MITIGATING THE IMPACTS OF COVID-19: LESSONS FROM AUSTRALIA IN REMOTE EDUCATION

Literature review

December 2020
EXECUTIVE SUMMARY

Responding to the impacts of COVID-19 on education in the Indo-Pacific

The delivery of education can be disrupted by a number of factors including natural disaster, wars, and disease. These events often occur in education systems that may already be volatile or vulnerable in nature. Yet the COVID-19 pandemic is different to anything most of us have experienced in our lives, in that it has disrupted education worldwide and is likely to change the way education systems will need to function in the future. As a result of school closures due to the COVID-19 pandemic, many students around the world have received, or are still receiving, a form of emergency remote schooling. Yet there has been little time for policy makers to fully consider the available evidence to guide remote learning practices. Many education systems are learning and adjusting their approach as they go through the implementation process.

This document provides a review of the evidence on what works in remote schooling, drawing on international literature and lessons from Australia, so as to inform educational responses in the Indo-Pacific region.

Overview

This literature review provides an overview of past and present responses to remote schooling in Australia, drawing on international research. The paper begins by discussing historical responses to emergency and extended schooling, including during the COVID-19 crisis. The discussion then focuses on effective teaching and learning practices and different learning design models. The review considers the available evidence on technology-based interventions and their use during remote schooling periods. Although this research is emergent, it offers insights into the availability and suitability of different mechanisms that can be used in remote learning contexts. Noting that the local empirical research base is limited, the discussion focuses on the ways in which Australia has drawn upon international best practices in remote schooling in order to enhance teaching and learning experiences. The paper concludes by discussing the conditions that can support effective remote schooling in different contexts, and the considerations that must be made around schooling during and post pandemic.

Key findings from the international literature

Where research on remote and distance learning exists, it has either focused on short term emergency situations or non-crisis settings, with evidence on remote learning during COVID-19 still emerging. Importantly, the majority of educational research has not yet focused on the implications of remote learning for extended periods of time. Nor has it considered the implications of pandemics upon teaching, learning, and associated student outcomes, particularly in low and middle income countries. There also remains a paucity of empirical evidence on distance and remote learning models in developing country contexts, particularly as it relates to the impact of educational reach and scale. This lack of research is particularly problematic for understanding the implications of the current pandemic on the most disadvantaged students.

The evidence base outlines a number of different approaches to supporting continued learning during emergency and extended periods. Research in conflict and remote learning contexts provides useful insights into the enabling conditions for effective teaching and learning, particularly relating to teacher preparation, teacher quality, and pedagogical approaches. However, these studies also reveal some of the barriers to successful remote schooling, including limited or low levels of teacher preparedness and skill, access to resources, student capacity, and family support in the home.
Effective teaching and learning

Quality education is supported by effective and purposeful educational programs that engage students, and by teachers who have been trained in the use of these programs. Effective programs are further enhanced when contextualised within the community. Research around school and community partnerships is international in scope and central to understanding educational outcomes. Much of this work is useful in understanding the current challenges faced by students and staff during the COVID-19 pandemic. It must also be noted that effective educational programs have a deliberate and planned learning design, whether they use technology or not (Table 1).

Table 1 Examples and benefits of different learning approaches

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<th>Learning Approach</th>
<th>Examples</th>
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| Remote Teaching   | • Mobile or radio broadcasting  
                   • TV broadcasting/streaming | • Applicable during crisis or extended periods of absence  
                   • Quick set up provides temporary access to instruction and support materials  
                   • Works with existing technologies  
                   • Immediate implementation  
                   • Direct replacement for face-to-face teaching  
                   • Real-time interaction between teachers and students |
| Online Learning   | • Computer-supported collaborative learning  
                   • Game-based learning  
                   • Live lessons, synchronous learning | • Collaboration between students and teachers  
                   • Accessible from any device, anywhere, synchronously or asynchronously  
                   • Learning analytics to monitor student engagement and progress |
| Blended Learning  | • Synchronous (live) / asynchronous (not live)  
                   • Face-to-face/remote blended  
                   • Differentiated learning  
                   • Flipped classroom | • Capitalise on existing learning resources in schools  
                   • May be as effective as classroom learning  
                   • Teacher-student connection maintained through video software  
                   • Accessible through any device  
                   • Allows for asynchronous learning |
| Distance Learning | • Paper-based packs  
                   • Correspondence learning  
                   • Non-computer based distance learning | • Minimal equipment or resourcing required  
                   • Assembly may be quicker than digital resources  
                   • Limited additional teacher training required |
Educational technology

Technological provision seeks to enable continuity of learning even when students are physically separated from their regular classrooms. Use and engagement with educational technology is therefore a key area of interest, though empirical research on the impacts of emergent educational technology remains limited. A number of interventions have been designed to provide both sustained educational access during COVID-19-induced school closures around the world, including educational broadcasting, the adoption of computer-supported collaborative learning tools and inclusive technology.

Educational technology can be beneficial for many students, however, technology is only successful with the right mix of policies, practices, and resources in place. The key is to find and understand ways of enhancing relevant, sustainable, quality and flexible learning options.

Lessons from Australia

There are many ways in which Australia has drawn upon the extensive international research on remote and distance learning to apply good practices over the previous century. Australia’s expertise in support for teachers, and the use of evidence-based practice, are particularly relevant during extended periods of remote schooling. Such lessons of good practice and considerations have been triangulated from the local and international evidence base and the principles include support for teachers, community partnerships, parental involvement, student engagement and education for inclusion and equity.

Figure 1. Principles of good practice in remote education
Support for teachers
Research shows that remote schooling offers many opportunities for adapting the way teaching and learning happens, and also for finding additional ways to support teachers and enhance student capability. All opportunities focus on the central role of teaching preparedness and practice. The research base provides evidence that technology supplements, but does not replace, teaching. Successful remote teaching requires teachers and students to have access to appropriate resources, including technology, and well-designed learning environments. It is therefore critical that teachers are provided with appropriate support and professional learning in each of these aspects, particularly in how to design learning that incorporates effective digital pedagogies. The Australian experience, suggests that there has been strong coordinated support for teachers during the transition to remote education, through policy guidance and resourcing at multiple levels of government and across different sectors.

Community partnerships
Research into remote schooling, particularly in Indigenous contexts, offers perhaps the most relevant lessons for building long-term partnerships in remote teaching and learning. Partnerships can be with educational organisations, but also with community members including parents. In Indigenous communities in Australia, a shared model which centres on active participation between schools, Indigenous Elders and parents has led to positive learning outcomes for children. Such models transform school structures and curriculum by reinforcing personal and cultural identities, connecting with families and the wider community.

Parental involvement
In extended school closures, parents and carers become central in supporting the educational challenges of students during remote schooling periods. Yet, parents and carers cannot replicate the role of teachers in sustaining learning at home, or provide the social and physical infrastructure and resources available in schools. This is especially the case for younger learners and students with disabilities who cannot undertake online or remote learning autonomously. Thus, it is important to understand what is being taught to students, and to develop strategies to support the health and wellbeing of students during lockdown and isolation measures.
Marginalised and disadvantaged students often have lower levels of support in the home when compared to students from more advantaged backgrounds. Adopting a parents-as-partners mechanism, which fosters effective and collaborative communication between school and family, can support and enhance the educational experiences of these students during periods of remote education.

Student engagement
While studies on the impact of learning losses are still emerging, recent research highlights that the COVID-19 pandemic has already begun to lead to reduced school completion rates, with detrimental impacts increasingly evident among graduates from low socioeconomic backgrounds. For this reason, it is crucial that education systems consider ways to support self-regulation, resilience, capacity, and engagement amongst students during periods of remote learning.
Supporting student engagement and achievement requires effective teaching practice and strong connections in the school community. Social connections and relationships are important protective factors against school dropout. Technology can play a role in maintaining social connections between teachers and students and amongst students, even if this interaction takes place via telephone. A significant concern is that learning loss will have a greater impact on certain groups of students, in particular those who are already experiencing educational disadvantage. Therefore, maintaining connection is important, especially for students who are at risk of disengagement.
Inclusion and equity

Emergent research indicates that many remote schooling arrangements have the potential for mixed outcomes for students. Some students can thrive in remote schooling enrolments. Whereas students who are marginalised by language, neurodiversity, or live within rural/remote areas are most at risk of experiencing learning losses over extended periods of time and must be supported. The COVID-19 pandemic is likely to widen gaps related to intergenerational poverty that had begun to close, as more parents are forced into unstable work or struggle to support their children’s learning at home. In addition, not all parents possess the digital skills required to help their children deal with the technical challenges of online learning. Nor do they have the knowledge and understanding of ways to support their children’s learning without access to resources.

Context matters

Context is important; one size cannot fit all. Best practice in remote teaching needs to be responsive to different contexts and cannot rely solely on technology. Understanding the impacts of learning in the home environment requires knowledge of specific experiences during school closures. Policy makers, system leaders, and schools now face two challenges: 1) addressing, the immediate learning needs of students, and 2) preparing for the considerable challenges that await when the current pandemic subsides.

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**Figure 2. Short and medium-term support to remote education**
Conclusion

The COVID-19 pandemic marks a significant crisis in disrupting children’s learning globally. Nevertheless, the post COVID-19 response provides a unique opportunity to leverage the combined expertise in the area of remote learning to ensure children, regardless of their level of disadvantage, are not left behind as result of this global crisis. By exploring the ways in which educational stakeholders can support the student experience, particularly in the context of skills, capacity, participation, and achievement, our education systems have the opportunity to create a responsive and sustainable form of pandemic pedagogy. Ultimately, understanding the necessary conditions that support inclusive, high quality teaching and learning offers a chance to leverage what is already in place.

As children return to school-based learning, there is an opportunity to support wide scale system restarts, focusing on teaching and learning in both advantaged and disadvantaged communities. For now, it is important to support teachers to be effective so as to ensure continuity of learning. However, with ongoing investment and support from key partners and stakeholders in the provision of adequate resources, it is likely that improved access to education, and enhanced educational quality and equity, will be a very real possibility.

Australia is in a highly advantageous position to support such educational reform during a pandemic. Australia’s experience in distance and remote teaching and learning provides relevant insights into effective models and enabling conditions for developing a long-term response to remote learning practices. In particular, remote and distance learning models applied in Indigenous settings can offer some helpful lessons in effective mechanisms for delivery, including partnerships and engagement with parents and the community.

The COVID-19 pandemic offers many opportunities to look at our education systems differently, and there are many insights to be gained. While the research body is limited in relation to remote schooling during the current pandemic, there are many ways to draw upon what we know about creating conditions to enhance teaching and learning, regardless of context. Indeed, drawing upon the different lessons from emergency and extended remote schooling provides the education community with a new lens for recognising opportunities amid the current crisis.
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1. INTRODUCTION

As a result of school closures due to the COVID-19 pandemic, many students around the world have received, or are still receiving, a form of emergency remote schooling. Yet there has been little time for policy makers to fully consider the available evidence to guide remote learning practices. Many education systems are learning and adjusting their approach through the process of implementation. Where research on remote and distance learning exists, it has either focused on short term emergency situations or non-crisis settings, with evidence on remote learning during COVID-19 still emerging. Importantly, the majority of educational research has not yet focused on the implications of remote learning for extended periods of time. Nor has it considered the implications of pandemics upon teaching, learning, and associated student outcomes, particularly in low and middle income countries. For this reason, this literature review attempts to provide an overview of those mechanisms that can support the enactment of remote schooling during, and after, the COVID-19 pandemic.

This literature review provides an overview of past and present responses to remote schooling, focusing first on international literature. The paper begins by discussing historical responses to emergency and extended schooling, including during the COVID-19 crisis. The discussion then focuses on effective teaching and learning practices and different learning design models. The review then considers the evidence on technology-based interventions during remote schooling periods. Although research is still emerging, it offers early insights into the availability and suitability of different mechanisms that can be used in remote learning contexts. After noting that the local empirical research base is limited, the discussion focuses on the ways in which Australia has drawn upon international best practices in remote schooling in order to enhance teaching and learning experiences. The paper concludes by discussing the conditions that can support effective remote schooling in different contexts, and the considerations that must be made around schooling during and post pandemic.

COVID-19 AND ITS IMPACTS ON EDUCATION

The novel coronavirus outbreak was first discovered in Wuhan, China in late December 2019 (Guan et al., 2020), and has now spread to almost every country in the world. As of August 2020, more than 25 million cases of infection had been reported worldwide (Higgins-Dunn, 2020), with more than 828,000 deaths being attributed to COVID-19 (Tooma et al., 2020). There have been a number of interventions designed to limit the spread of COVID-19, including enforced social distancing, workplace and school closures.

It is estimated that more than two billion students have been impacted by the COVID-19 pandemic, with school closures affecting around 80 percent of the world’s student population (UNESCO, 2020). As a result, many students have received or are now receiving some form of remote schooling. While many countries within the OECD have now opened their schools after initially strict lockdown measures, the closure of schools is ongoing in many parts of Africa, Asia, Australia and the Americas (UNESCO, 2020). In response, UNESCO has recommended the adoption of distance learning programs, online education, and distance
learning platforms designed to reach students remotely to mitigate the effects of education disruption (Oladipo et al., 2020).

Educational responses to the COVID-19 pandemic have varied around the world. As the pandemic spread, many countries closed schools abruptly (Flaxman et al., 2020; Stage et al., 2020; Swartz & Chetty, 2020), cancelled exams (UK Department for Education, 2020) and began offering different forms of online, distance, and remote education (Hamilton et al., 2020; Lake & Dusseault, 2020; Zhang et al., 2020). Other nations, such as Australia (Leask & Hooker, 2020), were more reticent to close schools and educational facilities, citing limited evidence to warrant the detrimental economic impacts, educational disadvantages, learning losses (Azevedo et al., 2020) and risks to vulnerable students that were expected to occur during online learning.

While many schools were temporarily closed as a precautionary measure to stem further spread of the virus, the justification of ongoing, nationwide school closure as a public health intervention against the spread of COVID-19 has been widely contested (Esposito & Principi, 2020; Poletti & Rabato, 2020); particularly when considering the non-virus-related consequences of school closures on economic stability, social factors, and overall population health (Rajkumar, 2020; Torales et al., 2020). The evidence base on the economic and mental impacts of COVID-19 related to school closures outlines a wide range of consequences that will extend long beyond the current pandemic. In particular, research from the United States highlights the detrimental consequences of school closures on health care workforces (Bayham & Fenichel, 2020), labour markets, job security, and wage instability (Psacharopoulos et al., 2020; Rojas et al., 2020).

Social distancing and lockdown measures may also further the suffering of the most vulnerable (Pfefferbaum & North, 2020). Indeed, increased rates of poverty (Van Lancker & Parolin, 2020) and child abuse (Baron et al., 2020; Griffith, 2020) have already been reported during the pandemic. Domestic abuse and family violence have also been reported as increasing dramatically during the COVID-19 pandemic (Bradbury-Jones & Isham, 2020; Campbell, 2020; Humphreys et al., 2020; Mazza et al., 2020; Piquero et al. 2020; Usher et al., 2020; Xue et al., 2020). All of these issues are likely to add additional burden to already wrought health systems, but also have the potential to impact on social and educational engagement, health, and overall wellbeing (Rothstein & Olympia, 2020). Indeed, the World Health Organization (2020) has predicted that the mental health impacts of social isolation and social distancing measures during the pandemic are likely to be devastating for adults and children alike (Holmes et al., 2020; Lee, 2020; Liu et al., 2020; Zandifar & Badrfam, 2020), mirroring the individual and social impacts of past conflicts and natural disasters (Kato et al., 2020). Student wellbeing and mental health support is already an area of concern for many schools and systems (Semple & Mayne-Semple, 2020). Unfortunately, not much is known yet about the long-term mental health effects of large-scale disease outbreaks on children and adolescents (Brooks et al., 2020; Golberstein et al., 2020).

In their analysis of the psychological impact of severe acute respiratory syndrome (SARS) on patients and health-care workers, Brooks and colleagues (2020) provoke us to reflect on the long-term implications of COVID-19. Given the widespread nature of COVID-19, it will be critical for national policies and practices to monitor and support the wellbeing of students as schools reopen around the world. There is a need for national systems to monitor young people’s mental health status over the long term, and “to study how prolonged school closures, strict social distancing measures, and the pandemic itself affect the wellbeing of children and adolescents” (Lee, 2020, p. 421). Thus, student engagement is of great concern during the COVID-19 pandemic. As Masters et al. (2020) note, disengagement may occur over time, or indeed become a consequence of longer-term challenges of schooling participation. Engagement is often correlated with students’ access to resources, and it is therefore highly likely that vulnerable children will be further disadvantaged when they do not have access to school-based support mechanisms (Sansa, 2020).
Data around the impacts of school closures on past global crises, such as the 1918 Spanish flu pandemic (Ammon, 2002; Wheeler et al., 2010) offer comparative insights and lessons for the COVID-19 pandemic. However, these findings are most relevant to the implications of disaster and disease on economic stability and labour markets, rather than education. The lack of relevance for the educational field is due, in part, to the gains that have been made in educational participation over past decades, and the number of students that are now in school around the world. Nevertheless, there is an urgent need to ensure that the implications of this health emergency do not result in learning losses, or regression in educational participation, particularly in the most disadvantaged contexts (Müller & Goldenberg, 2020).
2. EDUCATION IN EMERGENCIES

Looking to previous disasters, conflicts, and epidemics provides useful insights into ways in which educational responses can support the continuation of learning during the COVID-19 pandemic. The topic of education in emergencies is of particular relevance for this literature review as it offers evidence of what works in effective teaching and learning practice in initial crisis approaches and preparedness to shift to remote learning.

Education in emergencies refers broadly to ensuring people affected by emergencies and crises, no matter what type of crisis, continue to have access to safe, relevant, and quality education (Kagawa, 2005). Indeed, crisis has disrupted education in individual countries or regions repeatedly over previous decades, due to natural disasters, armed conflict, or disease outbreaks. The 2010 floods in Pakistan affected 20 million people, including many children (Warraich et al., 2011), as schools were closed and converted into temporary shelters for community members (Baytiyeh, 2018). In the Middle East, at least 2.8 million Syrian children have been out of school for some period during the last decade (Fayek, 2017), and some five million children were out of school during the Ebola epidemic that spread across West Africa (Onyango et al., 2019).

Research relating to the effect of bushfires in Australia on schooling found that “the leadership team must adapt, work and innovate with the teachers and staff, parents, the broader community, the assets management teams and other schools” (Nye, 2016, p. 94). This holds true in the current pandemic where the capacities of the whole community are impacted. Of note is that strengthened school-community-parental relationships were commonly mentioned in the disaster experience literature (Nye, 2016; O’Connor & Takahashi, 2014). Many lessons can be learned from emergency education contexts that are relevant for the COVID-19 crisis, and can support the transition from emergency to extended learning. Yet even in emergency situations, education activities should not be designed as short-term stopgap measures but rather as rapid response activities with longer-term development goals (Pigozzi, 1999).
3. EFFECTIVE TEACHING AND LEARNING

The literature reviewed in this section focuses on quality teaching and learning and its relationship to remote learning, specifically delivery modes, and remote teaching frameworks. The role of technology as an enabler for remote learning is considered in addition to differential learning outcomes for online versus in-class education (Rapid Research Information Forum, [RRIF], 2020).

In December 2019, the Council of Australian Governments (COAG) released the Alice Springs (Mparntwe) Education Declaration, and in April 2020 Australia’s National Cabinet released the COVID-19 National Principles for School Education (Department of Education Skills and Employment [DESE], 2020). Together these recognise that education in Australia “is best delivered by professional teachers to students in the classroom on a school campus” (Brown et al., 2020, p. 69). The National Cabinet recognised that “alternative flexible, remote delivery of education services may be needed” and did not reduce the expectation on schools to provide quality education, stating that “…all students must continue to be supported by their school to ensure participation in quality education during the COVID-19 crisis…” (Brown et al., 2020, p. 69).

Quality education is supported by effective and purposeful educational programs that engage students, and by teachers who have been trained in the use of these programs. Effective programs are further enhanced when contextualised within the community (Derewianka & Hammond, 1991; Widodo & Allamnakrah, 2020). Research around school and community partnerships is international in scope and central to understanding educational outcomes (Epstein, 2011; Sanders & Epstein, 2005). Much of this work is useful in understanding the current challenges faced by students and staff during the COVID-19 pandemic. However, it is research into remote schooling in Canada (Cummins, 1986; 1989; 1994; 1997; Gratton & O’Donnell, 2011; Ragoonaden & Mueller, 2017) and Australia (Burke, 2015; Maher & Bellen, 2015), particularly in Indigenous contexts, that offers perhaps the most relevant lessons for building long-term partnerships in remote teaching and learning. It must also be noted that effective educational programs have a deliberate and planned learning design, whether they use technology or not.

LEARNING DESIGN MODELS

Good learning design underpins engaging and effective learning experiences. Intentional design and planned high-quality interactive experiences can take months to develop when done properly (Hodges et al., 2020). The recent switch to remote learning happened rapidly, impacting on educator and school planning. If schools and education sectors set out to deliberately plan for learning that can be transferable across school and non-school settings, then a first step might be to examine different learning approaches and pedagogical models. These models and approaches need to be appropriate for the context, purpose, and learner needs (as outlined in Annex 1).

Emergency Remote Teaching (ERT): Emergency Remote Teaching is defined as a temporary shift of instructional delivery to an alternative delivery mode due to crisis circumstances (Hodges et al., 2020). It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid study, and then return to that format once a crisis or
emergency has abated (Zubrick et al., 2005). The primary objective in these circumstances is to provide temporary access to instruction and instructional support in a manner that is quick to set up and is reliably available during an emergency or crisis. Remote teaching acts as a direct replacement for face-to-face teaching. Teachers use video technology, or similar, to interact with students in real-time so it relies on students having set schedules. The differences between emergency remote teaching and well-planned online learning are discussed by Hodges et al. (2020). They make the important point that emergency remote teaching is a rapid approach that is unable to make full use of quality online learning design approaches that cover the cycle of prevention and preparedness for emergencies, as well as the response to and recovery from emergencies.

Distance learning: Bozkurt (2019) defines distance learning as the planned and organized teaching and learning in which learners are separated from teachers or facilitators in terms of both time and space. Distance learning is a complex balance of online content and physical interaction with content that is not delivered on a computer screen. Furthermore, Australia, like many countries within the Asia Pacific, is a vast country with many local communities who have unstable internet access, and therefore resources for offline learning need to be considered (AITSL, 2020). The specialist distance education schooling sector can offer insights about effective practice in remote learning. Australia has been at the forefront of distance education delivery in the school sector since 1914. In particular, the findings of the first major research into what worked in ‘education by correspondence’ (Cunningham, 1931) are useful to revisit during the current crisis, providing lessons and expertise on enactments of distance learning with low- and no technology -dependent methods of teaching and learning.

Online learning: Masters et al. (2020) further attempt to clarify the differences between the approaches taken, describing online learning as “an approach that typically provides anytime, anywhere access to resources” (p. 2). Over two decades of robust research is available in the area of online learning design, predominantly from the Higher Education sector (Roddy et al., 2017). A great deal of research effort has been expended in trying to determine whether online learning is more or less effective than traditional face-to-face models (Means et al., 2013). When students and teachers have the right training and preparation there is some evidence that older students retain more knowledge from online learning than in the face-to-face classroom, while younger students require a more structured environment with scaffolding and support (Li & Lalani, 2020).

Blended learning: Most systems are now using blended learning – most commonly described as a mix of synchronous and asynchronous mechanisms – yet the definition remains contested (Torrisi-Steele, 2011). Blended learning has been described as a context-dependent system (Hrastinski, 2019), and one widely applicable in curriculum implementation in situations where participants are separated by distance (Onwusuru & Ogwo, 2019). Blended learning has been outlined as the blending of different traditional and technological components (Dziuban et al., 2018), such as the integration of conventional face-to-face learning methods with digital or online learning methods (Garrison & Kanuka, 2004; Graham, 2013). Although blended learning is traditionally conducted within school environments – as face-to-face instruction is part of the blended model – its applicability in emergent pedagogical approaches during the pandemic has also been discussed (Dziuban et al., 2018) as a recovery strategy that combines appropriate teaching and learning methods with technology or online resources to provide dynamic learning experiences during school closures (Mirriahi et al., 2015). Approaches in which pupils interact over the internet while studying from home are also increasingly utilised during school closures.

Blended learning is a common approach in the Higher Education sector where students learn both on and off-campus, and consequently there is myriad research on this topic (Pima et al., 2018). Whereas emerging literature about the school sector has been described as limited and lacking in controls (Poirier et al., 2019). In the light of current restrictions, there is renewed impetus for re-examining the benefits of providing blended programs which combine face-to-face and online learning (Brown et al., 2020). Australian evidence
also suggests that “blended learning may be as effective as classroom learning for many students” (Brown et al., 2020, p. 1). For example, the “eKids Framework that has been supporting blended learning for rural and remote students for the past decade found significantly better educational outcomes from blended learning compared to classroom or online delivery” (RRIF, 2020, p. 2). In New South Wales, a blended learning approach is not new (Country Education Partnership [CEP], 2014; NSW DEC, 2013), and has come to the forefront as a proposed change in approach to education post-pandemic.

The contested definitions and disparate applications of blended learning models make this learning approach one of the hardest to implement effectively. Ultimately, as Australian academic Torrisi-Steele (2011) argues, it is crucial that blended learning approaches are not tokenistic, but embody reflective pedagogy. Accordingly, blended learning should not be only an exercise in technology use but rather a problem-solving activity that supports differentiated approaches to learning, reflective practice, and enhanced outcomes for all students.
Over previous decades, there has been a paradigm shift in the use of traditional pedagogical methods to technology-based teaching and learning. The COVID-19 pandemic has prompted the rapid transition to remote schooling, shifting schooling and pathways regardless of distance (Hrastinski, 2019; Onwusuru & Ogwo, 2019). The likelihood of future school closures or partial school closures during a pandemic also implies that educational technology and online resources are likely to become drivers of student learning. In this context, there are undoubtedly a number of opportunities for education systems, at this moment in time to draw on technology-based resources and tools to facilitate communication and collaboration, deliver personalised learning, and complement off-screen activities.

Technological provision seeks to enable continuity of learning even when students are physically separated from their regular classrooms. Over the previous eight months, a number of educational technology interventions have been designed to provide both sustained educational access during COVID-19 induced school closures around the world. Understanding ways to enhance sustainable, quality, flexible learning options is also of importance, and technology is one way that schools can address continuity of teaching and learning during the COVID-19 pandemic (Swartz & Chetty, 2020).

In the international development sector, educational technology is often cited as a way of responding to policy questions within educational systems (Rodriguez-Segura, 2020). However, as Rodriguez-Segura notes, no studies have provided empirical evidence on the implications of educational technology. His study adds to the limited research base, providing insights into the potential of educational technology to support self-led learning and improvements to existing teaching practice in a cost-effective mechanism. However, Rodriguez-Segura concludes, “access to technology alone is not sufficient to improve learning” (np), and the success of technology-based interventions rests on customisation of tools to context, policy supports, and resources. Clearly, pedagogy is at the forefront of best practice in integrating technology and education.

The development of a variety of digital skills, and having an efficient infrastructure both at home and at school are also key to success in the smooth roll-out of technology (AITSL, 2020; Masters et al., 2020; World Bank, 2020). Effective practice can be negatively impacted by the use of unsuitable products, such as ‘off-the-shelf’ education solutions. The premise underlying many off-the-shelf products is that education can be packaged, automated, personalised and delivered – at scale and at low cost. However, concerns have been raised around the risks and restrictions of these proprietary platforms and ‘quick fix’ digital solutions, and the related issues around data-mining student information (Selwyn & Facer 2013; Player-Koro et al., 2018).

**COMPUTER SUPPORTED COLLABORATIVE LEARNING**

In computer-supported collaborative learning (CSCL) approaches, learning takes place through social interaction using either a computer or the internet (Scalise, 2016). Collaboration may occur using video, chat, emails, discussion boards or knowledge forums (Luo et al., 2017; Stone & Logan, 2018). These approaches can take place in the classroom or over the internet. Approaches often use specific tools for co-construction of work – for example, shared workspaces like Google Meet, Google Docs or Slack (Al-Samarraie...
Some tools can help to build connection and prevent disengagement during the current pandemic (Masters et al., 2020). Indeed, cultivating social capital and connectedness may be supported between teachers and students, and students and their peers, with the right kind of technological interventions (Luo et al., 2017). Teachers can also use video technology (Swartz & Chetty, 2020) or similar “to interact with students in real-time and rely on students having set schedules” (Masters et al. 2020, p. 2). Live lessons may take the form of synchronous or asynchronous learning, or a blend of both.

The evidence for computer-supported collaborative learning approaches is consistently positive. Even when focusing only on school-aged pupils, Chen et al. (2019) found significant positive results when comparing collaborative learning with independent learning using computer-based instruction. One study reported a specific outcome measure for using CSCL as part of distance learning and found that the impacts were positive and of a similar magnitude to overall CSCL outcomes (Jeong et al., 2019). Chen et al. (2018) also explored the impacts of computer use for collaborative learning and found positive impacts on social interaction and group task performance. An interesting finding from research is the way CSCL appears to have been used in specific subjects. Chen et al. (2019) found that at primary school all of the studies focused on using CSCL for science, maths or language instruction. At secondary school level all studies were focused on maths or science. Jeong et al. (2019) found that CSCL had positive impacts for STEM subjects, while Lin (2014) found a positive impact for second language learning. When studies examined the way peers communicate, they found no difference between synchronous or asynchronous communication (Chen et al., 2018; Lin, 2014). There were, however, some insights into successful implementation strategies. Chen et al. (2018) found that peer assessment and feedback strategies led to positive learning outcomes, and also noted that teacher instruction and guidance in the use of computer platforms led to more positive outcomes. Jeong et al. (2019) also explored different types of implementation and their impact on student outcomes, and found that a combination of technological applications was particularly important. For example, they found that video conferencing technologies yield a positive impact when paired with shared online workspaces such as Google Docs. However, when video conferencing was supported by email communication, there was no evidence of impact.

Many different platforms, including Google’s G-suite, have now been made available free of charge for students in disaster-stricken communities across the world (Haren & Simchi-Levi, 2020), allowing teachers to deliver content via video-conferencing during periods of school closure. However, the quality of approaches to the application of educational technology vary widely and should be examined in relation to both context and age of their pupils. For example, game-based learning has been found to have some impact upon language learning and vocabulary development in students with disability (Constantinescu, 2007; Spooner at al., 2015). Overall, although the research base demonstrates that computer assisted learning works (Howell et al., 2017; Jeong et al., 2019; Scalise, 2016, Stone & Logan, 2018), the evidence related to the effective use of technology in enhancing overall achievement at scale remains contested (Vigdor et al., 2014).

**MOBILE PHONES**

The use of mobile phones as a technology-based intervention has also been outlined in the research base. While Kuhn and Vogt (2013) explored the use of mobile phones in face-to-face lessons, mobile phones have also been used in remote learning and emergency education responses. One study from Auld et al. (2012) explored mobile phones as a mechanism to improve Indigenous children’s literacy achievement in a remote Australian community, and found that phone use enhanced relationships in remote communities. More
recently, Hung and Wati (2020) explored the challenge of ensuring that digital home schooling, including mobile phone-based interventions, is ‘humane’ and creates a balance between technology and teacher. Porter et al. (2016) also examined mobile phones and education in Sub-Saharan Africa in relation to the transformative potential of mobile phone-based interventions, and much of this work is relevant to education during emergency and extended remote schooling periods. However, as Porter et al. (2016) note, challenges and detrimental consequences of mobile phone use in African schools, including online safety risks and engagement, particularly those in remote spaces, is becoming increasingly apparent. Accordingly, mobile phone-based technologies must be supported with policies and practices that mitigate harm and promote educational engagement.

EDUCATIONAL BROADCASTING

Educational broadcasting is the delivery of educational content and programmes via public television or radio. It can be a useful mechanism as it is not dependent on internet access, devices, or extensive resources. Educational broadcasting has been used widely during the COVID-19 pandemic and has traditions in previous conflicts and extended school closures. The OECD Rapid Response Report (Reimers & Schleicher, 2020) found that many of the 98 countries surveyed were implementing radio and television broadcasting to supplement online or remote learning. During the current pandemic, educational broadcasting has been used to support remote learning in a number of countries such as Australia, Croatia, Russia, Macedonia, Serbia, Spain, Poland, Timor-Leste, and Papua New Guinea. However, efficacy studies are scarce (Ha, 2017) and the quality of educational broadcasting services contested, which is largely attributable to the inability to measure the quality of interaction and subsequent use of content.

In Australia, educational broadcasting has traditions in remote settings (Fowler, 1987), with the notable School of the Air supporting students from isolated rural and Indigenous communities. Traditionally, education content was transmitted using shortwave radio but now lessons are conducted via two-way radio or internet. Students engage in group or individual lessons with a teacher for part of the day, and follow assigned tasks with a parent or a tutor. Educational broadcasting has also been common in other countries, such as the United Kingdom (Sumner, 1991), Sweden (Runcis & Sandin, 2010), the United States (Kentnor, 2015), South Africa (Barnett, 2002), and Uganda (Kiwanuka-Tondo, 1990). However, there remain concerns related to the efficiency of educational broadcasting as a means of transferring knowledge to students, with limited empirical research existing on the approach in Australia, or in other contexts. This is also true of other technological responses aimed at ensuring continuity of education during school closures.

INCLUSIVE TECHNOLOGY

Many studies have demonstrated that technology can be used successfully to support young people with disabilities. Watson et al. (2010) found positive results in using assistive technology (AT) to support the enactment of educational plans, goals and objectives, and making learning more accessible for students. One study by Parette et al. (2008) found that Microsoft PowerPoint is effective in teaching literacy skills, while other studies have supported the use of information technology to enhance educational engagement (Burne et al., 2011; Hoppenbrouwers et al., 2014; Lancioni et al., 2010). Technology has also been used to support the development of employment-focused skills in young people with disabilities (Damianidou et al., 2019). Assistive technology services are also widely used in post-secondary education for students with disabilities (Lombardi et al., 2017), though little is known about user experiences when AT interventions are applied in neurodiverse populations (Burne et al., 2011; Keefe & Copeland, 2011; Smith et al., 2009).
A wide range of effects have been noted in relation to educational technology on students with disabilities (Chen et al., 2018; Tsai & Tsai, 2018; Wouters & van Oostendorp, 2013), although the evidence on achievement is mixed, particularly in the area of computer assisted instruction (Riopel et al., 2019). In the context of the current pandemic, students with additional learning needs are more likely to be negatively impacted by school closures, even if supported by technology. Thus, there remains a need to explore the ways in which technology can enhance standardised learning outcomes, especially for students with disability (Hainey et al. 2016, Hussein et al. 2019).

USING TECHNOLOGY TO TRACK STUDENT LEARNING

High-quality data (especially in the area of assessment) can provide valuable information about how to best support students in times of disruption and uncertainty, and inform education policy and practice into the future. In relation to tracking student learning, technology has been used widely in student assessment. However, emergent research suggests that although technology can be used to support self-assessment and reproduction (Carpenter et al., 2020; Gillett-Swan, 2017), and can help pupils retain key ideas and knowledge, technological quizzes and games are not always a replacement for existing forms of assessment (Kearns, 2012; Wong et al., 2019), and there is still a need for support, particularly in the area of proctoring/invigilation (Cote et al., 2016; Ngo et al., 2020; Seppälä, 2020). Accordingly, educational leaders and policy makers should carefully consider the suitability and efficacy of available digital tools, resources and infrastructure before implementing them into curricula and practice during the current pandemic.

TECHNOLOGY LIMITATIONS

It should be acknowledged that most forms of remote learning – online, blended, and computer-supported collaborative learning approaches – are largely dependent on access to online resources, including internet access and devices in the home. With access to appropriate technology, there are a number of possibilities for leveraging existing teacher practice and supporting students during school closures. However, the research is still emerging. Thus they are not always possible for students in rural, remote or disadvantaged contexts.

The COVID-19 crisis has presented a situation that is quite different from previous approaches to online study for both teachers and students in terms of readiness, appropriate tools and resources, lack of design support, and issues with infrastructure (AITSL, 2020; Erturk & Ekundayo, 2020, Hodges et al., 2020). Teachers would usually be involved in planning to ensure that technology fits with instructional needs. However the sudden changes to educational delivery due to school closures precluded their involvement. Moreover, teachers have needed time to upskill in facilitation techniques and assessment practices where teaching is being offered solely in online mode (INEE, 2020; Masters et al., 2020).

HOME SUPPORT

Even with access to resources, it must be acknowledged that effective use and application of technological solutions for remote learning is highly dependent on the technological proficiency of students and/or their families. Research has revealed significant gaps in the extent to which the skills students possess sufficiently support their use of technology. Studies from the United States, for example, demonstrate significant challenges with student engagement during remote learning (Barnum & Bryan, 2020). These challenges are magnified when variables of socioeconomic status, education level, and family background are considered (Bucy, 2000; Jones et al., 2009; Rice & Haythornthwaite, 2006; Vigdor et al., 2014). Much of this research is
relevant for wider population groups, and countries outside of the OECD. Indeed, as more remote schooling solutions become predicated on the assumption of both sufficient resources and technological skills, participation gaps between affluent and disadvantaged students are likely to widen, impacting on both engagement and achievement. It is therefore important to consider ways of enhancing student engagement and increasing opportunities to learn during periods of school closures, regardless of access to resources.

Successful use of technology is predicated not only on access to resources, but to the skill of the user (Baylor & Ritchie, 2002; Russell et al., 2000). This applies to both teachers and students (Oliver, 1994; Oliver & Corn, 2008). Indeed, students from lower socioeconomic families are likely to require extra support and monitoring, as are teachers and school leaders who have not previously used information communications technology (ICT) mechanisms. There are also concerns that students from low socioeconomic backgrounds will experience disparate disadvantage in the shift to online learning, due largely to access to resources (Horowitz, 2020). Thus, as policy makers and practitioners consider how to best educate students in the wake of the COVID-19 pandemic, it is critical to better understand the ways in which pandemic-induced school closures can enhance student engagement and increase opportunities to learn, and consider mechanisms to mitigate any negative impacts upon student learning or engagement. Understanding what works in regards to technological provision can help policy makers, stakeholders, schools, and parents, to respond more effectively to the educational disruptions caused by COVID-19 induced school closures.

**EFFICACY OF TECHNOLOGY**

There is risk in determining how effective these tools and mechanisms are during the current pandemic, given the reactive nature of emergency school closures. Research into the impact of remote learning is limited and mixed. Zhao et al. (2005) found evidence that a combination of asynchronous and synchronous learning was most beneficial to outcomes, while other studies have failed to provide the same evidence (Bernard et al., 2009; Means et al., 2013).

The evidence on remote learning for pupils in primary school is very limited, and future research is needed on the efficacy of remote learning for younger pupils. There is also little available evidence on the impact of blended learning approaches on pupil outcomes (Means et al., 2013) and the findings are mixed (Poirier et al., 2019).

It is important to acknowledge that the rapid implementation of technological solutions that have been delivered in many parts of the OECD during the current pandemic has been fraught with challenge. Research into the application of educational technology mechanisms highlights issues of access and equity to technology; bandwidth (Taylor, 2020) and the skillset of educators (Fernández & Fernández, 2016; Roulston et al., 2019) and their students to use technology for learning (Ford, 2015). Research from Australia also shows that access to technology largely depends on the availability, accessibility, and affordability of ICT mechanisms, and is particularly problematic in regional, rural and remote education spaces (Masters et al., 2020).
There are many ways in which Australia has drawn upon the extensive international research base to apply good practices in remote teaching over the previous century. Australia’s expertise in support for teachers, and the use of evidence-based practice, are particularly relevant during extended periods of remote schooling. Such lessons of good practice and considerations have been triangulated from the local and international evidence base and are presented below. As shown in Figure 1, these principles include support for teachers, community partnerships, parental involvement, student engagement and education for inclusion and equity.

**Figure 1 Principles of good practice in remote learning**

**SUPPORT FOR TEACHERS**

As noted previously, the international research base provides extensive empirical evidence that technology supplements, but does not replace, teaching. Successful remote teaching requires teachers and students to have access to appropriate resources, including technology, and well-designed learning environments. It is therefore critical that teachers are provided with appropriate support and professional learning in each of these aspects, particularly in designing learning which makes use of effective digital pedagogies.
Rasheed et al. (2020) conducted a systematic review of implementation challenges of the online component of blended learning. Some of the highlighted challenges included supporting teachers’ professional development in implementing online aspects of blended learning and supporting the digital literacy of pupils. A key challenge identified was supporting the self-regulated learning of pupils during online teaching and preventing feelings of isolation from pupils. Technological challenges were also identified as a barrier to implementing online components of blended learning. Teachers need to be supported during the current crisis (Alves et al., 2020), and can be supported in the enactment of both policy and mechanisms to support their health, wellbeing, and leadership. While it is true that teachers should learn how to adapt in a changing world, it is essential to improve teachers’ digital competences (Redecker, 2017) as part of their continuous professional development.

In an increasingly connected and online world, competency in remote teaching methodologies is also important. However, according to the recent TALIS findings (OECD, 2020), only 60 per cent of teachers have received professional development in the use of ICT, while close to twenty per cent of teachers reported a high need for development in this area. This is of concern, as in this crisis, all teachers need to be involved in order to close some of the gaps in student learning (Schleicher, 2018), particularly as a result of school closures. Further, while technology can provide new ways of teaching, supporting the practice of teachers is key, as the return to school for millions of children after the COVID-19 crisis will see many teachers needing extra strategies to close the gap in learning for children who have been left behind. This includes assisting teachers to rebuild foundational knowledge and skills, as well as helping them to develop ideas, strategies and mechanisms for teaching and learning. Teachers need training in how to support students, regardless of access to materials or irrespective of distance. With such support, teachers can encourage their students to become active participants in the learning process and contribute to the construction of knowledge (Wikramanayake, 2005; Khan et al., 2012) that empowers and builds capacity.

Returning to the current pandemic, a recent survey of 10,000 Australian teachers conducted during April 2020 (Wilson et al., 2020) demonstrates that teacher training is an area worthy of discussion. Indeed, the findings of this survey show that only 30 per cent of Australian teachers had been trained to deliver remote learning prior to the crisis, and the majority (80%) felt unprepared for the transition, particularly those teachers in rural and remote schools. Further, only 25 per cent felt confident that their students were learning well under the current arrangements and less than half (43%) were confident the majority of their students were positively engaged with online learning. Teacher confidence in using ICT in their teaching was also measured in the International Computer and Information Literacy Study (ICILS) 2013 and 2018. The results were very similar across the two cycles of the study (Fraillon et al., 2019). In summary, teachers who are more confident users of ICT in their teaching: i) use ICT more frequently, ii) are younger (under 40 years old in comparison to 40 years and older), iii) have more positive views about the value of using ICT in teaching, and, iv) fewer negative views about the problems associated with using ICT in teaching (Wilson et al., 2020). These findings raise questions about the role of teacher professional learning in supporting the use of ICT in teaching. Online teaching is very different from face-to-face teaching. For teachers to be effective in an online environment, they need continual upskilling in both online teaching and online learning design.

COMMUNITY PARTNERSHIPS

Partnering with community and authorities is a common theme in current and historic literature. A study of schools (in the United States) during the 1918 pandemic identified that a successful response occurs when “planning brings public health, education officials, and political leaders together” (Battenfeld, 2020, n.p.). As part of the review of responses to the 1918 pandemic, Stern et al. (2009) also found “the smooth implementation of school closures was consistently associated both with a clear delineation of authority
among municipal and governmental agencies and with existing trust and transparent communication between health officials and the population at large” (p. 1067).

In Australian remote communities, partnerships involve school and community members in collaborative planning which makes use of partners’ particular expertise (ACER, 2012). Indeed, in 2017, the NTDoE (2017) embarked on a deliberate strategy to gather data and analyse school performance, and to support school improvement planning across differentiated improvement journeys. The *Education NT Strategy 2018-22* (NTDoE, 2017) aims to accelerate school improvement by ensuring that each school is focused on a sharp and narrow set of priorities and that, in turn, the system provides schools with differentiated support to achieve performance goals and targets (NTDoE, 2019). The Strategy is built on the premise that a school improvement agenda is ‘everybody’s business’; community engagement is a focus area, involving strong partnerships with families and community to inform decision-making and offer an inclusive approach (NTDoE, 2017).

Partnerships can be with educational organisations, but also with community members including parents (Berkowitz & Bier, 2005). In this context, there is a significant corpus of cross-disciplinary knowledge pointing to effective ways of working and researching with Indigenous communities in Australia to improve outcomes for Indigenous peoples (Bainbridge et al., 2013; 2015; Giles-Brown & Milgate, 2012; Milgate, 2016; Taylor Guy & Milgate, 2017). Lowe and colleagues (2019) identify the importance of co-leadership capacities of school and Indigenous community leaders in supporting the establishment of school cultures of transformative change. Similarly, Kamara (2009) highlights the efficacy of a shared leadership approach adopted by Indigenous female school principals in the Northern Territory, enabling Indigenous Elders and parents to be active participants in transforming school structures and curriculum. There are also lessons to learn when reflecting on Yunkaporta’s (2009) *8 Ways Aboriginal pedagogy* and the work of Martin and Mirraboopa (2003). *Foundations for Success* also helps early childhood educators implement a holistic program which reinforces personal and cultural identities, connects with families and communities, and provides the foundations for children’s successful and relevant learning.

**PARENTAL INVOLVEMENT**

There is strong evidence that parental investments are often key to enhancing educational engagement, both in the OECD (Houtenville & Conway, 2008) and in developing countries (Das et al., 2013; Pop-Eleches & Urquiola, 2013; Farkas, 2018). Research shows parental involvement in children’s learning is important regardless of the mode of delivery (Lee & Bowen, 2006). But given extended school closures, parents and carers become critical in supporting the educational challenges of students during remote schooling periods, especially for younger learners and students with disabilities who cannot undertake online or remote learning autonomously. Thus, it is important to understand what is being taught to students, and to develop strategies to support the health and wellbeing of students during lockdown and isolation measures.

Adopting a parents-as-partners mechanism, which encourages and fosters effective and collaborative communication between school and family, can only enhance the educational experiences of students most heavily impacted by the COVID-19 pandemic.

Research suggests that non-school factors are a primary source of inequalities in educational outcomes. The implications for vulnerable students are significant, particularly if remote schooling continues for an extended period of time. Moroni et al. (2020) argue that COVID-19 is likely to further widen the disparities between children from different socioeconomic backgrounds. This is substantiated by Masters et al. (2020), who also highlight educational inequity in remote schooling responses in Australia.

Australian data to June 2020 show that the proportion of people always working from home rose from seven per cent before COVID-19 to 60 per cent during the pandemic. While working from home, 40 per cent of
parents always or often cared for children during work hours (Hand et al., 2020). A unique feature of the current school and workplace closures is multi-tasking; adults playing multiple roles as parents, carers, and employees. Parents are supervising their own children while working, and some are worrying about not working as unemployment continues to rise. These factors have led to increased stress in households, and reduced access to family support services, with initial evidence suggesting a subsequent increased risk to child safety (Brown et al., 2020; O'Donnell et al., 2020; Teo & Griffiths, 2020). Support for parents of vulnerable children at this time is particularly important and especially so for parents of younger children.

Marginalised and disadvantaged students often have lower levels of support in the home when compared to students from more advantaged backgrounds. Research also shows that there is a correlation between parents’ and children’s cognitive ability. Anger and Heineck (2010) highlight the importance of parental education, and the positive relationship between cognitive skills and parental ability. Parental education plays an important role in explaining the transmission of cognitive abilities between generations (Holmlund et al., 2011; Sayer et al., 2004). The COVID-19 pandemic is likely to widen gaps related to intergenerational poverty that had begun to close, as more parents are forced into unstable work or struggle to support their children’s learning at home. In addition, not all parents possess the digital skills required to help their children deal with the technical challenges of online learning (Vigdor et al., 2014), nor do they have the knowledge and understanding of ways to support their children’s learning without access to resources.

Research also shows that parents are incredibly important in supporting the development of students’ digital literacy skills. In particular, involving parents and caregivers in student learning has a greater impact on improving student outcomes than socioeconomic status (Desforges & Abouchaar, 2003; Goldman, 2005). Research into parental involvement into schooling also shows that educational interactions are most effective when voluntary (Fischer et al., 2019; Hill et al., 2018), when there is a clear understanding of the roles of parents and teachers in learning (Chai et al., 2020; Daniels, 2017) and where partnerships between parents and teachers have a deliberate focus on learning and wellbeing (Gascoigne, 2014). Recent studies on the role of parents/caregivers in student learning also emphasise that the role of the parent is not to replace the teacher, but rather to support the learning of the child, particularly in regard to supporting students with disabilities (Dunn et al., 2016) or those impacted by disadvantage (Farkas, 2018). The nature of this support needs to be different depending on the age of the child. In general, parents/caregivers can support their children’s learning by helping them to develop independent learning skills, and schools can help parents by providing practical strategies and materials to support learning at home during the pandemic (Garbe et al., 2020).

Finally, adding to Lee’s (2020) research on the mental health implications of the COVID-19 pandemic on children, Moroni et al. (2020) argue that the socio-emotional skills of disadvantaged children may also be impacted more heavily than those from advantaged families. Their research indicates that parents from more affluent backgrounds may be better equipped to support the mental health of their children in crisis situations. Additionally, children from lower socioeconomic backgrounds are more likely to spend their quarantine time in more stressful home environments, and to experience financial problems, as well as the stress of sharing smaller living quarters and reduced access to digital devices at home (Moroni et al., 2020). Chetty et al.’s 2020 research also demonstrates that students from disadvantaged backgrounds experience substantially larger and more persistent reductions in learning progress when compared to students from more advantaged backgrounds, and this research is clearly relevant to the current pandemic. Thus, support for parents of vulnerable children at this time is particularly important and especially so for parents of younger children (Masters et al., 2020).
STUDENT ENGAGEMENT

While studies on the impact of school-based learning losses are still emerging, recent research conducted by Aucejo et al. (2020) argues that the pandemic has already begun to lead to reduced school completion rates, with detrimental impacts increasingly evident among graduates from low socioeconomic backgrounds. For this reason, it is crucial that education systems consider ways to support self-regulation (Cai et al., 2020), resilience, capacity (Brookhart, 2020), and engagement amongst students. Supporting student engagement and achievement requires effective teaching practice and strong connections in the school community. Social connections and relationships are important protective factors against school dropout. Technology can play a role in maintaining social connections between teachers and students and amongst students, even if this interaction takes place via telephone. Maintaining connection is important, especially for students who are at risk of disengagement.

Attendance at school is also used as a school-based measure and proxy for student engagement. School attendance has been a core tenet of the Australian Government’s Closing the Gap strategy since 2007. The 2020 Closing the Gap Report shows that school attendance rates for Indigenous students have not improved over the past five years and remain lower than for non-Indigenous students (around 82 per cent compared with 92 per cent in 2019). These gaps are evident from the first year of schooling and widen during secondary school. The gap is most prominent in remote and very remote schools, where communities experienced multiple layers of disadvantage. In light of this, further disengagement from schooling for Indigenous students as a result of school closures is a valid concern. However, biosecurity measures, such as those implemented in the Northern Territory to manage the COVID-19 situation, have meant that many remote and very remote school communities are continuing to function as normal during the current crisis.

Regardless of context, maintaining connection with students is important when schooling is interrupted, especially for students who are at risk of disengagement. Positive relationships between students and teachers reduces the risk of students’ dropping-out, especially among high-risk students. Finding ways to maintain those connections and relationships will be of great importance for vulnerable students.

During the post COVID-19 system start up period, it will be even more important for teachers to be able to reliably determine the current level of development of individual students (that is, how much learning has been missed) in order to effectively target their teaching to the point of need (Wyse et al., 2020). Without this ability, time may be lost and learning opportunities wasted if students are faced with learning experiences that are either too easy for any new learning to occur, or too difficult to allow meaningful access into learning (Brookhart, 2020). Understanding the extent to which learning losses have occurred is important (Cai et al., 2020; Middleton, 2020), but so too is creating opportunities for learners to do well in periods of remote learning (Taylor Guy & Chase, 2020).

EDUCATION FOR EQUITY AND INCLUSION

From a policy perspective, stakeholders must prepare for the considerable challenges that education systems face now, and when the COVID-19 pandemic subsides. While learning might continue unimpeded for children from higher income households, children from lower income households are likely to struggle. Previous recessions have exacerbated levels of child poverty with long-lasting consequences for children’s health, wellbeing, and learning outcomes (Chzhen, 2017). At a national level, the research base suggests that exploring ways to mitigate COVID-19 related poverty through stimulus and recovery measures is the first step in supporting the provision of high-quality education (Bowleg, 2020). As a result of economic recessions, inequity between urban and rural, the wealthy and the poor, will also be augmented in the coming months, years, and even decades. At the local level, an adequate response must include targeted education and material support for children from low-income households to begin to close the learning gap that is likely to
have occurred. Schools and teachers must also begin to consider how to adapt teaching practice and learning materials for students who do not have access to wireless internet, a computer, or a place to study. Without such action, the current health crisis could become a social crisis that will have long-lasting consequences for children in low-income families (Azevedo et al., 2020).

It is important to remember that the majority of educational systems have now been impacted by the COVID-19 pandemic, and this will have consequences for all individuals, regardless of nationality, level of education, income or gender. But as discussed, the consequences of the pandemic are likely to further marginalise those already most at risk. Inequities within education systems will be further magnified if policies and practices do not seek to include learners in the most marginalised groups. Beyond these educational challenges, families living in poverty, low socioeconomic circumstances, or low income countries face an additional threat: the ongoing pandemic is expected to lead to a severe economic recession (Buheji, 2020). Disparate quality across and within health systems renders the most vulnerable of countries defenceless in protecting their populations from illness, but also from the resultant economic instability, educational inequity, and marginalisation of the most vulnerable that has already begun to ensue. Indeed, previous pandemics, natural disasters, conflicts, and economic recessions have shown to exacerbate existing levels of child poverty with long-lasting consequences for children’s health, wellbeing, and learning outcomes – particularly for students already marginalised on the basis of gender or disability (Al-Miqdad, 2007; Noori, 2017).

Access to resources for learning is often related to underlying social issues which, although beyond the control of schools, need to be considered when delivering remote learning. Expert analysis provided to Australia’s Chief Scientist in April 2020 also indicated that one of the factors likely to moderate the effectiveness of remote learning is access to digital technology and the Internet (RRIF, 2020, p.1). Ideally, all students will have access to, and skills in using, appropriate hardware and software, and teachers will have skills in, and access to, good online learning curriculum resources and be skilled in online pedagogy.

While technology is one way that schools can address continuity of teaching and learning, the 2019 Australian Digital Inclusion Index shows that – although the overall index has increased since 2017 across all three dimensions of digital inclusion: access, affordability and digital ability – there are substantial and widening gaps for some groups (Brown et al., 2020; Thomas et al., 2019). Inequalities exist in both developed and non-developed countries. For example, there is a substantial digital divide between richer and poorer Australians, regardless of location (Krishnan, 2020; Thomas et al., 2019). Current literature suggests mitigation strategies like optimising content for low bandwidth, and offline approaches such as making content available in PDF format for download before class, and offering shorter video snippets (AITSL 2020; World Bank, 2020).

SUPPORTING GIRLS AND WOMEN

Vulnerable and developing education systems and their students are likely to be most at risk of learning losses and student attrition. There is a strong risk that the COVID-19 pandemic may lead to an increase the number of early school leavers (UNESCO, 2020) as a consequence of economic pressures. For example, research from South Africa (Onwusuru & Ogwo, 2019) reveals projected learning losses are expected to last longer than six months as a result of this pandemic. Indeed, in many spaces school students have been locked out of educational access entirely, and some may never return to education (UNESCO, 2020). This is likely to be particularly concerning for disadvantaged students and girls, who are often the most marginalised of learners in many countries (Cameron, 2012; Noori, 2017; Wenham et al., 2020), with adolescent girls and women often shouldering the burden of home responsibilities such as childcare (McLaren et al., 2020).
While research is still emerging as to the projected impacts of COVID-19 upon the educational outcomes of girls and women, concerns around gendered impacts of the pandemic have begun to appear (Alon et al., 2020; Zamarro et al., 2020). Consequences for girls and women are expected to include school and labour market attrition (Akmal et al., 2020), sexual exploitation (Farley, 2020), and increases in gender inequity (Codd et al., 2020; Malisch et al., 2020; McLaren et al., 2020).

Research into the impact of past pandemics, such as the 2013-2015 Ebola virus disease (EVD) outbreak in West Africa, offers lessons for considering the consequences for educational and health outcomes of girls and women. As Onyango et al. (2019) highlight, a focus on containing the rapid spread of EVD resulted in the failure to protect adolescent girls and young women during the outbreak. As quarantines and school closures were put in place to contain the spread of disease, women and adolescent girls were vulnerable to coercion, exploitation, rape, and sexual violence. They were also unable to attend community meetings where education and instructions were given about protecting themselves from contracting the disease. While the number of Ebola-infected patients and deaths were recorded accurately, victims of violence during the outbreak went uncounted, unrecognised, and unattended. Gender was overlooked during the response, leaving young girls highly vulnerable (Onyango et al., 2019). Increased rates of child abuse, neglect, and exploitation, particularly directed at girls and women, were also reported in the Ebola outbreak. Child protection risks occur frequently in emergencies because existing mechanisms for keeping children safe are either inaccessible or break down. Vulnerable children and their families are also at much greater risk in terms of cyber safety (Leach, 2015; Masters et al., 2020). It is also yet to be understood if vulnerable girls and children will face increased risks from online sexual predators as a result of the COVID-19 pandemic, now that hundreds of millions of young people are using technology for educational purposes. It is also yet to be seen if existing structures can contribute to minimising the trafficking of girls and women into the sex trade during the current pandemic (Asongu et al., 2020; Farley, 2020).

The COVID-19 crisis provides an opportunity for an education system wide reset, particularly reflecting on the challenges that face students who are most at risk. The concept of ‘building back better’ in post disaster spaces is not new (Lamond et al., 2013). The notion has been drawn upon in many different contexts and educational systems, from post disaster reconstruction in Christchurch, New Zealand, after the 2011 earthquake (Francis et al., 2018), to curricula reform and culturally responsive practice in Rwanda as a result of ethnic cleansing and genocide (Freedman et al., 2008). Rwanda’s post-colonial education system reform demonstrates that sustainable change to established structures and systems is possible. Transforming inequitable education systems is not only about improvements to infrastructure; it is about recognising educational possibilities that support students in a changed world.
6. CONTEXT MATTERS

As of August 2020, UNESCO (2020) estimates that some 21 million children in low income countries who are currently impacted by school closures as a result of the pandemic may never return to the education system. In low income countries, current school closures as a result of COVID-19 are expected to continue for extended periods of time. This is largely due to constrained education resources and limited capacity within existing education systems. School closures and remote learning experiences are likely to widen the learning gap between children from disparate socioeconomic backgrounds. Increasing student inequity during the current pandemic is further augmented by disparate access to online learning tools during extended periods of remote learning, and here, many low-income nations are particularly susceptible to the extended impacts of COVID-19 and school closures.

China offers a notable example of how the rapid response to COVID-19 has impacted on education. Despite being the first country affected by COVID-19, China reacted very quickly to support schools, teachers, and students (Huang et al., 2020; Ye, 2020). As Huang et al. note, the Chinese response was impressive, and served to minimise the projected impacts of school closures on learning losses through responsive practice and technological provision. Even as Wuhan (and broader China) began to experience tightening economic conditions in light of the emerging disaster, their schools were given priority funding to ensure effective and efficient transition to online learning. A national cloud platform was quickly launched in China, “offering digital learning resources to students in schools free of charge across the country... to 50 million learners simultaneously” (Schleicher, 2020, np). It was not only the Chinese government that provided resources to schools (Zhang et al., 2020). Support for students and teachers came from extended social avenues in the form of free wireless internet, resources, and devices for school and their students. Importantly, teachers were well prepared for online learning and able to quickly connect with their students via remote mechanisms (Schleicher, 2020). This took the forms of both synchronous lessons, as well as asynchronous delivery, “with teachers offering online resources for self-directed learning...and those without access to digital resources were not forgotten. In many places, parents could collect free textbooks from schools or ask schools to deliver them to their home” (para 7).

As Sansa (2020) notes, it is likely that many educational systems will be seriously affected by the impacts of the coronavirus pandemic well into the future. Developing country contexts are arguably most at risk of sustained losses and increased inequity as a result of current and ongoing school closures. The stakes are high considering the impact of past school closures resulting from disease (Smith, 2020), natural disasters, war (Barber, 2008). Kuhfeld et al. (2020) predict that COVID-19-induced school closures will generate significant learning losses, with the largest negative effects concentrated among low-achieving students. Research on school closures as a result of disease also highlight the possibility of permanent damage to education systems.

As Schleicher (2020) notes, although many schools are now equipped with technology, tools, and systems required for the delivery of online learning, research indicates that the quality of disparate digital technologies also possesses the possibility to hinder student learning. Thus, as school closures have become more common, there have been increasing concerns about the effects of the shift to online learning (Malkus,
2020; von Hippel, 2020), and the resulting implications for access, quality, and equity in different contexts. While education systems such as Singapore and South Korea that have historically used internet and communication technology as part of educational delivery, report high levels of success in the transition to online learning, less mature systems, such as Vietnam (Schleicher, 2020), report greater challenges in integrating and using digital technologies. These challenges are shared by many developing contexts, where lack of electricity, functional classrooms, and basic amenities can hinder the effective integration of technology with conventional teaching methods (Dzansi & Amedzo, 2014), particularly in rural and remote settings.

Rural schools are also often less advantaged in terms of quality education, effective teachers (Du Plessis & Mestry, 2019), and access to resources. High quality technological solutions rely on school and student access to resources; the kind of resources students in many low income and remote contexts often do not possess. Online learning environments usually require computers and a reliable internet connection, and a substantial number of children live in homes in which they have no suitable place to study, no devices, or have no access to the internet. In some countries, as outlined in Oladipo, et al.’s 2020 analysis of educational barriers in Nigeria, students in rural areas cannot study after sunset, due to the absence of electricity or adequate power supplies. Therefore, adopting online or virtual models of learning is problematic, if not impossible.

Context is important; one size cannot fit all. Best practice in remote teaching needs to be responsive to different contexts and cannot rely solely on technology. Understanding the impacts of learning in the home environment requires knowledge of specific experiences during school closures (AITSL, 2020; Brown et al., 2020). As an example, initial research suggests that online learning in remote contexts is easier for older and motivated students than it is for younger students who generally require, and are used to, a structured learning environment (Brown et al., 2020; Li & Lalani, 2020; World Bank, 2020).

Policy makers, system leaders, and schools now face two challenges: 1) addressing, the immediate learning needs of students, and 2) preparing for the considerable challenges that await when the current pandemic subsides. Figure 2 below draws on the evidence base from this literature review to propose a series of short and medium term interventions that will contribute to a more resilient education system, able to respond to future disruptions in schooling.
Looking at emergency educational responses as a way to develop capacity within the education community can help schools, systems, and teachers to better respond to the challenges brought by COVID-19 pandemic. However, as educators plan for the delivery of remote learning, they need to ensure immediate response activities also align to long-term goals. To this end, focusing on short, mid, and long-term responses is required to support continued learning and schooling, in both developed and developing sector contexts. In the short term, as Taylor-Guy and Chase (2020) outline, ensuring the continuity of learning and student engagement is key. This entails making sure students have access to resources, while monitoring the health, and wellbeing of students and families, particularly those most at risk. Collaboration with relevant government and community agencies is also crucial. If the short-term goals are well planned and supported, teachers will be more equipped to move to sustainable learning and teaching practices that focus on equity, inclusion, infrastructure, and capacity-building.
7. CONCLUSION

The COVID-19 pandemic marks a significant crisis in disrupting children’s learning globally. Nevertheless, the post COVID-19 response provides a unique opportunity to leverage the combined expertise in the area of remote learning to ensure children, regardless of their level of disadvantage, are not left behind as result of this global crisis. By exploring the ways in which educational stakeholders can support the student experience, particularly in the context of skills, capacity, participation, and achievement, our education systems have the opportunity to create a responsive and sustainable form of pandemic pedagogy. Ultimately, understanding the necessary conditions that support inclusive, high quality teaching and learning offers a chance to leverage what is already in place.

As children return to school-based learning, there is opportunity to support wide scale system restarts, focusing on teaching and learning in both advantaged and disadvantaged communities. For now, it is important to support teachers to be effective so as to ensure continuity of learning. Yet, with ongoing investment and support from key partners and stakeholders in the provision of adequate resources, it is likely that improved access to education, and enhanced educational quality and equity, will be a very real possibility. Australia is in a highly advantageous position to support such educational reform during a pandemic. Australia’s experience in distance and remote teaching and learning provides relevant insights into effective models and enabling conditions for developing a long-term response to remote learning practices. In particular, remote and distance learning models applied in Indigenous settings can offer some helpful lessons in effective mechanisms for delivery, including partnerships and engagement with parents and the community.

The COVID-19 pandemic offers many opportunities to look at our education systems differently, and there are many insights to be gained. While the research body is limited in relation to remote schooling during the current pandemic, there are many ways to draw upon what we know about creating conditions to enhance teaching and learning, regardless of context. Indeed, drawing upon the different lessons from emergency and extended remote schooling provides the education community with a new lens for recognising opportunities amid the current crisis.
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<table>
<thead>
<tr>
<th>Learning approach</th>
<th>Types</th>
<th>Australian examples</th>
<th>Benefits</th>
<th>Consideration</th>
<th>Enabling conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote teaching (emergency and extended)</td>
<td>Mobile or radio broadcasting TV broadcasting/streaming</td>
<td>ABC TV Education</td>
<td>Provides fully remote teaching solutions during crisis or extended periods</td>
<td>Limited empirical research as to the efficacy</td>
<td>Provide access to devices (school/system level)</td>
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<td>Provides temporary access to instruction and instructional supports in a manner that is quick to set up</td>
<td>Requires access to resources (devices and internet)</td>
<td>Ensure access to internet (system level)</td>
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<td></td>
<td></td>
<td></td>
<td>Accessible from any device including a smart-phone</td>
<td>Relies on students having set schedules</td>
<td>In homes with more than one student, organise sharing resources (school level)</td>
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<td></td>
<td></td>
<td></td>
<td>Can be implemented immediately</td>
<td>Requires digital skills of students and their families</td>
<td>Professional learning should focus on equipping teachers with adequate ICT skills (school/system level)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Acts as a direct replacement for face-to-face teaching</td>
<td>Only works in real time</td>
<td>Train school leaders and teachers to support parents and students in the use of ICT (system level)</td>
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<tr>
<td></td>
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<td></td>
<td>Teachers can interact with students in real-time</td>
<td>Recordings require cloud storage, large data downloads</td>
<td>Ensure that content is age and linguistically appropriate that provides opportunities for differentiated learning (system level)</td>
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<td>Does not allow for curation of learning resources</td>
<td>Create formative assessment processes and regular check in mechanisms that monitor student engagement and outcomes (staff/school level)</td>
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<td></td>
<td>Privacy and security issues in models with technology (particularly among vulnerable students)</td>
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<td>Doesn’t monitor student engagement</td>
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<td>Doesn’t provide collaborative learning opportunities or build social connections between students</td>
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<tr>
<td></td>
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<td>There is no means to supervise or guarantee that the curriculum is being followed, leading to unequal provision of education and risk to progression through school</td>
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Table 3 Fully online learning

<table>
<thead>
<tr>
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</table>
| Fully online learning  | Computer-supported collaborative learning      | STILE Education                                 | – Allows for collaboration between students and teachers, including social connections | – Requires a Learning Management System  
– Requires skilled teachers in online learning design and teaching with appropriate digital skills  
– Requires access to resources (devices and internet)  
– Younger children need high levels of support  
– Children with additional learning needs require extra support  
– Privacy and cyber safety issues may occur if children are not supervised  
– Vulnerable children and their families are at greater cyber safety risk than other groups | – Provide access to devices (school/system level)  
– Ensure access to internet (system level)  
– In homes with more than one student, organise sharing resources (school level)  
– Professional learning should focus on equipping teachers with adequate ICT skills (school/system level)  
– Train school leaders and teachers to support parents and students in the use of ICT (system level)  
– Ensure that content is age and linguistically appropriate that provides opportunities for differentiated learning (system level)  
– Create formative assessment processes and regular check in mechanisms that monitor student engagement and outcomes (staff/school level) |
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</tr>
</thead>
</table>
| **Blended learning** | Synchronous (live) / asynchronous (not live); blended learning | eKids Framework Facilitated by LMS platforms e.g. Moodle | – Can capitalise on existing learning resources in schools  
– May be as effective as classroom learning  
– Using video software maintains teacher-student connection  
– Can work with smartphone technology  
– Allows for asynchronous learning | – Wide range of empirical research  
– Requires skilled teachers in online learning design and teaching with appropriate digital skills  
– Requires independent learning from students  
– Difficult to track student engagement and progress in asynchronous mode  
– Requires access and connectivity  
– Requires support of parent/caregiver  
– Potentially more complex management of consistency across modes of delivery  
– Difficult to do well – not only an exercise in technology use but rather a problem solving activity that supports differentiated approaches to learning, reflective practice, and enhanced outcomes for all students | – As above |
<table>
<thead>
<tr>
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<th>Enabling conditions</th>
</tr>
</thead>
</table>
| Distance learning | Paper-based packs  
Correspondence learning  
Non computer based-distance learning | School of the Air | – Requires minimal equipment or resourcing  
– May be quicker to assemble than digital resources  
– Limited additional teacher training required | – Limited empirical research  
– Printed materials need to be delivered to students’ homes  
– Requires student self-regulation and parental support  
– Difficult to track learning  
– Minimal student-teacher connection or student-to-student connection  
– Many vulnerable children have neither the family resources, nor environment to use provided resources usefully for learning  
– Teachers need to find ways to connect with vulnerable children and provide direction and support | – Ensure students have appropriate support in the home so as to participate in learning (system/school)  
– Create formative assessment processes and regular check in mechanisms that monitor student engagement and outcomes (staff/school level)  
– Enhance connectedness through writing exchange rather than online collaboration (staff level) |