning, can also be a good compromise between grade repetition and automatic promotion, and enable smoother transitions (OECD, 2018_[61]). In a context of disruption, countries should provide students the flexibility to remain engaged in learning as long as possible with support options (as the ones mentioned in the previous sub-sections).

5. Conclusion

Education systems face heightened pressure to become ever more resilient in times of change, enhance the efficiency of public spending and address emerging learning gaps triggered by a range of external shocks. The consequences of climate change, a volatile geopolitical situation and unpredictable disruptions like the recent pandemic means that students are increasingly exposed to interruptions or disturbances in their learning experiences. Whether such shocks lead to school closures, destructions, or lower-quality learning experiences, they likely translate into lost learning opportunities that need to be recovered to ensure no student is left behind.

Based on research and policy evidence of learning recovery programmes implemented at a large scale, this working paper shows that education systems can envision a range of mix of regulatory, pedagogical, and technology-based solutions to support learning recovery and bridge student learning gaps. While countries can typically rely on a combination of solutions, the timing and sequencing of measures will often depend on the context (e.g. emergency due to conflict, natural disaster) and, very importantly, on the cost-effectiveness of such measures. Some solutions (e.g. curricular prioritisation, remote tutoring schemes based on low-tech solutions such as phones or through general online communication platforms) can provide flexible options for addressing learning gaps in the short term. Personalised learning approaches and the provision of instruction in small groups have been shown to be particularly effective at enhancing student learning outcomes, in spite of the potentially larger costs associated with some of these strategies (e.g. tutoring). At the same

⁴ The new upper cycle is based on a reorganisation affecting three-year secondary and upper secondary schools in the academic and vocational sectors from the 10th grade.

time, research evidence also shows that the design features of tutoring programmes (e.g. adaptation to students' age, subject thought, choice of paraprofessional vs. teacher tutors) can enhance their cost-effectiveness. In this respect, digital technologies can be leveraged to enable more personalised (e.g. through intelligent tutoring systems) and accessible learning experiences (e.g. by matching students and tutors in online tutoring schemes), although remote learning requires further investments in strategies to maintain students engaged and motivated.

While education systems can rely on a variety of strategies to support learning recovery, a range of policy approaches can enhance the effectiveness of such strategies. Assessing learning gaps is a critical step in designing any recovery strategy for lost learning opportunities. Teachers are often well-suited to conduct skill level assessments in a reasonable timeframe, although a range of other options exist (e.g. surveys of parents or teachers, national or international tests). Given the range of learning recovery strategies available, skills assessments matter for the design and choice of specific strategies, as well as for their ongoing adaptation to adjust for any identified strategy shortcomings and to reflect students' evolving skills (OECD, 2021^[33]). In this respect, the design of learning recovery strategies should go hand in hand with efforts to develop data tracking systems and more generally, design mechanisms and tools to monitor learning recovery interventions and students' changing needs. These also highlight the need for countries to effectively assess the human, financial, physical and digital resources requirements when designing and implementing learning recovery strategies (UNESCO, 2020^[55]). While some solutions (e.g. intelligent tutoring systems) are particularly promising in terms of learning, they also likely entail substantial financial investments (e.g. to acquire and maintain digital infrastructure, build capacity for its use) that may not be affordable in the short-term or in the absence of additional funding support (e.g. international aid in emergency contexts). Cost-effectiveness considerations thus become critical in the design and implementation of specific learning recovery strategies.

Last but not least, building resilient education systems that adapt and respond to unforeseeable disruption requires build teachers' and education institutions' capacity and recognising the multiple challenges faced by learners. Research and policy evidence shows that learning recovery strategies should embed a strong capacity-building component whereby teachers and education institutions are provided with the guidance, support and resources (e.g., in terms of professional development) to assess and remediate learning gaps, and adapt to learners' changing needs. While programme evaluations have put relatively less focus on the effect of learning recovery strategies on students' socio-emotional skills, the experience of the pandemic, wars and climate-related disasters shows that learning recovery strategies need to take a whole-child approach that includes a socio-emotional component. In this respect, fostering collaboration between education professionals but also with stakeholders outside the education sphere (e.g. parents, social services, health professionals) can support more coherent learning strategies that are better tailored and more responsive to learners' multiple needs. These in turn requires the design of policies that can promote more effective collaboration between teachers and other professionals, and a potential rethink of teachers' working conditions and professional learning opportunities (e.g. by better leveraging digital technologies) to better prepare teachers for their changing roles.

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