

Review of remote and online learning experiences during COVID-19

September 2022

Acknowledgements

The Australian Education Research Organisation (AERO) acknowledges the traditional custodians of the lands, waterways, skies, islands and sea country across Australia. We pay our deepest respects to First Nations cultures and Elders past and present. We endeavour to continually value and learn from First Nations knowledges and educational practices.

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This Review was requested by Education Ministers and commissioned by the Australian Government on behalf of all jurisdictions.

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A key recommendation from *Through Growth to Achievement: Report of the Review to Achieve Excellence in Australian Schools* (sometimes referred to as the Gonski review) was the establishment of a national education evidence body – AERO. The intent was to ensure that all school leaders, teachers and educators have access to the best available evidence and resources and are supported to easily and effectively incorporate them into their practice in schools and early childhood services across Australia.

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About CIRES

The Centre for International Research on Education Systems, located at Victoria University, conducts strategic research that identifies how well education systems work, for whom, and how they can be improved to work well for all. The Centre undertakes large-scale survey and policy-related projects covering every state and territory in Australia and every sector of education and training. It also undertakes international comparative research examining the features and performance of education systems around the world.

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Executive summary

Prepared by the Australian Education Research Organisation

The COVID-19 pandemic demanded a transformation in the delivery of schooling across Australia, comprising a rapid shift to remote and online learning. The extent of remote and online learning over 2020 and 2021 ranged from 6 lockdowns totalling 36 weeks in metropolitan Melbourne, through to Darwin experiencing less than 1 week of remote schooling. While extended lockdowns have not been a feature of 2022, continued COVID-19 outbreaks, workforce pressures and natural disasters (such as major flooding across the eastern states) underscore the continued need for policymakers and schools to understand effective remote and online learning.

The *Review of remote and online learning experiences during COVID-19* (the Review) was commissioned on behalf of all education ministers to synthesise what is known about effective remote learning by taking stock of lessons learned through the COVID-19 period, as well as those gained from earlier, pre-pandemic experiences. The Review was administered by the Australian Education Research Organisation (AERO) and conducted by the Centre for International Research on Education Systems (CIRES) at Victoria University.

The Review sought to identify the effect of, and approaches to, remote and online learning for student cohorts, learning domains and year levels. The Review also examined the efficacy of remote and online learning as compared to face-to-face learning.

Of particular interest were:

- approaches to remote and online learning that are most beneficial for students
- the effect of delivering schooling via remote and online learning on a range of outcomes, including wellbeing and achievement.

An extensive literature review and stakeholder consultations were undertaken as part of the Review. Insights and findings were generated from these activities. When AERO's Standards of evidence¹ were applied, the evidence collected for the Review was found to sit on the continuum between low (Level 1) to medium confidence (Level 2). This means the evidence is not very strong and makes it difficult to conclusively answer the key research questions at the core of the Review.

New research will need to be conducted for systems and schools to better understand how online and remote learning can be most effectively delivered, how it compares to classroom delivery, and the extent to which the answers to these questions vary by student cohort, year level and subject.

¹ <https://www.edresearch.edu.au/using-evidence/standards-evidence>

Effective practices in remote and online learning

Due to an insufficient evidence base, the Review was unable to make confident recommendations about effective practices or approaches to remote learning that could be adopted by systems or schools. The Review was able to collect insights from the pandemic period for consideration in any future crises, or in the delivery of conventional future remote and online learning provision.

System approaches to remote and online learning

The Review found that during the pivot to remote and online learning in 2020, systems had insufficient time to convert and upscale existing distance education materials for more widespread general use. Initially, many schools and teachers were required to make decisions about curriculum and remote teaching in isolation. As systems developed remote learning resources, these became an important support for schools. As such, it may be beneficial for systems to:

- consider maintaining sets of resources and materials adaptable to different modes of remote learning and student contexts
- undertake an audit of curricula to identify learning areas, or elements of learning areas, to prioritise during future crises requiring sharp pivots to remote and online learning.

The Review found that systems with standardised technological infrastructure in place prior to the pandemic were advantaged when transitioning to remote learning, as it enabled them to provide guidance and support more easily.

Systems leveraged existing networks as well as informal arrangements across and within jurisdictions and sectors to facilitate information and resource sharing at different phases of the pandemic. Effective linkages enabled systems and schools to adapt more quickly to remote learning and implement required processes and supports. It would be beneficial for schools and systems to identify existing collaborative arrangements, and address any gaps, to facilitate timely information and resource sharing at the outset of any future crises requiring remote learning.

School and classroom approaches to remote and online learning

The Review found that there was significant variety in the approaches and tools schools used in their transition to remote and online learning during COVID-19. Some of these approaches are somewhat supported by evidence, including:

- adjusting the school timetable (for example, shortening periods, changing the start and end time of the school day, creating new or optional classes) to mitigate online burnout
- teaching self-management and self-regulation strategies, as students who can manage their study time, set goals, and engage in self-evaluation can perform better in online learning
- explicitly structuring online lessons to provide students with the opportunity to interact and socially connect with each other.

Conducting additional research into specific models of remote learning, such as the appropriate mix of synchronous and asynchronous instruction, will enable teachers, school leaders and systems to make more informed decisions in the event of future crises, and improve the quality of standard online and remote schooling provision.

Research opportunity 1: Conduct new research to determine effective remote and online learning practices

The evidence base on remote and online teaching practices is too immature for detailed guidance for teachers to be confidently developed. Conducting new research will enable teachers, schools leaders and systems to make more informed decisions in the event of future crisis situations, and improve the quality of standard online and remote schooling provision.

This research should prioritise evaluations of both widely used and promising online and remote teaching approaches. In particular, the appropriate mix of synchronous and asynchronous delivery for school-aged children should be investigated. Where possible, these should use evaluation techniques that would be classed as High confidence under AERO's Standards of evidence, in order to provide causal evidence on 'what works' in this space. These evaluations should explore whether particular approaches (for example, varying the structure of the school day to suit online and remote provision) have heterogeneous impacts across different student cohorts (for example, English as an Additional Language/Dialect (EAL/D) students, students with disability, at-risk students or those who may disengage or dropout of school) and across different age ranges.

Wellbeing outcomes in remote and online schooling

The Review was only able to find research and data on wellbeing outcomes in remote and online schooling during the COVID-19 pandemic. It found that primary and secondary students reported increased stress and anxiety during the COVID-19 pandemic, but the share of this attributable to the shift to remote and online learning alone cannot be determined.

Beyond students, the Review found that teacher wellbeing also declined during the pandemic, due in part to the sudden shift to remote and online learning, which required teachers to devote significant time to adjusting their pedagogical approaches.

The Review also found that some families felt unprepared and unsupported during the pivot to remote and online learning. Families of students with disability felt particularly unsupported, as they often lost services usually received at school and had to spend more time adjusting learning materials that were not differentiated from those provided to students without disabilities.

Further research could look at the best practice models for how schools can deliver essential wraparound support services to students in times of crisis and as part of conventional remote and online learning.

Research opportunity 2: Improving wellbeing services delivered during remote and online learning

While systems and schools made changes to how mental health and wellbeing services could be accessed by students during remote and online learning, no evaluations of the effectiveness of these arrangements have been undertaken and we do not know whether these additional supports helped to mitigate effects of the COVID-19 pandemic or led to improved student wellbeing. The effectiveness of wellbeing services delivered in a remote and online settings could particularly impact students from disadvantaged families who may be more reliant on services delivered through schools.

A potential avenue for further research is examining best practice models for how schools can deliver essential wraparound support services to students in times of crisis and through periods of conventional remote and online learning. This would include evaluating the transferability of school-based wellbeing supports into the online and remote environment, particularly those that are most critical for students, such as school counselling. This research should provide information to school leaders and school-based services to guide how they deliver these services in future remote and online learning contexts. These evaluations may also provide guidance to systems on whether there is potential to scale up services that can be effectively delivered online. A further consideration would be identifying how services need to be adapted for students at different age levels, EAL/D students, students with disability and their parents and carers.

Academic outcomes in remote and online learning

There is limited pre-pandemic research on the impacts of remote and online learning on academic outcomes. The research that does exist is conflicting, largely due to the specific student cohorts undertaking online and remote learning, which makes designing a fair evaluation challenging. Some studies, such as those covering virtual charter schools in the United States, are also unlikely to have results that are generalisable outside their specific context.

Studies of online and remote learning during the COVID-19 period do not provide a clear assessment of the relative efficacy of online and remote learning. This is because the approach to provision cannot be separated from the concurrent imposition of lockdowns and other restrictions that may impact academic achievement.

International studies generally conclude that students made less progress in remote and online learning conditions than previous non-pandemic years. Australian research is less conclusive:

- Analysis undertaken by the Australian Curriculum, Assessment and Reporting Authority (ACARA) has to date not identified any negative impact on literacy and numeracy outcomes or increases in educational inequality.
- 'Check-in assessments' undertaken in NSW government schools in 2020 found that students fell approximately 3 to 4 months behind in Year 3 reading, and 2 to 3 months behind in Year 5 reading and numeracy, and Year 9 numeracy.
- The Term 4 2021 'Check-in assessments' results were mixed with the expected learning trajectory maintained (or outperformed) for some primary cohorts, while secondary students saw results that were below their expected learning trajectory across both literacy and numeracy.

Research Opportunity 3: Develop a more sophisticated understanding of the impacts of remote and online learning

The Review was unable to find conclusive evidence of the academic impacts of the 2020 to 2021 remote and online learning period, due to limitations in Australian data and research available. Further research is required to understand the broader impacts of this period and target support to address learning loss. Examples of potential research streams that could be explored are listed below.

Conducting a targeted analysis of ACARA's NAPLAN data, with a particular focus on vulnerable student cohorts. This would consist of comparing empirical learning trajectories estimated from using historical NAPLAN data against the data obtained for 2021 and 2022 to start assessing the longer-term impact of the disruption to learning caused by COVID-19. Specifically, this includes contrasting the trajectories of students who may have undergone significant remote learning periods with those of statistically similar students in other jurisdictions that had less strict COVID restrictions

Undertaking a detailed analysis of 2021 Australian Early Development Census data, focusing on the vulnerable young learners, for example, low-socioeconomic status or EAL/D learners to facilitate a better understanding of the differential impact of COVID-19 and associated lockdowns on early childhood development. A more nuanced understanding of the strength and vulnerabilities of this cohort, from the time they enrol in schools, will help systems better evaluate any potential longer-term effect of COVID-19 as well as the effectiveness of any system intervention efforts to help students get back on track.

Additionally, teacher shortages may see systems increasingly having to make decisions on how to deliver secondary schooling (particularly in rural areas for certain subjects) where the ideal scenario, the employment of a suitably trained teacher, cannot be achieved. If both online and remote delivery and in-person provision with an out-of-field teacher are viable alternatives, studies to capture the relative impact of each approach (across achievement and wellbeing outcomes) should be undertaken. These would be compared to face-to-face teaching with a qualified teacher. Such evaluations could also explore whether outcomes differ for online and remote delivery of subjects with practical or applied elements like science, the performing arts and Vocational Education and Training subjects.

Looking forward

The Review found that there were a range of strategies in use during the COVID-19 pandemic. The effectiveness of these in supporting student outcomes in remote learning is unclear, with some research suggesting that student outcomes have declined.

Of particular importance, the Review found the current evidence base on remote and online teaching practices is too immature for detailed guidance for teachers to be confidently developed, or for systems to put in place broader supports (for example, for parents and carers). Further research will enable systems to more confidently plan in the event of future crises and support improved remote and online delivery in conventional use.

Review of remote and online learning experiences during COVID-19

Final report

Prepared for the Australian Education Research Organisation

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Abbreviations

ACT	Australian Capital Territory
ACARA	Australian Curriculum, Assessment and Reporting Authority
AERO	Australian Education Research Organisation
AITSL	Australian Institute for Teaching and School Leadership
AUSLAN	Australian Sign Language
CAD	Computer Aided Design
CALD	Culturally and Linguistically Diverse
CED	Consideration of Educational Disadvantage
EAL/D	English as an Additional Language or Dialect
ESA	Education Services Australia
ICSEA	Index of Community Socio-Educational Advantage
ICT	Information and Communications Technology
FTE	Full Time Equivalent
LBOTE	Language Background Other Than English
LMS	Learning Management System
MAP	Measures of Academic Progress
NAPLAN	National Assessment Program – Literacy and Numeracy
NCEC	National Catholic Education Commission
NILFET	Not in the labour force, education or training
NSW	New South Wales
NT	Northern Territory
OECD	Organisation for Economic Co-operation and Development
PAT	Progressive Achievement Test
SA	South Australia
SEA	Socio-educational advantage
SES	Socio-economic Status
STEAM	Science, Technology, Engineering, Arts and Mathematics
TALIS	Teaching and Learning International Survey
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VCAA	Victorian Curriculum and Assessment Authority
VCAL	Victorian Certificate of Applied Learning
VET	Vocational Education and Training
VRQA	Victorian Registration and Qualifications Authority

Policy Opportunities

Rationale and context	Policy opportunities	Potential outcomes
<i>1. Support the current and future teacher workforce</i>		
<p>The COVID-19 period highlighted the importance of a ‘digital ready’ workforce.</p> <p>Many school systems had challenges in teacher staffing and technological capabilities during the initial stages of the pandemic. Teachers hold various levels of capability in online and remote technologies and pedagogical practice.</p> <p>Upcoming releases of the Australian teacher workforce study will be able to capture the perspective of the current workforce. Future teacher workforce capability is essential too, with ITE courses playing an important preparatory role.</p>	<p>(PO2) Facilitate ongoing professional learning opportunities for teachers and other school staff to ensure that the workforce is ‘digital ready’ and has a knowledge of effective remote and online teaching and learning approaches.</p> <p>(PO3) Examine whether the Australian Standards of Professional Practice appropriately articulates levels of capability in remote and online teaching.</p> <p>(PO4) Investigate the extent to which quality remote and online teaching and learning practices are incorporated into Initial Teacher Education courses.</p> <p>(PO8) Scale up effective online initiatives that provide teachers with ways to collaborate with one another, potentially to assist teachers working in regional/remote areas or out-of-field teaching.</p>	<p>‘Digital ready’ teachers who are equipped with an understanding of best practice in online and remote classrooms may be more likely to deliver quality teaching and learning, leading to improved student achievement and engagement.</p> <p>Teachers who are equipped for online and remote delivery may also experience improved collaboration and overall wellbeing, particularly during any return to online and remote classrooms in the future.</p> <p>Teachers who are experienced in digital tools may be better equipped to support families and their ability to engage with their child’s learning at home.</p>
<i>2. Enhance student wellbeing</i>		
<p>Many approaches were used to monitor and support student wellbeing during COVID-19. However, we do not know whether students felt that their wellbeing was improved as a result of the initiatives brought into schools during recent periods of remote and online learning.</p>	<p>(PO5) Continue to position student wellbeing as a central element of schooling, to be included within system planning and school improvement frameworks.</p> <p>(PO9) Ensure wellbeing-focussed activities and surveys are monitoring the longer-effects of the COVID-19 pandemic.</p>	<p>Schools and education systems that focus on enhanced student wellbeing will have happier students and realise greater student achievement. Wellbeing and achievement are interconnected.</p>

Rationale and context	Policy opportunities	Potential outcomes
<p>There is scope to improve wellbeing programs, particularly for students who are reliant on wraparound wellbeing services provided by schools (e.g. disadvantaged students and families, and students with disability).</p> <p>Students and families will benefit from applying the lessons learned from COVID-19 and continuing to refine and implement beneficial strategies.</p>	<p>(PO10) Evaluate the transferability of school-based wellbeing supports into the online and remote environment and consider whether there is any potential to scale up the ones that were effectively delivered online.</p>	<p>Evidence-based and effective wellbeing focussed activities delivered by schools assist families and improve their wellbeing.</p>
<p><i>3. Strengthen online and remote learning resources and infrastructure</i></p>		
<p>Access to technology and devices is required for online learning, but access can vary across Australian schools due to location and internet access.</p> <p>Each system responded differently to deliver remote and online learning during COVID-19.</p> <p>Planning for future crises that may involve a return to online and remote schooling may limit the negative effects that occurred during the COVID-19 pandemic.</p>	<p>(PO1) Establish, or strengthen existing, consistent ICT infrastructure for students and staff, including device and learning platforms.</p> <p>(PO6) Undertake curriculum planning for future ‘crisis’ events, by identifying content that can be removed while maintaining subject integrity, and adapting aspects of the curriculum which are challenging to deliver online.</p> <p>(PO7) Conduct a critical assessment of the common technological tools purchased by schools and education systems, evaluating their accessibility and impact upon student outcomes.</p>	<p>Schools with robust online and remote learning resources and infrastructure in place can deliver better student achievement and wellbeing outcomes in future crises scenario which may demand a return to online learning. Strong digital programs are also essential for the contemporary ‘onsite’ classroom.</p> <p>Identifying which students were negatively impacted by the shift to online and remote learning, will make it easier to provide targeted support to ensure that any ongoing academic effects can be mitigated.</p> <p>Teacher practice will improve through access to high-quality online and remote learning resources and infrastructure.</p> <p>Family engagement with school may also improve when school systems have consistent and accessible ICT infrastructure.</p>

Research Opportunities

Research opportunity 1: Conduct new research to determine effective remote and online learning practices

The current evidence base on remote and online teaching practices is too immature for detailed guidance for teachers to be confidently developed. Conducting new research will enable teachers, school leaders and systems to make more informed decisions in the event of future crisis situations, and improve the quality of standard online and remote schooling provision.

This research should prioritise evaluations of both widely used and promising online and remote teaching approaches. In particular, the appropriate mix of synchronous and asynchronous delivery for school-aged children should be investigated. Where possible, these should use evaluation techniques that would be classed as High Confidence under AERO's Standards of Evidence, to provide causal evidence on 'what works' in this space. These evaluations should explore whether particular approaches (e.g. varying the structure of the school day to suit online and remote provision) have different impacts across different student cohorts (e.g. English as an Additional Language / Dialect (EAL/D) students, students with disability, at-risk students or those who may disengage or dropout of school) and across different age-ranges.

Research opportunity 2: Improving wellbeing services delivered during remote and online learning

While systems and schools made changes to how mental health and wellbeing services could be accessed by students during remote learning, no evaluations of the effectiveness of these arrangements have been undertaken and we do not know whether these additional supports helped to mitigate effects of the COVID-19 pandemic or led to improved student wellbeing.

The effectiveness of wellbeing services delivered in a remote and online setting could particularly impact students from disadvantaged families who may be more reliant on services delivered through schools.

A potential avenue for further research is examining best practice models for how schools can deliver essential wraparound support services to students in times of crisis and through periods of conventional remote and online learning. This would include evaluating the transferability of school-based wellbeing supports into the online and remote environment, particularly those that are most critical for students such as school counselling.

This research should provide information to school leaders and school-based services to guide how they deliver these services in current and future remote and online learning contexts. These evaluations may also provide guidance to systems on whether there is potential to scale up services that can be effectively delivered online. A further consideration would be identifying how services need to be adapted for students at different age levels, EAL/D students, students with disability and their parents and carers.

Research Opportunity 3: Develop a more sophisticated understanding of the impacts of remote and online learning

The Review was unable to find conclusive evidence of the academic impacts of the 2020-2021 remote and online learning period, due to limitations in Australian data and research available. Further research is required to understand the broader impacts of this period and to target support to address learning loss. Examples of potential research streams that could be explored are:

- Conducting a targeted analysis of ACARA's NAPLAN data, with a particular focus on vulnerable student cohorts. This would consist of comparing empirical learning trajectories estimated from using historical NAPLAN data against the data obtained for 2021 and 2022 to start assessing the longer-term impact of the disruption to learning caused by COVID-19. Specifically, this includes contrasting the trajectories of students who may have undergone significant remote learning periods with those of statistically similar students in other jurisdictions that had less strict COVID restrictions.
- Undertaking a detailed analysis of 2021 AEDC data, focusing on the vulnerable young learners (e.g. low SES or EAL/D learners) to facilitate a better understanding of the differential impact of COVID and associated lockdowns on early childhood development. A more nuanced understanding of the strength and vulnerabilities of this cohort, from the time they enrol in schools, will help systems better evaluate any potential longer-term effect of COVID as well as the effectiveness of any system intervention efforts to help students get back on track.

Additionally, teacher shortages may see systems increasingly having to make decisions on how to deliver secondary schooling (particularly in rural areas for certain subjects) where the employment of a suitably trained teacher, cannot be achieved. If both online or remote delivery, and in-person provision with an out-of-field teacher, are viable alternatives, studies to capture the relative impact (across both achievement and wellbeing outcomes) of each approach should be undertaken. These results would be compared to face-to-face teaching with a qualified teacher. Such evaluations could also explore whether outcomes differ for online and remote delivery of subjects with practical or applied elements like science, the performing arts and Vocational Education and Training subjects.

Summary of findings

Section 2: System approaches for online and remote learning in Australia

1. Schools across Australian jurisdictions were able to rapidly implement remote and online learning, ensuring continuity of schooling for students, although the number and duration of remote learning periods varied markedly across jurisdictions.
2. Systems leveraged existing networks as well as informal arrangements across and within jurisdictions and sectors to facilitate information and resource sharing at different phases of the pandemic. Effective linkages enabled systems and schools to adapt more quickly to remote learning and implement required processes and supports.
3. A key task for systems at the commencement of any remote and online learning period is to ensure all students have access to a digital device and the internet when learning at home, and facilitate provision of these resources to students through schools or other means.
4. Systems with standardised technological infrastructure in place prior to the pandemic were advantaged when transitioning to remote learning.
5. The provision of professional learning and development programs for teachers is critical in ensuring they not only have the technical skills to deliver schooling online, but a deep understanding of effective practice, catering to both blended learning and fully remote settings.
6. An important resource for schools has been remote and online teaching and learning materials developed by systems, which can be easily adapted to school and student context, for remote and blended delivery.
7. Student wellbeing was a key priority for systems and schools during periods of remote learning, indicating the importance of considering student wellbeing alongside teaching and learning in any future crisis events.

Section 3: School and classroom approaches for remote and online delivery

8. Many schools adjusted their timetable (e.g., shortened periods, changed the start and end time of the school day, created new classes or optional classes) during remote and online delivery as a way to mitigate online burnout.
9. There are various technological tools in use within classrooms but only limited robust and independent evaluations concerning which ones improve student outcomes.
10. It is crucial that families can access and understand how to use the school technologies which support remote and online learning, and in some cases schools may need to provide resourcing to help.
11. Provisions for teacher collaboration need to be developed and available to use during periods of remote and online learning.
12. The development of active multichannel communication strategies between schools and families, which are appropriate for context, are important and more likely to increase student engagement during periods of remote and online learning.
13. Learning plans need to be explicitly structured to provide students with the opportunity to interact and socially connect with their peers in the online and remote environment.
14. Sequencing lessons and structuring content is particularly important within an online and remote classroom.

15. Student skills in self-regulation and self-management need to be explicitly taught to build capacity to engage in online and remote learning.
16. Online and remote classrooms provide the opportunity for students to present evidence of learning in different ways (e.g., audio or visual recordings) that may promote greater engagement.

Section 4: Wellbeing during remote and online schooling

17. Primary and secondary students reported increased stress and anxiety during the COVID-19 pandemic, but it is difficult to separate out how much of this is only due to the shift to remote and online learning.
18. Student engagement is different in an online and remote classroom and attendance rates varied across student cohorts.
19. Schools placed an increased focus on student wellbeing during remote and online learning, where many schools considered the importance of wellbeing as equal to literacy, numeracy and other academic outcomes.
20. Teacher workload was increased by the sudden shift to remote and online learning, and many teachers devoted significant time to adjusting their approaches to suit the online classroom.
21. Teacher wellbeing suffered as a result of the pandemic, but also because of the work required due to the shift to online and remote delivery.
22. Families had to support their children in remote and online learning through the pandemic, and some felt unprepared and unsupported to do so.

Section 5: Academic outcomes in remote and online learning

23. Pre-COVID-19 evaluations of virtual schools in the United States found that students achieved less learning growth and lower on-time graduation rates than those in traditional classrooms. Other international research also found that students learning online achieved less than matched students in previous years.
24. While NAPLAN data shows no major changes in student learning achievement in reading and numeracy across states and territories, analyses of other data sources such as 'Check-in assessments' in NSW highlight that secondary students may have been negatively impacted by remote and online learning.
25. Some early evidence suggests that particular cohorts of students may be more negatively impacted by remote and online learning. One study based on Progressive Achievement Tests¹ (PATs) showed that Year 3 students from low SES backgrounds achieved less learning growth than their peers from high SES backgrounds.
26. ACARA data highlight no differences in certification rates in jurisdictions that experienced the longest periods of remote and online learning such as Victoria and NSW.
27. Relative to previous years, in 2021, more Victorian Year 12 completers and school leavers enrolled in vocational training and higher education, rather than taking up employment.

1 PATs measure a range of key learning areas and are used by half of Australian schools. See <https://www.acer.org/au/pat/assessments> for more information.

1. Introduction

Background of review

The Review of remote and online learning (the Review) was commissioned by the Australian Government on behalf of all Education Ministers. The Review was administered by the Australian Education Research Organisation (AERO) and conducted by the Centre for International Research on Education Systems (CIRES) at Victoria University.

The purpose of the Review is to identify policy insights to inform the future delivery of remote and online learning in Australian schools. These insights are expected to be relevant to the delivery of schooling during future crises events, and/or conventional schooling. A particular area of interest is the application of digital technology and online learning to enhance options for education delivery.

The Review follows the application of remote and online learning across Australia during 2020 and 2021 due to the COVID-19 pandemic, yet does not take COVID-19 as the starting point. Many education systems, both in Australia and internationally, delivered remote and online learning in a hybrid arrangement prior to COVID-19. This saw some subjects being offered to students via remote and online learning (e.g., through distance education), or selected students accessing a full learning program of remote and online learning.

The COVID-19 pandemic occurred suddenly and became an important phenomenon for schools and education systems as they bore the impact of lockdown restrictions. Many schools across Australia transitioned almost overnight from face-to-face classroom practice into a fully remote and online delivery model for most students. The quantity and nature of the research undertaken during COVID-19 is mixed. This is in large part due to state and territory education departments limiting the capacity for research to be undertaken in schools during this time.

Research questions guiding the Review

The Review was guided by two key research questions:

1. What has been the effect of delivering schooling via remote and online learning on a range of outcomes, including achievement and wellbeing?
2. What approaches to remote and online learning are most beneficial for students?

The Review also sought to address three sub-questions:

- How does the effect of remote and online learning vary at a cohort level?
- Does the effect of remote and online learning vary according to:
 - learning domain or subject area?
 - year level or phase of schooling?

Defining remote and online learning

For the purposes of the Review, 'remote' learning comprises programs of learning operating independently from 'on-site' classrooms. 'Online' learning comprises teaching and learning centred on digital tools. Much, but not all, of the 'remote' learning during the COVID-19 pandemic was online.

The Review's methodology and the approach undertaken to determine rigorous and relevant evidence is in Appendix A.

2. System approaches for online and remote learning in Australia

Section 2 Findings

1. Schools across Australian jurisdictions were able to rapidly implement remote and online learning, ensuring continuity of schooling for students, although the number and duration of remote learning periods varied markedly across jurisdictions.
2. Systems leveraged existing networks as well as informal arrangements across and within jurisdictions and sectors to facilitate information and resource sharing at different phases of the pandemic. Effective linkages enabled systems and schools to adapt more quickly to remote learning and implement required processes and supports.
3. A key task for systems at the commencement of any remote and online learning period is to ensure all students have access to a digital device and the internet when learning at home, and facilitate provision of these resources to students through schools or other means.
4. Systems with standardised technological infrastructure in place prior to the pandemic were advantaged when transitioning to remote learning.
5. The provision of professional learning and development programs for teachers is critical in ensuring they not only have the technical skills to deliver schooling online, but a deep understanding of effective practice, catering to both blended learning and fully remote settings.
6. An important resource for schools has been remote and online teaching and learning materials developed by systems, which can be easily adapted to school and student context, for remote and blended delivery.
7. Student wellbeing was a key priority for systems and schools during periods of remote learning, indicating the importance of considering student wellbeing alongside teaching and learning in any future crisis events.

The COVID-19 pandemic necessitated a large-scale systemic response within jurisdictional education departments and school sectors. This response supported the rapid shift to remote and online learning implemented across communities to ensure the continuity of learning for school students during periods of social distancing.

The context for remote and online learning in Australia

Distance Education: remote learning in Australia prior to COVID-19

For decades, distance education has been central to providing schooling to children and young people in isolated regional areas, supporting communication and interaction between these students, and a community capacity building role across dispersed populations (Stacey & Visser, 2005; Halsey, 2018).

Prior to the COVID-19 pandemic, remote and online learning was used for a range of purposes across Australia, including:

- the main form of school provision in rural and remote areas
- curriculum expansion for one or more subjects for both metropolitan and regional students, to complement what is available on-site at school
- providing access to school for students who are travelling
- where schools have been affected by natural disasters.

Further information on the history and current provision of distance and virtual schooling in Australia is provided in Appendix D.

School educational response to COVID-19 in Australia

Lockdowns and social distancing measures occurred from March 2020 across many Australian communities. In response, schools in most jurisdictions ceased face-to-face learning by the end of Term 1 in 2020 in an attempt to slow and stop the spread of COVID-19. The number and duration of remote and online learning periods across 2020 and 2021 varied markedly across areas, ranging from less than a week in Darwin to 36 weeks in Melbourne, as shown below in Table 2-1. Further information regarding the timeline of remote and online learning periods across Australia is provided in Appendix E.

Table 2-1 Duration of remote learning across states and territories 2020–2021

State / territory	2020				2021				Total
	T1	T2	T3	T4	T1	T2	T3	T4	
New South Wales (Greater Sydney, Central Coast and Illawarra)	3	4					10	3	20
New South Wales (Regional*)							3-7	1-3	4-10
Victoria (Metro Melbourne and Mitchell Shire)	1	8	9	3	2	2	11		36
Victoria (Regional)			9	1	1	1	11		23
Queensland (Brisbane and South East)	1	5			<1		1		7.5
Queensland (Cairns)	1	5					<1		6.5
Queensland (Remainder)	1	5							6
Western Australia		3							3
South Australia	1			<1				1	2.5
Tasmania		6							6
Australian Capital Territory	3	5					5	3	16
Northern Territory (Darwin)							<1		<1
Northern Territory (Katherine)							1	2	3

Source: ACARA, 2020b. *Regional New South Wales lockdown periods varied across local government areas.

The educational response to COVID-19 can be classified into four phases (see Figure 2-1). States and territories with prolonged lockdowns and remote and online learning periods experienced multiple phases.

Figure 2-1 Phases of the school education response to COVID-19



Source: Adapted from Barbour et al. (2020).

Phase 1: Rapid transition to remote and online learning

Phase 1 captures the start of the pandemic, where schools undertook emergency remote and online learning. Although findings from consultations with government school systems, non-government school peak bodies, and other education organisations indicate that schools were able to quickly implement remote learning, the rapid transition within a period of weeks meant that schools and teachers had little time to prepare for this full delivery of online learning.

Emergency remote teaching, defined as ‘a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances’ (Barbour et al., 2020) is distinct from ordinary online teaching and learning, in which virtual experiences and online instruction have been planned from the beginning (Affouneh, Salha, & Khlaif, 2020; Barbour et al., 2020). Enacting emergency remote teaching therefore places increased stress and a challenging workload burden on the teaching workforce. Beginning teachers for example, may already experience challenges in adjusting to aspects of the profession and have been reported to have experienced greater challenges in an emergency situation such as COVID-19 (Anderson et al., 2008).

The rapid transition to remote and online learning from March 2020 meant this initial phase was typically unable to draw on the evidence developed within pre-existing programs of remote and online delivery, such as Schools of the Air or distance education / virtual schools. Issues such as platform access meant that stakeholders were for the most part not able to easily scale up these existing models to meet the requirements for universal online learning. However, it was noted in some jurisdictions that materials already developed for remote and online learning were able to be applied or used as a basis for teaching and learning materials.

Phase 2: Recalibrated remote and online delivery; and Phase 3: Extended transition during continued turmoil

Phase 2 saw systems and schools more fully address the question of quality in their remote and online delivery. This included making adjustments for more equitable access, good practice, and providing additional supports for students (Barbour et al., 2020). In Phase 3, delivery of remote and online learning extended to periods of up to full terms in some jurisdictions, while also navigating staged returns to more traditional face-to-face education delivery or blended learning, as health restrictions allowed.

Evidence from consultations identified that many schools and teachers advanced their understanding and application of remote and online learning during 2020 and 2021 (Phases 2 and 3). Departmental staff spoke of the teaching workforce gaining skills and confidence in this area, regardless of their initial level of expertise. At the same time, the challenges associated with consistently delivering teaching and learning in an online environment during persistent lockdowns intensified, leading to variability in schooling experiences.

Phase 4: Emerging new normal

The final transition to a 'new normal' reflects the mid-2022 context in which schools have formally returned on-site, but also operate with a 'blended' model to cater for high rates of teacher and student absenteeism. The impact of extreme weather events, including flooding and bushfires, will further necessitate the continuation of online teaching and learning in some form into the future.

Ongoing challenges will include a reduced in-person connection between families and schools due to restrictions relating to on-site attendance; students returning to schools at different levels of learning; students transitioning to more structured environments than was potentially available during the remote learning period; and schools requiring higher levels of technology and teacher skill capability than pre-pandemic times to reliably support students within these learning environments.

Findings

1. Schools across Australian jurisdictions were able to rapidly implement remote and online learning, ensuring continuity of schooling for students, although the number and duration of remote learning periods varied markedly across jurisdictions.

System approaches to support remote and online learning

System level approaches comprise actions implemented across multiple schools within a school system. These system level actions have been identified in the stakeholder consultations and through departmental and sector documents supplied to the Review research team. System-level supports include the following:

- facilitating increased collaboration
- ensuring provision of technology
- enabling teacher professional learning and development
- developing teaching and learning materials aligning with the curriculum
- ensuring provision of wellbeing supports to students
- providing additional supports for different student cohorts
- providing guidance on senior secondary curriculum coverage and assessment
- developing a framework for minimum expectations during remote and online learning.

While it is important to note that evaluations of the system supports presented here have not yet been undertaken, they do provide insights into the resources required to support

the delivery of remote and online learning (both fully remote and blended) and inform the planning and preparation for future crisis events. Specific examples of the approaches used in different jurisdictions are provided in Appendix F.

Facilitating increased collaboration

Collaboration between jurisdictions and school sectors during the COVID-19 pandemic included sharing expertise and promoting wider accessibility of online resources. This included the use of existing teaching and learning networks to identify successful practices at the local level, which were then shared between schools. Virtual networks were also used to link up teachers across schools, such as via state-wide virtual staffrooms. These collaborative efforts were regarded positively by stakeholders, providing both mutual support for jurisdictions going through multiple lockdowns, and opportunities for those with fewer incidences of system-wide remote schooling to learn from the experiences of others.

Case study: Statewide virtual staffrooms, NSW Department of Education

In NSW, the Department of Education implemented statewide virtual staffrooms to allow for the sharing of teaching strategies, materials and ideas across schools, with up to 5,000 teachers in each staffroom. Using Microsoft Teams, around 25 separate staffrooms are available for primary teachers in different locations (metropolitan, regional, rural), secondary teachers across different key learning areas, and staff working in other areas, including literacy, numeracy, disability support, careers and transition, Aboriginal education and student wellbeing.

Based on these experiences, it would be beneficial for systems to identify existing collaborative arrangements, as well as any gaps, to facilitate timely information and resource sharing across jurisdictions and sectors at the outset of any future crisis events requiring remote learning.

Findings

2. Systems leveraged existing networks as well as informal arrangements across and within jurisdictions and sectors to facilitate information and resource sharing at different phases of the pandemic. Effective linkages enabled systems and schools to adapt more quickly to remote learning and implement required processes and supports.

Ensuring provision of technology

A key and immediate challenge during the first phase of remote and online learning was student access to technology, including a lack of one-on-one devices and internet access at home. Jurisdictional and sectoral education departments addressed this as part of their initial emergency response, in recognition of the inability of students to participate in online learning without these provisions. Interviewees viewed digital access as an equity issue, with students from disadvantaged families more likely to be without devices or internet access at home than their more advantaged peers. In response, laptops were sourced and supplied to students at a school level, along with dongles providing internet access. In some jurisdictions, particularly in

disadvantaged communities, this was aided by partnerships with private businesses donating their services.

Some education systems already had consistent technological infrastructure and digital supports in place prior to the COVID-19 pandemic. Jurisdictions with existing system-wide devices and learning management systems (LMS) felt they were at an advantage when moving quickly to remote learning. In some other sectors and jurisdictions, the implementation of a system-wide LMS has been fast tracked as a priority action since the pandemic. Boosting bandwidth is also a key consideration in many jurisdictions, in acknowledgement of the importance of providing schools and students with reliable and fit-for-purpose internet access regardless of location.

Other technology supports were also required during this period, such as the purchase of additional whole-of-site software licences for different packages and increased web-filtering, which are programs that block certain websites. While web-filtering at a school-level was seen to be adequate prior to COVID-19, some systems implemented web-filtering at device-level when students moved to home learning to increase protection against potential network or safety threats.

In the event of future periods of remote and online learning, it will be important for systems to ensure equitable access to technology and supporting infrastructure for students and teachers, as well as the provision of sufficient safety and privacy protocols.

Findings

3. A key task for systems at the commencement of any remote and online learning period is to ensure that all students have access to a digital device and the internet when learning at home, and facilitate provision of these resources to students through schools or other means.
4. Systems with standardised technological infrastructure in place prior to the pandemic were advantaged when transitioning to remote learning.

Enabling teacher professional learning and development

While the Australian Standards of Professional Practice 2.6 details levels of expected teacher knowledge of ICT, the minimum level of capability in online teaching required in modern classrooms remains unclear. This posed a challenge for systems and schools at the outset of the remote learning period, when teachers were required to rapidly change practice to deliver education in an online teaching environment despite large variation in teacher skills, capacities, and experiences. It was consistently noted in the consultations that teaching online requires a unique skill set, and even the most experienced of teachers need to be learning new skills for online delivery.

All systems provided professional learning and development to support teacher digital uptake, rapidly delivered in the first instance, and then as an ongoing activity. For states experiencing longer and more frequent lockdowns, professional development had two main phases. The first phase focused on the mechanics of teaching online, that is, how to

get started, operate the videoconferencing platform, access the LMS, and communicate with school staff and students. The second phase focused on developing a sophisticated understanding of how to deliver high-quality content using best practice pedagogy in an online environment.

According to stakeholders, teachers have improved their capabilities in digital teaching and progressed their knowledge of online learning compared to prior to the COVID-19 pandemic. These views are supported by teachers, with survey results reporting markedly improved levels of confidence in ability to teach using remote delivery formats across lockdown periods (Catholic Education Melbourne, 2021). Teachers in NSW were in strong agreement that the upskilling of teachers in digital and online education was a positive outcome of the pandemic (Wilson et al., 2020).

Skills developed during the pandemic have continued to be utilised by teachers in the return to on-site learning. It will be useful for systems and schools to maintain the currency and availability of professional learning materials and opportunities, ensuring they are based on evidence of effective practices that will continue to support online, remote, hybrid and face-to-face learning modes.

Findings

5. The provision of professional learning and development programs for teachers is critical in ensuring they not only have the technical skills to deliver schooling online, but a deep understanding of effective practice, catering to both blended learning and fully remote settings.

Developing remote and online teaching and learning materials aligning with the curriculum

A key activity undertaken by systems since the commencement of the pandemic has been the creation of remote and online teaching and learning materials aligned to the Australian Curriculum. These include digital and printable units, often accessible to school staff through an online portal.

Typically, materials include lesson packs in the online environment that can be modified for student and school context. Some of the early resources were 'stop gaps' or starting points for schools and teachers needing assistance to adapt to remote and online learning for the first time. Different jurisdictions spoke about the varying quality of these materials and their use by teachers, with some seen as placing too much reliance on parental participation in daily learning.

More sophisticated materials were developed by systems as lockdowns continued. These included online packages of lessons across key learning areas and stages of schooling, which allowed teachers to easily modify sections and send via the LMS to students to differentiate teaching and learning within a single class. Anecdotal evidence from consultations suggests many of these tools are continuing to be used during face-to-face teaching, with successful adaptation to blended learning and teaching modes.

Case study: ‘learning@home TV’ using TV for remote and online learning, Queensland Department of Education

During remote and online learning periods in 2020, the Queensland Department of Education partnered with commercial TV networks to broadcast school programs to students at home. ‘Learning@home TV’ was broadcast free-to-air and provided an alternative way for students – especially those with limited access to digital devices and the internet – to participate in teaching and learning. It was implemented in conjunction with other streams of remote and online schooling.

Programs included teaching and learning segments for K–10 mathematics, English and science, and physical activity Brain Breaks and First Nations My Place segments to support students’ wellbeing. The programs are also available through the learning@home website with over 150,000 page views as of November 2022.

Hardcopy or printable materials were also prepared for schools by systems across states and territories. Early years students were a key target group, as well as schools that had not previously engaged with digital learning, and those experiencing issues connecting with and accessing technology such as schools located in remote communities. It was reported that the hard copy resources developed during the pandemic have since been used during times of natural disasters, such as for delivery to schools in areas experiencing bushfires and cyclones. It would be beneficial for systems and schools to consider maintaining sets of resources and materials adaptable to different modes of remote learning and student contexts.

Findings

6. An important resource for schools has been remote and online teaching and learning materials developed by systems, which can be easily adapted to school and student context, for remote and blended delivery.

Ensuring provision of wellbeing supports to students

Wellbeing is recognised by systems as critical to student health and learning, both prior to, and during the pandemic. Across several states and territories, systems provided recommendations and directives to schools indicating that student mental health and wellbeing was the number one priority during the period of remote learning. As outlined in Section 4 of this report, numerous studies have shown that the pandemic has a significant effect on school students and young people more broadly.

In some cases, it was a matter of systems adapting existing, on-site mental health and wellbeing supports to the online environment. Other new initiatives were also implemented. Systems provided a comprehensive set of student wellbeing resources during periods of remote and online learning, including:

- online planning tools to help school staff identify vulnerable students in the remote learning environment
- counselling services to students, while ensuring that school staff were aware of any differences in the referral processes during remote learning periods compared to when on-site
- online information about ways to seek help for mental illness and depression, with links and resources made available to students, staff, and parents
- further information to parents and carers and teachers on how they could best support their child, including conversation starters
- additional outreach support provided to schools by area-based experts, focusing on students with mental health concerns and those at high risk of disengagement
- mental health practitioners and departmental health, wellbeing, and inclusion workforces adapting to remote delivery where required
- increased professional learning for school staff on mental health and wellbeing, including child safety information sessions
- a greater focus on wellbeing within system school improvement and reporting frameworks

Across the school sectors, widespread use of digital wellbeing checks provided ongoing monitoring of student wellbeing. This varied from fortnightly, to weekly, to daily check-ins, with some students even undertaking check-ins at the end of each learning task or digital pack. Some digital wellbeing check-in programs such as Ei Pulse gave students the ability to flag when they needed help, and provided connection with a nominated teacher. This platform was used in around 70 schools across Australia, with the earliest adopters being schools in the non-government sector (Barker, Thurbon & Goodhue, 2021).

Systems also released schools from non-essential administrative tasks to help relieve the increased workload for principals and teachers. This included allowing only minimal research and evaluation in schools, which would ordinarily involve surveys or interviews with students and staff. Departments were flexible with deadlines occurring as part of the regular reporting cycle, and workload was also reduced through the cancellation of NAPLAN in 2020.

Stakeholders spoke about the significance of the greater awareness and knowledge of wellbeing across school communities, and the importance of this focus continuing as students returned to the classroom. These experiences suggest that it would be beneficial for systems and schools to ensure there are mechanisms in place to effectively monitor the wellbeing of students undertaking remote and online learning.

Findings

7. Student wellbeing was a key priority for systems and schools during periods of remote learning, indicating the importance of considering student wellbeing alongside teaching and learning in any future crisis events

Providing additional supports for different student cohorts

It was acknowledged in consultations that additional supports were required for some groups of students to allow full participation during periods of remote and online learning. The key response from systems was to keep schools open for children identified as vulnerable and children of essential workers. In some jurisdictions this comprised all schools, while in others a selection of schools remained open, such as specialist schools. Supports were revised as increased student need became apparent, such as in Melbourne, where changes were made following the initial remote learning periods to allow children with a disability to learn on-site where the family was experiencing severe stress.

Other common supports across systems included providing teachers with information on inclusive online teaching practices and adjustments for different contexts and student cohorts. Where possible, individual learning plans continued to be used, and support was provided for teachers to change individual learning plans for students requiring additional adjustments for learning at home. Challenges emerged where individual learning plans had not yet been put in place for the school year prior to the initial lockdown, and for some students these were not able to be established during this time. Jurisdictions with ongoing periods of remote learning subsequently prioritised the implementation and maintenance of student individual learning plans (Parliamentary Secretary for Schools, 2020).

In some systems, expanded interpreting and translation services were provided for students from EAL/D backgrounds, including for online materials. In some schools, staff who were ordinarily available on-site, such as Education Support staff or EAL/D teachers, continued to support students online. In states and territories with prolonged periods of remote and online learning, regular contact with Culturally and Linguistically Diverse (CALD) families and Indigenous communities was established either daily or weekly. Indigenous Assistants were available in some areas to support students to engage with learning, and to successfully re-engage on return to school.

Systems continue to draw on lessons from COVID-19 to further improve supports for different cohorts during remote, online and blended learning, including through active collaboration with internal diversity and inclusion teams. Ongoing evaluation of this work would be useful to confirm effective approaches and to identify improvements that can be made.

Providing guidance on curriculum coverage and senior secondary assessment

The restrictions in place due to COVID-19 and the subsequent pivot to remote and online schooling meant there were interruptions to the planned curriculum coverage at all year levels, and more so in jurisdictions with multiple lockdowns. At the senior secondary level in particular, assessments were also affected. Education departments, curriculum and assessment authorities, and qualification regulators worked together to mitigate the impacts for students of these interruptions, and to help maintain continuity of learning and assessment across the school year.

An important consideration for systems was truncating the curriculum at senior secondary level, especially in jurisdictions where students faced lengthy periods of remote and online

learning. This was necessary to ensure that students with greater interruptions to schooling due to the pandemic were not disadvantaged. Adjustments were required to examination and assessment content to reflect any changes in study design. Programs of special consideration, which adjusted individual assessment scores for students experiencing disruptions to learning due to the pandemic, were adopted across jurisdictions.

Reviews of study designs undertaken regularly by state curriculum authorities and boards of studies provide opportunities to plan for future periods of remote and online learning, whether due to pandemics or natural disasters. The identification of any content that can be abridged or removed without undermining subject integrity, alongside identifying aspects of the curriculum which are most challenging to deliver online (e.g., practical components), and those more easily adapted, will contribute to ongoing preparedness. As such, it may be beneficial for school systems to undertake an audit of curricula to identify learning areas, or elements of learning areas, to be prioritised during future crisis situations requiring sharp pivots to remote and online learning.

Case study: reduced curriculum coverage and adjusted assessments, Victoria

In Victoria, the Victorian Curriculum and Assessment Authority (VCAA) liaised with the Department of Education and Training and the Victorian Registration and Qualifications Authority (VRQA) to provide schools with guidance on curriculum coverage and assessment.

The VCAA adjusted study designs to remove content at the Units 3/4 level (usually Year 12 subjects), as these units have external assessment components, and any changes need to be clearly articulated. These modifications took into account the integrative nature of the study designs and kept the integrity of the study by staying as close as possible to the original learning intentions. Studies were also adjusted to account for limitations in undertaking practical components.

The VCAA also provided guidance and support to schools regarding internal assessments, including how they could ensure authentication of work and submissions of assessments, or the number of different ways a school might deliver an assessment online, or wait until students returned to school. There were some arrangements made with the Department of Health where small groups of students could attend school for practical studies that required in-person access to resources and to teachers.

Providing a framework for minimum standards of delivery during remote and online learning

Prior to the COVID-19 pandemic, school systems did not need to contend with minimum standards for remote and online learning outside of virtual or distance schools. However, throughout the pandemic, systems continued to provide guidance to schools. In some states this included minimum standards or expectations for teaching and learning during remote learning periods. In some jurisdictions, such as Victoria and Queensland, these included daily minimum durations for students to undertake learning across different subject areas, focusing on literacy, numeracy, physical education, and wellbeing (see Table 2-2).

Table 2-2 Daily minimum guidelines during remote learning, minutes, Queensland and Victoria, 2020

	Prep-Year 2	Years 3-6	Years 7-10
<i>Queensland</i>			
English/literacy	45-60	45-60	60-70
Maths/numeracy	30-45	30-45	45-60
Science	30	30	30
Physical Education/Health	}	30	30
Other areas	} 30	40	40
<i>Victoria</i>			
English/literacy	45-60	45-60	60-70
Maths/numeracy	30-45	30-45	45-60
Physical activities	}	30	30
Other areas	} 30-45	90	90

Source: Data for Queensland from Department of Education (2020b); Data for Victoria from Department of Education and Training (2020).

In other states, the advice covered a broader set of topics. NSW developed a set of minimum expectations for schools required to revert to remote and online learning in 2022. These included:

- ensuring continuity of learning for students, by continuing learning sequences incorporating digital learning
- connecting with students by using video/web conferencing daily, and ideally delivering regularly scheduled lessons live to enable explicit teaching, assessment, and student feedback
- facilitating teacher participation in professional learning to support teachers in delivering schooling online
- monitoring and recording student attendance during remote learning
- accessing departmental provided devices, internet, and collaboration tools (NSW Department of Education, 2022b).

The expectations around the application of these guidelines over varying durations of remote learning are also provided, as well as for when students are learning at home with no teacher.

Based on these experiences, it may be beneficial for systems to maintain guidance for schools on minimum expectations to be enacted during periods of remote and online learning.

Conclusion

The experience of remote and online learning during the pandemic varied across jurisdictions, in part due to differences in both the number and duration of lockdown periods, which ranged from just a couple of weeks to over eight months in total. These varying durations shaped system responses to remote and online learning, as the supports required evolved over time.

The initial focus of systems in the rapid pivot to remote and online learning was on providing technology to disadvantaged students who had no device or internet access available at home. There was insufficient time to convert and upscale existing distance education materials for more widespread general use. The teaching and learning materials that were developed, and the professional development provided for teachers, had a limited focus on the immediate transition to online delivery. It was only as the periods of remote and online learning continued that these became necessarily more sophisticated. As time progressed, the focus shifted toward being better able to engage students in their learning, and to account for differentiated learning needs. Supports extended beyond teaching and learning to include student wellbeing and assessment.

As schools face new challenges in the blended learning environment, and teacher shortages continue through 2022, research into and evaluation of the effectiveness of systemic supports for remote and online learning have yet to be undertaken. Greater understanding of system approaches will lead to improvements in the delivery of remote and online learning across all jurisdictions, and better preparedness for future crisis events.

Section 2 policy opportunities

(PO1) Establish, or strengthen existing, consistent ICT infrastructure for students and staff, including device and learning platforms.

(PO2) Facilitate ongoing professional learning opportunities for teachers and other school staff to ensure that the workforce is 'digital ready' and has a knowledge of effective remote and online teaching and learning approaches.

(PO3) Examine whether the Australian Standards of Professional Practice appropriately articulates levels of capability in remote and online teaching.

(PO4) Investigate the extent to which quality remote and online teaching and learning practices are incorporated into Initial Teachers Education courses.

(PO5) Continue to position student wellbeing as a central element of schooling, to be included within system planning and school improvement frameworks.

(PO6) Undertake curriculum planning for future 'crisis' events, by identifying content that can be removed while maintaining subject integrity and adapting aspects of the curriculum which are challenging to deliver online.

3. School and classroom approaches for remote and online delivery

Section 3 Findings

8. Many schools adjusted their timetable (e.g., shortened periods, changed the start and end time of the school day, created new classes or optional classes) during remote and online delivery as a way to mitigate online burnout.
9. There are various technological tools in use within classrooms but only limited robust and independent evaluations concerning which ones improve student outcomes.
10. It is crucial that families can access and understand how to use the school technologies which support remote and online learning, and in some cases schools may need to provide resourcing to help.
11. Provisions for teacher collaboration need to be developed and available to use during periods of remote and online learning.
12. The development of active multichannel communication strategies between schools and families, which are appropriate for context, are important and more likely to increase student engagement during periods of remote and online learning.
13. Learning plans need to be explicitly structured to provide students with the opportunity to interact and socially connect with their peers in the online and remote environment.
14. Sequencing lessons and structuring content is particularly important within an online and remote classroom.
15. Student skills in self-regulation and self-management need to be explicitly taught to build capacity to engage in online and remote learning.
16. Online and remote classrooms provide the opportunity for students to present evidence of learning in different ways (e.g., audio or visual recordings) that may promote greater engagement.

This chapter summarises various approaches to remote and online education delivery that work well, as reflected in pre-pandemic international and Australian literature, studies conducted amidst the pandemic, and stakeholder consultations.

School-level approaches include actions strengthening and supporting quality teaching and learning in remote and online environments. Classroom level approaches include effective teaching and learning practices in the virtual 'classroom' or how technologies can be used by teachers to engage students in remote and online learning.

Table 3-1 shows each school-level and classroom-level approach, alongside the level of reliability of evidence describing each strategy.

Table 3-1 School-level and classroom-level approaches for remote and online learning

Evidence-informed approach	Reliability ^a
<i>School-level approaches</i>	
Changing the structure of the school day to suit online provision	●
Using high-quality technological tools that support student learning	●
Integrating digital technologies within school communities	●
Providing opportunities for teachers to collaborate and support one another during online and remote delivery	●
Developing various communication channels with families through periods of online and remote delivery	●
<i>Classroom-level approaches</i>	
Providing opportunities for students to interact with their peers in the online classroom	●
Facilitating teacher-student communication through digital technologies	●
Adopting learning plans designed for remote and online delivery	●
Varying teaching pedagogies to promote student engagement in remote and online delivery	●
Supporting students to work independently at home	●
Providing appropriate assessment and feedback in the online classroom	●
Adapting practical subject areas to the online learning environment	●

Notes: ^a Reliability determined by AERO framework (2021). The rating is a summative estimate of the overall identified literature and determined by at least one document meeting the requirements of the higher evidence threshold.

Evidence reliability key: ● = low confidence ● = medium confidence.

It should be noted that there is limited evidence linking specific remote and online learning approaches to improved student learning, including achievement or engagement outcomes. Similarly, there is limited research meeting the minimum evidence requirements for approaches to remote and online learning in primary or secondary schooling for different cohorts, including students with a disability, Indigenous students, or EAL/D students. A broader discussion concerning the reliability of research evidence can be found in Appendix G.

School-level approaches

Changing the structure of the school day to suit online provision

Remote and online education can provide students with ‘control, choice and ownership’ in their learning (Bartley et al., 2018; Louwrens & Harnett, 2015). To do this, remote and online learning needs to have appropriate structure and be designed in ways that are different to regular ‘on site’ school (Bartley et al., 2018; Louwrens & Harnett, 2015). The organisation

of remote and online learning is particularly vital for younger students who ‘benefit from predictability and regularity of learning content and activities’ (Liao et al., 2021).

Evidence collated by the Review through the consultations and the literature search shows that as the lockdowns continued in certain jurisdictions, some schools altered their timetables by adjusting lesson times, and others delayed the start of school (DET, 2022b; Kearney et al., 2021; Learning First, 2020). Some Victorian government and Catholic schools adjusted their school day to have shortened periods (Learning First, 2020).

To mitigate student ‘online burnout’, schools took different approaches to the length of time they expected students to remain ‘logged on’ for remote and online delivery (DET, 2022b; Kearney et al., 2021). Some schools moved to provide optional classes, rather than traditional timetabling where students are expected to be present for the whole day (QDOS, 2020). As an approach, this was particularly valued by senior secondary students (Yates, Starkey, Egerton & Flueggen, 2020). Other schools created entirely new timetabled sessions during the period of online and remote learning, such as check-in or support classes.

Case study: changing the school day for online provision, Victoria

Kunyang Primary School expected their students to remain online all day, although their school day was shortened to commence at 9:30am and finish at 2:30pm. In contrast, students at Mount Waverley North Primary School were required to only log in at the start of the day for a roll call, one minute of physical movement at home undertaken together as a class, and a wellbeing check-a process which was repeated at the end of the day. During the rest of the day students were expected to follow a learning plan, but they did not need to remain logged in (DET, 2022b).

Findings

8. Many schools adjusted their timetable (e.g., shortened periods, changed the start and end time of the school day, created new classes or optional classes) during remote and online delivery as a way to mitigate online burnout.

Using high-quality technological tools that support student learning

The use of high-quality and accessible technological tools contributes to student engagement in the remote and online learning environment (Flack, Walker, Bickerstaff, Earle & Margetts, 2020). Schools across Australian jurisdictions have varying degrees of autonomy concerning the technologies they use in their classrooms. Findings from a survey of Australian and New Zealand teachers reported over 140 different technological tools used across their classrooms, implying a high degree of differentiation between schools (Flack et al., 2020).

With the abundance of technological tools available, consideration needs to be given to how technology can improve learning, align to the curriculum, and strengthen teacher pedagogies – rather than serve as entertainment or function to deliver ‘busy work’ (DiPietro et al., 2008). This can be difficult when teachers are experiencing work pressures, the evidence base is limited, and independent evaluations have struggled to keep up with the rapid pace of

technological evolution. Schools also need to ensure that digital tools used in classrooms are age-appropriate, particularly for younger students who are building their digital skills (Darragh & Franke, 2020; Liao, et al., 2021). In addition to this, schools also need to guarantee the security and privacy of students when they use digital educational tools in classrooms. One way that they are supported to do this is through the Safer Technologies 4 Schools initiative, which provides information to schools concerning the compliance and safety of digital products (ESA, 2022).

Findings

9. There are various technological tools in use within classrooms but only limited robust and independent evaluations concerning which ones improve student outcomes.

Integrating digital technologies within school communities

The pandemic was a catalyst for many schools to expand their application of digital technologies (Kearney et al., 2021). Victorian schools that did better with the shift to remote and online learning either minimised the introduction of new technologies or they already had strong technological programs in place (QDOS, 2020). Digital integration challenges reported by schools included limited hardware availability, poor access to the internet and low computer literacy within families, which were more pronounced in disadvantaged schools (QDOS, 2020). Ensuring that families were able to understand the technologies in place to support remote and online learning and teaching was seen as crucial. Some schools had to provide resourcing to help. One example is Frankston Primary School in Victoria that released their school administrative staff to provide support for families with technological issues (DET, 2022b).

A research study used regression modelling to establish a positive relationship between student engagement and the extent to which schools in England used virtual learning environments (e.g., integrated web-based Learning Management Systems) (Lucas, Nelson & Sims, 2020). Schools that were using digital technologies routinely had higher levels of student engagement than schools that were only using their website to provide information about learning activities (Lucas, Nelson & Sims, 2020). This study also found that schools which were unable to rely exclusively on their virtual environments or LMS were often located in deprived areas. Schools that worked with disadvantaged communities often had to instigate more labour-intensive methods to communicate with parents, such as telephone and video calls home, staff deliveries and visits to homes (Lucas, Nelson & Sims, 2020). This shows that despite schools using integrated digital technologies to support remote and online learning, in practice not all families can access or use the technologies, and so schools may still need to use traditional methods.

Schools located within communities that have limited internet connectivity and access to technology also face greater challenges in providing remote and online learning. This is illustrated by evidence from a remote community school in Western Australia that had to deliver paper-based learning packs to students during the pandemic (Department of

Education, 2020a). This challenge was not isolated to remote schools and was experienced by some schools in metropolitan areas (QDOS, 2020).

Findings

10. It is crucial that families can access and understand how to use the school technologies which support remote and online learning, and in some cases schools may need to provide resourcing to help.

Providing opportunities for teachers to collaborate and support one another during online and remote delivery

Prior to the pandemic, providing virtual collaborative opportunities for teachers in remote and online schools was regarded as an effective way to support teacher engagement and strengthen student outcomes (Borup, Graham & Drysdale, 2014). One practice which emerged in virtual schools within the United States were online faculty rooms, which aimed to foster collegiality and share best practice (Borup et al., 2014; Rehn, Maor & McConney, 2018). Another research study described a differentiated operational model made possible in virtual schools, where teachers worked in teams and took on different roles including the virtual school designer (e.g., designing the content for the students), virtual school teacher (e.g., presenting the content and teaching it), and the virtual school site facilitator (e.g., helping students while they complete independent work) (Davis, 2007 cited in Barbour, 2018, p.528).

Case study: providing opportunities for teachers to work together, NSW and Victoria

SPCC Dale is an Independent K-12 school for students with disabilities in NSW. During the pandemic, their staff met daily over Zoom to share experiences, debrief, and collaborate. Teachers at Port Phillip Specialist School in Victoria were initially preparing time-intensive individual classes due to the complex needs of their students. The school adapted its approach with team teaching, where different teachers, specialist teachers or therapists took turns in running whole-school classes two times each day in a synchronous format, supported by classroom teachers providing individual students with follow-up after the session (DET, 2022b).

Findings

11. Provisions for teacher collaboration need to be developed and available to use during periods of remote and online learning.

Developing communication channels with families during online and remote provision

A key principle for teaching in remote and online learning environments is facilitating rich and useful communicative practices between students, teachers, and families (Borup et al., 2014). The online and remote environment may provide even greater opportunities for

communication than regular face-to-face classroom practice, as reported by teachers who were experienced in online delivery prior to COVID-19, who felt they had more opportunities to interact with students and their families using digital tools, and that they were more proactive in initiating communication (Borup et al., 2014). Interviews with parents of students with disabilities in United States online schools reported that many perceived their child's success depended upon the communication between teachers and parents, which provided them with clarity about their child's learning (Smith, Burdett, Cheatham & Harvey, 2016).

One international study used quantitative data to measure whether communication practices between schools and families were associated with higher levels of student engagement. This study in the Los Angeles School District found that student engagement improved with every additional mode of communication that parents reported receiving from the school, such as app notifications, social media, packages in the mail, and online teleconferencing (Domina, Renzulli, Murray, Garza & Perez, 2021). This is one of a few studies able to demonstrate using quantitative data that schools which were more active in their communication strategies with families during remote and online instruction were more likely to have students more engaged in their learning.

During the pandemic, communication practices established between schools and families differed according to student age. In Victoria, parents of secondary aged children were less likely than primary school parents to report that they wanted regular communication from teachers (Learning First, 2020). They were also less likely than parents of primary school aged children to want significant detail about their children's work requirements or daily check-ins (Learning First, 2020).

As a result of the new practices developed through the pandemic, Victorian school leaders signalled they were likely to move more of their communication with families online as common practice (Learning First, 2020).

Engaging families is best done via multichannel strategies, ensuring that there are various points where families can be looped into what is occurring in their child's school and classroom.

Case study: communicating with families using various methods, Victoria

Families at Bullarto Primary School, in rural Victoria, were given two one-to-one sessions a week with their child's teacher to talk with one another about any issues of concern (DET, 2022b). Mount Waverley North Primary School held regular parent forums on Sunday evenings to check in with parents and carers and gather feedback on remote and online learning (DET, 2022b).

Findings

12. The development of active multichannel communication strategies between schools and families, which are appropriate for context, are important and more likely to increase student engagement during periods of remote and online learning.

Classroom-level approaches

Providing opportunities for students to interact with their peers in the online classroom

Research undertaken in the United Kingdom by the Education Endowment Foundation (2020) summarised systematic reviews and meta-analyses to identify approaches that schools and teachers can use to support remote and online learning. A key finding was that peer interactions are central to student motivation and can improve learning outcomes (EEF, 2020). Students are not as likely to succeed in their learning without a sense of connection to their school and their peers (Goss, Sonnemann & Griffiths, 2017).

Providing students with the opportunity to meet their peers and develop a social presence in an online lesson requires deliberate and careful planning (DiPietro et al., 2008; Louwrens & Harnett, 2015). Strategies to encourage interaction online can include peer marking and feedback, sharing models of good work, and opportunities for live discussion of content (EEF, 2020). Anecdotal evidence collected in consultations confirmed the importance of peer feedback during class time. Likewise, the ACT Education Directorate reported peer feedback as a valuable tool for student engagement and motivation during online learning, with supports provided to teachers to set up these mechanisms if required.

Case study: providing opportunities for students to interact with peers in the online classroom, New South Wales and Victoria

Nepean Special School in Victoria restructured their timetable so that at 2pm daily, students were invited to a live online catch up with their peers to promote student engagement (DET, 2022b). In NSW, The Nature School, an independent school for K-Year 5 students, created specific small group Zoom sessions to provide the opportunity for online social interaction with peers (Kearney et al., 2021).

According to the UK research, the structure of lessons within remote and online contexts also differed by age group (EEF, 2020). Teachers and parents recognised that younger children longed to connect with their peers and missed seeing their friends, and therefore lesson planning in the digital classroom had to provide the opportunity for younger students to connect or talk with one another (Ames et al., 2020; Ewing & Cooper, 2021).

There are further distinctions between upper and lower primary school students (Liao et al., 2021). Research finds that upper primary school students have more developed language and digital literacy skills, therefore there is a greater capacity to promote interaction when undertaking remote and online learning, while younger primary school students benefit when they are paired up with their peers to share their work in an online learning environment (Liao et al., 2021). Evidence from NSW independent secondary schools showed that they gave older students opportunities to connect with their peers through online pastoral care groups, or small group sessions on Zoom (Kearney et al., 2021).

Findings

13. Learning plans need to be explicitly structured to provide students with the opportunity to interact and socially connect with their peers in the online and remote environment.

Facilitating teacher-student communication using digital technologies

Online learning provides opportunities for students and teachers to communicate that differ from traditional classroom practices (Cavanaugh, Repetto, Wayer & Spitler, 2013). For instance, while safety concerns must be taken into account, using the webcam during classes can provide a more personal insight into student and teachers' homes, which can serve to break down barriers and improve student engagement (Louwrens & Harnett, 2015). Curtis & Welch concur (2015) that technology decreases 'the distance between teacher and student' so that remote and online learning has greater potential to build connections between the lives of students and their teachers.

Despite the importance of this approach, in practice it is not easy. Teachers working in fully virtual schools in the United States expressed difficulties in engaging reluctant students in remote and online classes, particularly with the loss of visual cues and physical separation (Borup et al., 2014). Ames et al. (2020) describe how Queensland teachers in remote schools use various activities simultaneously to promote interaction in their classes, including the chat function, emoticons, audio and video features (Ames et al., 2020, p.368). This pre-pandemic study captures how teachers in online and remote schools proactively use various digital technologies to reach students, knowing that some students may prefer certain types of communication over others (Ames et al., 2020). Examples of this approach are outlined in the case study.

Case study: facilitating teacher-student communication using digital technologies, Tasmania and Victoria

Teachers in Frankston Primary School made the time to talk one-on-one with each student during 2020, making 'a great difference for some kids' (DET, 2022b). Stakeholders in Tasmania described how teachers at a primary school used team-teaching methods to maximise student participation and engagement during class. Assigning presenter-producer roles, one teacher presents the learning materials in a live session, while another is working in the 'chat' to immediately answer student questions, and then stays online following the presentation to respond to any further queries.

Adopting learning plans suited for remote and online delivery

It is important that teachers know their students and can plan lessons which are appropriate for them during remote and online delivery (Ferdig et al., 2010 cited in Cavanaugh et al., 2013). Learning plans that take into account the diverse needs of all students – including students with additional learning needs – have been shown to be particularly effective in leading to improved outcomes within remote and online learning environments (Cavanaugh, 2013).

The sheer volume of resources available online contribute to the great potential for remote and online teaching. There are many possibilities for learning plans to include digital resources, online tools, and automated and adaptive technologies that it may be overwhelming for teachers to sift through resources and choose which ones work best (DET, 2021c). For instance, educational games hold promises for building skills and fostering student engagement, but they have mixed learning outcomes (Cavanaugh, 2013; Christopoulos & Sprangers, 2021; EEF, 2020). Teachers have to carefully select digital resources to use in their lessons that facilitate conceptual growth and provide greater understanding of curriculum areas (Cirkony, Tytler & Hubber, 2022).

Carefully sequencing lessons and structuring content is essential for students to work independently and learn online successfully (DiPietro et al., 2008). Teachers from the Virtual School Victoria made recommendations to ‘keep passages of text and videos short’ and that ‘students generally need more ‘chunking’ of information online than they do face to face’ (DET, 2021c). Research indicates that younger students also need to work with knowledge in smaller components when learning online (Musgrove & Musgrove, 2004).

Planning and delivering integrated curriculum units can build student engagement and independence in online and remote learning programs (Louwrens & Harnett, 2015). Case studies from Victorian schools provide perspectives into the ways that schools adjusted their learning plans and used integrated curriculum units during periods of online and remote learning.

Case study: delivering an integrated curriculum through online and remote provision, Victoria

Dandenong Valley Special Development School adopted an integrated approach to their curriculum, where teachers devised units of work based on relevant themes to their students, such as superheroes or the Paralympics, to motivate and engage students in their learning during online and remote provision (DET, 2022b).

Findings

14. Sequencing lessons and structuring content is particularly important within an online and remote classroom.

Varying pedagogies to promote student engagement in online and remote delivery

Teachers use various approaches to cater for the distinctive abilities of students within physical classrooms and pedagogical variety is similarly essential to delivering effective teaching in the online environment. However, the mechanics or ‘art’ of teaching in the digital environment is different to classroom practice (Brennan, 2003). Some research has identified that teachers have more ways of adjusting their pedagogies in remote and online environments (Yates et al., 2020; Wagner 2021).

Arguably the biggest difference between teaching in the classroom and teaching online is timing. Online pedagogies can be enacted in either real time (synchronous) or at a later time (asynchronous). There are positives and negatives associated with both approaches (Murphy, Rodríguez-Manzanares & Barbour, 2011). For instance, asynchronous instruction is less interactive. When activities are planned for asynchronous delivery, researchers suggest that they should be done with low-bandwidth activities, so they can be accessed by those in all locations, including remote sites with limited internet connectivity (Barbour et al., 2020). This was reiterated by representatives from Education Services Australia during consultations. On the other hand, despite its high interactivity, synchronous instruction over Zoom or Skype is more susceptible to technological outages and one-way communication.

According to a rapid review of the research literature undertaken by the Education Endowment Foundation, there is no clear difference in outcomes between synchronous teaching and asynchronous teaching, instead, 'what matters most is whether the explanation builds clearly on pupil's prior learning or how pupil's understanding is subsequently assessed' (EEF, 2020, p.4).

Research into online teaching pedagogies suggest there are important distinctions when teaching primary or secondary students. Pedagogies supportive of synchronous delivery were identified as being more able to address the needs of younger students than asynchronous delivery (Liao et al., 2021). One research study from the United States interviewed primary school teachers with strong digital pedagogical skills about how they made online learning successful for younger students. Teachers reported alternating synchronous and asynchronous delivery between whole group, small group and individual online meetings throughout the day (Liao et al., 2021). On the other hand, secondary students may be more engaged by asynchronous pedagogies, such as the flipped classroom model. This model moves the 'the lecture outside the classroom via technology' and moves 'homework and exercises with concepts inside the classroom via learning activities'. Research highlights that flipped classrooms may be better suited for online delivery with self-directed secondary students (Bond, 2020b; Clark, 2015, p.91; Gallagher & Cottingham, 2020).

Case study: varying pedagogies to promote student engagement in online and remote provision

Aspendale Gardens Primary School in Victoria refined their approach following parent, student, and teacher feedback. The school settled on synchronous delivery to larger groups, alongside smaller WebEx support groups, where at least two were provided per week for each student. The smaller sessions provided students with the opportunity to ask their teacher questions and check understanding (DET, 2022b). Al Noori Muslim School, a K-Year 12 Independent school in NSW, adopted a flipped classroom approach which meant that students completed pre-class online activities. Results from these activities determined which identified areas were in focus during the 'live' classes on Microsoft Teams (Kearney et al., 2021).

Another way that teachers adjusted their practices in online and remote learning was by creating videos for their students (DET, 2022b). Research highlights that this may be particularly beneficial for student engagement, as students were typically more engaged by videos created by their teachers than those from other online sources (Bond, 2020a). One

example is Hillsmeade Primary School in Victoria, which developed a specific ‘Full STEAM ahead’ remote learning program with structured science investigations and experiments to conduct at home. As part of this program, teachers recorded STEAM-focused videos (e.g., Fishing Ice Cubes or Making a Herbarium), which were popular with students and families (DET, 2022b). Teachers at The Nature School, an independent school in NSW, invested time in creating instructional videos designed to communicate key ideas and explanations to students and function as a form of explicit teaching (Kearney et al., 2021).

Supporting students to work independently at home

Darling Hammond et al.’s (2020) framework for restarting and reinventing school post-COVID-19 suggests that self-management strategies need to be explicitly taught to students, as students who can manage their study time, set goals, and engage in self-evaluation perform better in online learning. This corresponds to an OECD report looking into global lessons from initiatives to support learners and teachers during the COVID-19 pandemic, which made clear that ‘distance learning requires more grit and self-discipline from students’ (Vincent-Lancrin, Cobo Romani & Reimers, 2022, p.98). Therefore ‘curricular, schools, pedagogy and teachers need to be intentional about how they are developing self-reliance and self-directed learning skills appropriate to each age level, which are personalised to each student’ (Vincent-Lancrin et al., 2022, p.98).

The EEF similarly identified the value of strategies that help students work independently with success in the online environment and contribute to improved student learning outcomes (EEF, 2020). These strategies include prompting students to reflect on their work, identifying techniques they can use to undertake the work if they feel stuck, and encouraging students to develop checklists or daily plans to help them work independently (EEF, 2020). The EEF’s evidence specifically drawn from research into metacognition and self-regulation suggests that disadvantaged students were likely to particularly benefit from the identified strategies (EEF, 2020).

Evidence collected during the pandemic in selected Australian schools shows that many teachers shared detailed lesson plans with students. This provided a greater transparency, particularly around the learning intentions for each class (DET, 2022b; Kearney et al., 2021). Many teachers also used Learning Management Systems (LMS), which can function as effective repositories for teaching and learning resources, and when they work well, they can give students a sense of ownership and control over their learning (Flack et al., 2020; VicSRC, 2020). Examples of ways that Australian schools supported students to work independently at home are detailed in the case study.

Case study: supporting students to work independently at home, Victoria, NSW

Allansford and District Primary School, a rural government school, asked students to attend live check-ins in the morning and the afternoon. In the morning session, teachers would provide worked examples for the asynchronous activities planned for that day. These examples meant that students were less likely to become lost during the day as they worked by themselves. In the afternoon check-ins, teachers were able to monitor student progress (DET, 2022b). SPCC Dale, an independent school in NSW for students with special needs, set out a daily work program for students. Teachers also wrote a daily blog which provided instructions for students to follow which were structured clearly and designed for students to read (Kearney et al., 2021).

The development of student self-regulated learning skills, alongside digital skills, was a key opportunity presented by the remote and online learning demanded by the pandemic (Chiu, 2021). The increased flexibility and control over pace of learning was positively regarded by students, particularly amongst secondary school students in Victoria, and focus groups highlighted that many students enjoyed the freedom to plan their own day (Learning First, 2020; Vic SRC, 2020; QDOS, 2020). This was a feature in international studies, where students similarly ‘reported positive experiences with flexible school days when they organised their own daily routines, worked at their own pace and experienced independence’ (Bubb & Jones, 2020, p.220).

Supporting student independence was particularly valued by some secondary students as a positive feature of remote and online learning; however, the literacy and numeracy skills required for self-regulated learning may be underdeveloped within younger students. Musgrove & Musgrove (2004) argued that online learning needs to be altered for younger students from K-Year 5 to support their capacity to work independently and be successful. Their principles for pedagogical practice with younger students in an online context include acknowledging the differences in cognitive competencies and capacities. Younger students have less capacity to really work within an independent and autonomous learning program and they need more guidance and encouragement than older students (Musgrove & Musgrove, 2004).

Findings

15. Student skills in self-regulation and self-management need to be explicitly taught to build capacity to engage in online and remote learning.

Providing appropriate formative assessment and feedback in the online classroom

Clear feedback and assessment contribute to success in remote and online teaching and supports student motivation (EEF, 2020). Providing feedback and undertaking assessment online is different to regular classroom practice. Teachers may feel better equipped in person to identify student comprehension or missed learning opportunities. Douchet, Netolicky, Timmers and Tuscano (2020) describe how authentic online formative assessments are a crucial part of online distance learning, as assessment and feedback serve as a way to bridge

the distance between teachers and students. Formative assessments can also provide a checkpoint for teachers to adjust the content and the pace of learning (Douchet et al., 2020).

Digital learning tools and technologies can offer greater immediacy of feedback between students and teachers (Ames et al., 2020). They also provide students with different ways of submitting assessments during periods of remote and online learning, providing the opportunity to present their knowledge in ways that may be more personally meaningful or better suited to their abilities (DiPietro et al., 2008). Barbour et al. (2020) recommend that teachers allow students to submit assignments or portfolios in any format that they choose whether Google Docs, Word, audio or video recordings. This corresponds to what occurred in some Victorian government schools like Somerville Secondary College, which changed its assessment approach to provide greater scope for students to submit photographic and other digital forms of learning (DET, 2022b). Providing students with greater differentiation and choice in their assessment was positively linked to engagement, particularly for younger students (Wagner, 2021). Furthermore, during consultations, representatives from the VCAA noted a shift by teachers during remote learning to applied learning assessments, where students' understanding of knowledge is tested as it applies to case studies or scenarios, rather than through memorisation.

Online formative assessments, which give students and teachers quick diagnostic information about where students are with their learning, were reported by Education Services Australia (ESA) as a tool that teachers were seeking in the shift to online practice. Formative assessments help teachers target learning to the level students are at in any given point in time, enabling progressions based on how quickly students learn. Following ESA's review of online formative assessment, the organisation is currently developing a suite of formative assessments that will be made available online for teacher use.

Case study: examples of formative assessments used during online and remote learning, NSW and Victoria

NSW schools were able to access online 'Check-in Assessments' for students in Years 3 to 9 which covered reading and numeracy assessment (NSW Department of Education, 2022b). The digital formative assessments were designed to be quick and easy to administer, and schools and students were able to access feedback quickly. Officer Secondary College in Victoria maintained and adapted their regular assessment routines into the remote and online environment. In 2021, they ran Progressive Achievement Tests (PATs) remotely, which involved setting a specific time for students to sit each test, providing a link to access, allocating a time limit and ensuring support was on hand for any technical difficulties. Students were emailed individually their PAT scores, which were subsequently discussed individually with their teacher and used as a basis to set a 'growth goal' for the months ahead (DET, 2022b).

Findings

16. Online and remote classrooms provide the opportunity for students to present evidence of learning in different ways (e.g., audio or visual recordings) that may promote greater engagement.

Adapting practical subject areas to the online learning environment

Evidence from the consultations pointed to variation across subject areas in terms of ease of adaptability in the remote and online environment. Practical studies such as design and technology, physical education or visual arts, by their very nature, are more challenging for teachers to deliver and students to undertake in the online environment. Consultation participants spoke of the innovative ways that schools and teachers managed the practical components of learning while meeting curriculum requirements, including by using Computer Aided Design (CAD) software for design and technology subjects, and school staff providing resources such as paints for arts students to use at home. The sciences adapted by using household items for chemistry and other experiments at home, while at some schools, students designed experiments undertaken by a teacher or laboratory technician under students' instruction, via web-conferencing. Jurisdictions with shorter remote learning periods were able to focus on the theoretical and design elements of a subject and return to the practical application once on-site learning resumed.

The national and international research literature has limited information on the effectiveness of different techniques in adapting practical subject areas to the online teaching environment. Case studies provided through the consultations pointed to several examples of how schools and teachers were able to continue these subjects remotely.

Case study: adapting practical subject areas to the online environment, Western Australia

Students attending an agricultural college were able to continue to attend and be assessed in subjects with practical elements, including vocational education and training. Video and photographic third-party evidence was used for assessment in certain Physical Education skills (e.g. golf swing) and also specific VET competencies (e.g. operating tractors). Daily logbooks were created to allow students working on their own farms or family businesses to track hours and skill sets towards competencies for Recognition of Prior Learning on their return, with parents and carers or employers signing off the logbook. Likewise, trades projects were taken home and completed in farm workshops, and photographic evidence and work hours were recorded on a daily log sheet and signed by parents/employers (Department of Education, 2020).

Conclusion

This chapter has identified evidence-informed approaches applied in schools and classes through a desktop review and stakeholder consultations. Each of the evidence-informed approaches provide an insight into what is currently known about good practices for online and remote teaching. While remote and online learning offers much promise, it is apparent some gaps exist in the research regarding what quality remote and online provision looks like and the ways it is different to the practice which occurs in regular face-to-face classrooms.

These research gaps need to be addressed to ensure that schools can deliver research-informed quality practices in remote and online delivery, leading to improved student achievement and wellbeing outcomes for students, teachers, and parents and carers. Having an established research base about how to deliver effective remote and online learning will

also facilitate practices for teaching in blended or hybrid arrangements that will carry forward into the future.

Section 3 policy opportunities

(PO7) Conduct a critical assessment of the common technological tools purchased by schools and education systems, evaluating their accessibility and impact upon student outcomes.

(PO8) Scale up effective online initiatives that provide teachers with ways to collaborate with one another, potentially to assist teachers working in regional/remote areas or out of field teaching.

Section 3 research opportunity

(RO1) Conduct new research to determine effective remote and online learning practices

The evidence base on remote and online teaching practices is too immature for detailed guidance for teachers to be confidently developed. Conducting new research will enable teachers, schools leaders and systems to make more informed decisions in the event of future crisis situations, and improve the quality of standard online and remote schooling provision.

This research should prioritise evaluations of both widely used and promising online and remote teaching approaches. In particular, the appropriate mix of synchronous and asynchronous delivery for school-aged children should be investigated. Where possible, these should use evaluation techniques that would be classed as High Confidence under AERO's Standards of evidence, in order to provide causal evidence on 'what works' in this space. These evaluations should explore whether particular approaches (for example, varying the structure of the school day to suit online and remote provision) have different impacts across different student cohorts (for example, English as an Additional Language/ Dialect (EAL/D) students, students with disability, at-risk students or those who may disengage or dropout of school) and across different age ranges.

4. Wellbeing during remote and online schooling

Section 4 Findings

17. Primary and secondary students reported increased stress and anxiety during the COVID-19 pandemic, but it is difficult to separate out how much of this is only due to the shift to remote and online learning.
18. Student engagement is different in an online and remote classroom and attendance rates varied across student cohorts.
19. Schools placed an increased focus on student wellbeing during remote and online learning, where many schools considered the importance of wellbeing as equal to literacy, numeracy and other academic outcomes.
20. Teacher workload was increased by the sudden shift to remote and online learning, and many teachers devoted significant time to adjusting their approaches to suit the online classroom.
21. Teacher wellbeing suffered as a result of the pandemic, but also because of the work required due to the shift to online and remote delivery.
22. Families had to support their children in remote and online learning through the pandemic, and some felt unprepared and unsupported to do so.

Student wellbeing, as defined by the OECD, refers to ‘the psychological, cognitive, social and physical functioning and capabilities that students need to live a happy and fulfilling life’ (OECD, 2017). In considering the various wellbeing effects on students, teachers, and parents and carers, it can be difficult to separate the educational impact of remote and online learning from the experience of the wider pandemic. Most of the available Australian and international research literature has been developed during the COVID-19 pandemic, and usually includes self-reported survey data from either students, parents and carers or teachers. The stakeholder consultations often involved anecdotal discussion of wellbeing effects, and evidence submitted featured qualitative or quantitative studies similarly centred on perceptions of wellbeing at various points in the pandemic. Research on the wellbeing effects from remote and online provision pre-COVID-19 has been used where appropriate.

The key wellbeing effects are identified in Table 4-1, with both negative and positive effects outlined. Primarily negative wellbeing effects were identified for each group.

Table 4-1 Overall wellbeing effects of remote and online learning during the COVID-19 pandemic

Group	Negative effect	Positive effect
<i>Students</i>	<ul style="list-style-type: none"> • Increased stress and anxiety. • Limited extra-curricular and enrichment activities. • Poor student attendance. • Change in the wellbeing wraparound supports usually provided by school. 	<ul style="list-style-type: none"> • Greater focus upon 'wellbeing' in the school day.
<i>Staff</i>	<ul style="list-style-type: none"> • Increased teacher workload. • Teacher absence. • Increased teacher stress and anxiety. 	<ul style="list-style-type: none"> • Proven resilience driving appetite for change.
<i>Parents and carers</i>	<ul style="list-style-type: none"> • Compromised mental health. • Challenges in providing home support for remote and online learning. 	<ul style="list-style-type: none"> • Greater parent involvement in schooling.

Student wellbeing effects

Increased stress and anxiety

Findings from various recent Australian surveys indicate that young people experienced increased stress and anxiety during the COVID-19 pandemic (VicSRC, 2020; Save the Children, 2021; UNICEF Australia, 2020; Catholic Education Melbourne, 2021), which correspond to similar survey findings with young people around the world (International Labour Organisation (ILO), 2020). The shift to remote and online learning occurred within the wider context of the pandemic, which, for many young people, was characterised by uncertainty, change and fear.

At the start of the pandemic, systems and schools recognised that student wellbeing was a crucial area of concern for children and young people. Australia was not alone in this position and the OECD identified that many education systems sought to balance educational and health-related priorities (OECD, 2020a; OECD, 2020b). Consultations with education authorities in all states and territories highlighted how student wellbeing was recognised very early, and then throughout, as a concern with remote and online provision.

In Australia, research on increased stress and anxiety among school students is drawn mostly from online surveys during 2020 and 2021 undertaken by various research groups funded by philanthropy (Mission Australia, 2021; Save the Children, 2021), analysis of surveys undertaken by state and territory education departments (Learning First, 2020; QDOS, 2020;) or research by other peak bodies (Catholic Education Melbourne, 2021; Independent Schools Victoria, 2021). Other organisations provide a state-based perspective on the effects of COVID-19 on young people (Commissioner for Children and Young People Western Australia, 2020; South Australian Commissioner for Children and Young People, 2021; Victorian Commission for Children and Young People, 2020). Most Australian research only examines wellbeing at

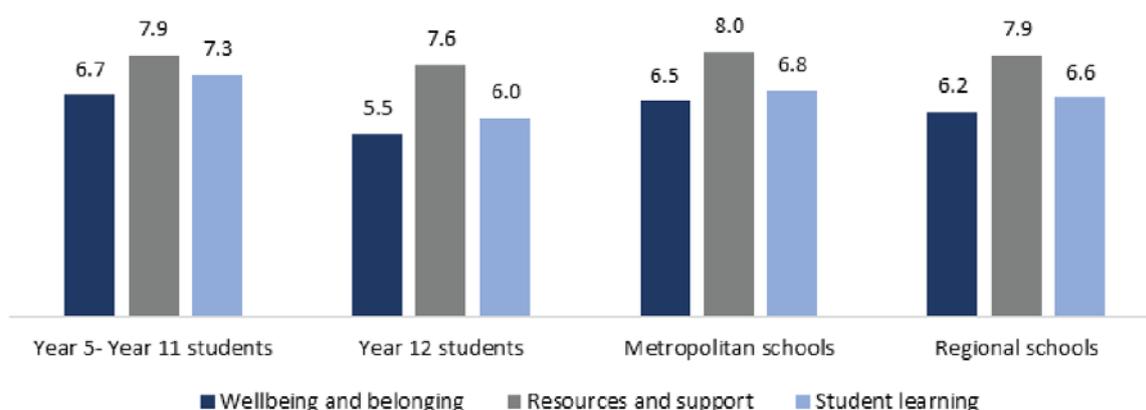
an overall level, with a limited focus on the wellbeing effects of remote and online learning on different student cohorts, such as EAL/D students, students with disability, or students according to socio-economic background.

Each of these surveys have their own distinct questions and sample, but a coherent picture is provided of the ways primary and secondary school students were negatively affected by the COVID-19 pandemic, which led many to experience increased stress and anxiety. Mission Australia's (2021) survey of young people reported that 45.7 per cent of respondents nominated COVID-19 as one of the most important issues in Australia at that time, with the three areas most negatively impacted by COVID-19 including participation in activities (68.3 per cent), education (62.3 per cent), and mental health (50.3 per cent).

The mental health and wellbeing impacts of COVID-19 were greater in the states with longer lockdowns. A survey by Save the Children (2021) identified that 64 per cent of young people across Australia experienced mental health and wellbeing impacts of COVID-19, which rose to 77 per cent for the Victorian sample, and 75 per cent in NSW (Save the Children, 2021). Even in those states where schooling was not significantly impacted by restrictions, young people reported increased stress and anxiety (Commissioner for Children and Young People Western Australia, 2020; South Australian Commissioner for Children and Young People, 2021).

A nationally representative survey of children aged 13-17 years, found that over half of Australian young people, increasing to nearly six in ten in Victoria, felt like they were falling behind in their learning due to the shift to remote and online learning (55 per cent and 59 per cent respectively) (UNICEF, 2020). The educational causes for stress were different for older students, as Victorian students completing high school felt anxious about the effect studying remotely would have on their assessments (Victorian Commission for Children and Young People, 2020), while a smaller survey with Victorian students found that primary school students (76 per cent) missed interaction with their peers (VicSRC, 2020). This corresponds to work undertaken by Catholic Schools in Melbourne where eight out of ten children reported that they acutely missed the ability to play with their friends during lockdown (Catholic Education Melbourne, 2021). Information collected from students in Victorian independent schools during 2020 is displayed in Figure 4-1.

Figure 4-1 Victorian independent school student satisfaction across various dimensions scaled 1-10, 2020



Source: ISV (2021).

In Victorian independent schools, students from Year 5 to Year 11 recorded the least satisfaction in their wellbeing and belonging when compared to other dimensions including resources and support, and student learning. Year 12 students had the lowest satisfaction scores for wellbeing and belonging. There was also a slight difference in average satisfaction scores on overall wellbeing and belonging between students in metropolitan and regional Victorian Independent schools (Independent Schools Victoria, 2021, p.10).

However, not every student experienced negative wellbeing effects due to the shift to remote and online schooling. Some students described remote and online learning to be beneficial, leading to a better overall learning experience (Victorian Commission for Children and Young People, 2021). In consultations it was raised that some students prefer remote learning, including older students, who are more able to undertake self-directed learning, and those experiencing social difficulties at school. Prior to the pandemic, remote and online learning programs in Australia and overseas had experienced increased diversity in students choosing to enrol due to medical reasons such as mental health or anxiety, to avoid bullying, or other social and emotional reasons (Barbour, 2018; Bartley et al., 2018).

International studies on wellbeing for young people during the pandemic

The increased stress and anxiety experienced by young people during COVID-19 in Australia is similarly reflected in international research findings (ILO, 2020). English school leaders identified COVID-19 related anxiety as a common issue for primary and secondary students (Blanden, Crawford, Fumagalli & Rabe, 2021; Sharp & Nelson, 2021). Using the UK Household Longitudinal Study, Blanden et al. (2021) identified large negative effects on student wellbeing as a result of remote and online delivery. Students who had to learn remotely for longer had a greater increase in negative behaviours and emotional difficulties than students who returned to school earlier, to the extent that ‘missing a whole six weeks of school could increase behavioural and emotional difficulties by more than one standard deviation, which is roughly equivalent to children exhibiting three or four new and serious negative behaviours or emotional difficulties’ (Blanden et al., 2021). Another crucial finding is that the deterioration

in wellbeing seems to persist on returning to schooling and that ‘going back to school in itself does not appear to be sufficient for students to ‘bounce back’’ (Blanden et al. 2021, p.4).

School leaders in England reported concerns that students with no previous wellbeing or mental health issues before the pandemic demonstrated a wide range of issues on their return to school including:

- reduced cognitive abilities (such as poor concentration, memory and stamina)
- lack of motivation and withdrawal
- poor social skills and fractured friendships
- lack of sleep
- poor physical fitness
- weight gain
- speech and language problems (Sharp & Nelson, 2021).

The same national research in England suggests that wellbeing effects due to school closures were different according to student age (Sharp & Nelson, 2021). Younger children in nursery and reception were reportedly particularly impacted, possibly because the duration of the pandemic occurred over a relatively larger proportion of their lives than for older students (Sharp & Nelson, 2021).

A research brief published in the United States similarly described how greater numbers of students experienced anxiety and depression during the COVID-19 pandemic (Hough, Witte, Wang and Calhoun, 2021). Students who undertook schooling via remote and online delivery for longer were associated with greater negative mental health consequences (including emotional problems, peer problems, conduct, and hyperactivity), particularly for older, Black and Hispanic children, and those who were from low-income families (Hawrilenko, Kroshus, Tandon & Christakis, 2021).

Wellbeing over the course of the pandemic

Studies show that the effects on student wellbeing changed over the course of the pandemic. Naidoo, D’warte, Gannon and Jacobs’ (2021) small scale qualitative study with Year 9 and 10 students in NSW and Victoria identified a sense of vulnerability and loss initially in 2020, but as the restrictions and at-home learning went on students described gaining a stronger sense of confidence, resilience and being able to effectively use new ways to communicate with their peers online.

In Victoria, where periods of remote learning were the longest and most frequent, the annual Attitudes to School Survey for government school students saw differing results at primary and secondary levels. While overall, levels of reported connectedness to school remained high amongst primary students, with around four in five strongly agreeing or agreeing with this measure, there was a small decline in levels of agreement of around two percentage points in 2020 compared to 2021 (see Table 4-2). On the other hand, levels of connectedness to school amongst secondary school students in 2020 compared to 2019 increased by around four percentage points for Year 7 to 10 students, and by around seven percentage points for Year 11 to 12 Students.

While caution should be taken when comparing these results to prior years due to changes to the timing, question structure, and participation rates of the 2020 survey, it was suggested in the consultations that the increased positivity from secondary students may be a response to the additional flexibility afforded during remote and online learning, while primary school results reflect the negative impacts of social isolation felt by younger students. The 2021 results have not yet been published, however consultations revealed an anecdotal return to 2019 levels for both primary and secondary students (as observed by education officials).

Table 4-2 Proportion of Victorian government school student responses that ‘agreed’ or ‘strongly agreed’ that they feel connected to schooling, 2017-2020 (%)

	2017	2018	2019	2020
Years 4-6	81.7	81.2	81.0	79.2
Years 7-10	56.0	56.7	56.0	59.9
Years 11-12	52.8	53.1	53.3	59.4

Source: Department of Education and Training (2021a, p.24).

‘Tell Them From Me’ student surveys undertaken in NSW provide a picture of student engagement at school. In 2021, 84 per cent of primary students and 64 per cent of secondary students reported positive engagement at school (NSW Department of Education, 2022a, p.24). These are the lowest levels of student engagement reported since 2015. Other states and territories, such as Tasmania, reported stable results from student wellbeing surveys over the duration of the pandemic. Evidence provided from the South Australian Wellbeing and Engagement collection reported no significant declines in overall student wellbeing as a result of COVID-19, but Year 4 to Year 6 students were less likely to report high emotional wellbeing comparing results from 2019 and 2021. It should be noted that these states and territories had shorter periods of lockdown compared to NSW and Victoria.

A shift in wellbeing effects over time was similarly demonstrated in a quantitative study by the CORE Districts through their Californian-wide student survey in the United States, finding that students had lower levels of personal and interpersonal wellbeing following the shift to remote and online practices (Wang, Pier, Meyer & Webster, 2021). Some indicators of wellbeing, particularly concerning the conditions of online learning such as their engagement with their teacher and their access to school-work online, actually improved as the lockdown continued. Wang et al. (2021) speculate that this improvement reflects improved teaching and learning using digital tools as time went on.

Findings

17. Primary and secondary students reported increased stress and anxiety during the COVID-19 pandemic, but it is difficult to separate out how much of this is solely due to the shift to remote and online learning.

Limited extra-curricular and enrichment activities

During the pandemic, schools in Australia and internationally had to limit their enrichment and extra-curricular activities, potentially contributing to student stress and anxiety (Mission Australia, 2021; Sharp & Nelson, 2021; UNICEF Australia, 2020). In the early stages of the pandemic, over half (60 per cent) of Victorian students stopped their usual extra-curricular activities both within and out of school (UNICEF Australia, 2020 p.16). As a result of the lack of extra-curricular activities, young people reported that they felt unmotivated and ‘flat’ (UNICEF Australia, 2020). Despite the conditions presented by remote and online learning, many schools found ways to provide students with the opportunities for physical expression, as exemplified in the case study.

Case study: extra-curricular activities during online and remote delivery, Victoria

Teachers from Aspendale Gardens Primary School, a government school in Victoria, developed their own PE-focused YouTube channel. The YouTube channel featured teacher-made videos of physical activities for students to undertake at home with easy-to-read instructions and suggested adaptations (DET, 2022b).

Extra-curricular activities play a positive buffering role and are associated with stronger academic motivation, particularly for younger students (Zaccoletti et al., 2020). A study in England through the National Foundation for Education Research reported that many school leaders emphasised the need to prioritise variety in school and extra-curricular activities as students return to schooling ‘on-site’, supporting student emotional recovery (Sharp & Nelson, 2021).

Student attendance effects

Measuring student attendance in remote and online classrooms

A recognised measure of student wellbeing and engagement in learning is student attendance (NSW Department of Education, 2022a). Student attendance was and continues to be affected by the COVID-19 pandemic. Not only was attendance impacted due to students being identified as a direct COVID-19 case, but also by students needing to isolate when identified as a close contact.

When students participate in remote and online learning the traditional concept of ‘attendance’, which is relatively easy to evaluate when students attend schools ‘on-site’, needs to be reimagined (Gallagher & Cottingham, 2020; Wagner, 2021). Student attendance and engagement in learning looks different in remote and online classrooms and is more than just ‘logging on’. 2020 data from the Los Angeles Unified School District showed that close to all students logged into their LMS, but only 92 per cent viewed content, and of those only 81 per cent submitted assignments (Gallagher & Cottingham, 2020). Some teachers question what it means for students ‘to be present, interacting, participating’ in online spaces, and what attendance actually looks like in the remote and online classroom (Wagner, 2021).

Student attendance during the COVID-19 pandemic

Victorian attendance data (Table 4-3) indicates that the average number of days absent per full-time student reduced in 2020 compared to 2019. However, the number of unapproved student absence days increased between 2019 and 2020 for both Years 1-6 students and for Years 7-12 students (Table 4-4). Another report using Victorian attendance data explained that the overall improvement in attendance rates during the initial period of remote and online learning in 2020, when compared to 2019, could possibly be explained by the relative ease by which students could participate in schooling at home (Parliamentary Secretary for Schools, 2020).

Table 4-3 Mean number of student absence days per full-time equivalent (FTE) per year for Victorian government schools

	2016	2017	2018	2019	2020
Year 5	15.1	15.5	15.6	16.4	13.6
Year 6	15.6	16.3	16.3	17.3	13.8
Years 7-10	19.7	20.2	20.4	21.3	18.9
Years 11-12	16.6	16.6	16.9	17.3	14.8

Source: Department of Education and Training (2021a, p.21).

Table 4-4 Mean number of unapproved student absence days per full-time equivalent (FTE) per year for Victorian government schools

	2016	2017	2018	2019	2020
Years 1-6	5.4	5.0	3.8	3.6	5.3
Years 7-12	8.0	7.8	6.6	6.4	8.3

Source: Department of Education and Training (2021a, p.21).

In NSW in 2020, 77.8 per cent of primary students and 59.6 per cent of secondary students attended school for at least 90 per cent of the time. A comparison with 2018 attendance data shows a 1.6 per cent drop for primary students and a 4.9 per cent drop in attendance for secondary students during the initial year of the pandemic (NSW Department of Education, 2022a, p.26).

The following case study provides a picture of how schools monitored attendance during remote and online learning in Victoria.

Case study: monitoring student attendance during online and remote learning, Victoria

St Albans Secondary School had online attendance which exceeded 93 per cent each day. This was attributed to monitoring student absence in every lesson with prompt follow-up calls to families in the case of student absence. The school also provided comprehensive supports to lessen the likelihood of student absence through their Wellbeing Team, including meditation sessions to senior students, food boxes to families, and a technology team to troubleshoot any technical issues with remote and online learning technologies. Westall Primary School held a WebEx session every morning and recorded attendance using Google Sheets. This provided the staff with rapid data analytics, allowing them to quickly follow up on any students of concern (DET, 2022b).

Student attendance across cohorts

Not all students were equally likely to miss school, whether in person or remote and online learning. In Victoria, there were some positive changes in student attendance, particularly for Koorie children, and for certain students who were normally considered as school ‘refusers’ (Parliamentary Secretary for Schools, 2020; QDOS, 2020). However, attendance rates for students with additional needs, refugees, Culturally and Linguistically Diverse Students (CALD), vulnerable students (students disengaging from education and students in out-of-home care), and students undertaking the Victorian Certificate of Applied Learning (VCAL) or Vocational Education and Training (VET) had less improvement when compared with 2019 attendance rates (Parliamentary Secretary for Schools, 2020). Attendance rates declined over the period of remote and online learning, which supports anecdotal reports of diminishing student motivation (Parliamentary Secretary for Schools, 2020).

There is a link between student socio-economic background and student attendance. In Victoria, analysis of departmental data during the first 2020 lockdown showed that students from more disadvantaged homes recorded higher absentee rates (around 10 per cent) than students from more advantaged homes (around 4 per cent) (Learning First, 2020, p.9). It should be noted that students from disadvantaged homes also record higher absenteeism during ‘on-site’ learning. Another paper analysed whether there were socio-economic patterns in secondary school attendance data in Tasmania, which had relatively shorter periods of ‘lockdown’ than other Australian jurisdictions. Attendance rates were similar between 2018 and 2020 in government schools for students from high socioeconomic homes, but there was a drop in attendance rates for students from low socioeconomic homes (Tomaszewski, Zajac, Rudling, te Riele, McDaid & Western, 2022). Patterns of social disadvantage in student attendance rates were similarly established in England during the period of school closures, where students in the most deprived schools had lower attendance compared to students in the least deprived schools (Sharp et al., 2020).

Findings

18. Student engagement is different in an online and remote classroom and attendance rates varied across student cohorts.

Change in the wellbeing wraparound supports usually provided by school

Schools connect students and their families to social services, including social workers, health practitioners, counsellors, chaplains, and other allied health workers. All of these services play a crucial role in supporting student wellbeing, and were also forced to adjust to a remote and online delivery model, especially in the states and territories with attenuated lockdown periods. Examples of system supports for wellbeing are outlined in Section 2. While systems made changes to how mental health and wellbeing services could be accessed by students during remote learning, there are limited evaluations of the effectiveness of these arrangements, and as such researchers do not know whether students felt that their wellbeing was improved by these additional supports.

Internationally, the limited provision of wellbeing supports in a remote and online learning environment was a known concern. Research summaries produced in the United States cautioned that ‘in a distanced setting that is not directly designed around student relational needs, students will not have typical social interactions, and teachers and other school personnel will be less likely to access basic information about students’ home lives that enable them to respond as they typically would to students in crisis’ (Gallagher & Cottingham, 2020, p.3). Another study from the United States highlighted that ‘loss of access to school-based mental health care may be of heightened importance for youth from low-income families, as they are more likely to receive mental health services solely from their school’ (Hawrilenko, et al., 2021). This too is a factor in Australia, as wellbeing supports provided by schools are essential services for disadvantaged students and their families. School leaders in England observed that even if measures were put in place to promote student emotional and mental health, they were unable to get the support services they required as specialist services were not operating fully or insufficiently, partly due to ongoing staff shortages (Sharp & Nelson, 2021; Sharp & Skipp, 2022).

Positive student wellbeing effect: greater focus upon ‘wellbeing’ within the school day

Many schools and systems recognised that wellbeing required more explicit inclusion into the everyday, alongside cognitive and skill development (OECD, 2020a; Orima Research, 2021b). Schools have an important role to play in ensuring student wellbeing, and this has gained a greater predominance since the start of the COVID-19 pandemic. Victorian school leaders described how they negotiated the shift from ‘on-site’ to online practices, where they ‘prioritised the welfare and wellbeing of members of the community above all other concerns’ (Longmuir, 2021). During the pandemic, school leaders perceived that the relational aspects of being a school leader and compassion were emphasised, and the focus on ‘academic progress’ became secondary (Longmuir, 2021).

In ‘regular’ educational provision, wellbeing can sit aside as an aspect of pastoral care or occur through informal strategies within the classroom. Wellbeing required a more explicit focus and structured planning in the remote and online environment, particularly in states with extended restrictions. An example of the explicit focus given to wellbeing during remote and online learning is presented in the following case study.

Case study: greater focus upon ‘wellbeing’ within the school day, Victoria

Bullarto Primary School is a government school located within a regional Victorian community. This school emphasised that ‘our wellbeing is our priority’. During the lockdown restrictions, every school day started with a 9am check-in for all staff (including support and maintenance staff), students, parents, and younger siblings. The learning packs used in the school focussed upon wellbeing alongside literacy and numeracy through the inclusion of activities which involved students undertaking deep listening journals, meditation, taking photos of nature to show their feelings, and writing accompanying poems (DET, 2022b).

The explicit focus on student wellbeing within the school day during COVID-19 was regarded positively by students in Victoria, to such an extent that many students supported ‘mental health or wellbeing classes’ to be a ‘mandatory addition to all school timetables for all year levels’ (VicSRC, 2020, p.33). Departmental staff reported in consultations a beneficial shift to greater levels of understanding of student mental health and wellbeing across schools, and understanding of student wellbeing becoming more central in policy development.

Findings

19. Schools placed an increased focus on student wellbeing during remote and online learning, where many schools considered the importance of wellbeing as equal to literacy, numeracy and other academic outcomes.

Staff wellbeing effects

Increased teacher workload

The changes that teachers had to implement during the pandemic – and continue to implement – are arguably some of the ‘most significant and pervasive since the introduction of mass schooling’ (Longmuir, 2021). As the pandemic continued, schools often had to shift to a hybrid model, where delivery occurred for some students online and for others in classrooms. Evidence from the consultations indicated that in certain jurisdictions, an assessment was made to ensure teachers were not required to deliver face-to-face and online at the same time.

The huge workload of Australian teachers was acknowledged in various reports and surveys (Learning First, 2020; Orima Research, 2021a; Orima Research, 2021b; QDOS, 2020; Ziebell, Acquaro, Seah & Pearn, 2020) and consistently raised during stakeholder consultations. Just under half, or 49 per cent, of Australian educators who responded to an Australian Institute for Teaching and School Leadership (AITSL) survey provided negative feedback about the impact of the pandemic, of which 23 per cent indicated the pervasive effect of the increased workload/time requirements, and 22 per cent described increased fatigue or stress (Orima Research, 2021a). Another national survey of teachers undertaken at the start of the pandemic found that two-thirds of respondents perceived that they had worked more hours than usual, half perceived that they had worked more than six hours extra per week, and some were working an additional 20 hours (Ziebell et al., 2020). A further study conducted with Australian and

New Zealand teachers similarly reported significant increases in teacher workload during the period of remote and online learning (Flack et al., 2020).

Stakeholders consulted in the Northern Territory outlined how some of their teachers working in isolated communities were unable to leave due to the biosecurity risk presented by COVID-19. This meant that many were unable to have a break during their designated holidays, which left many feeling increasingly isolated and under pressure.

Findings

20. Teacher workload was increased by the sudden shift to remote and online learning, and many teachers devoted significant time to adjusting their approaches to suit the online classroom.

Teacher absence

Teacher absence became an issue to address during the pandemic due to teachers being identified as a close contact or contracting COVID-19. There are limited Australian workforce studies providing a perspective on teacher absence due to COVID-19. AITSL asked teachers to identify the impacts of COVID-19, but absence was not picked up in their responses at that time (Orima Research, 2021a). The Australian Teacher Workforce Study due to commence in 2022 may yield some relevant findings.

Pressure mounts when there are a high proportion of staff absences, as teachers have to cover additional classes and duties. In England, school leaders reported that they had to use Teaching Assistants to lead classes as a remedy to high teacher absence (Sharp et al., 2020). An English workforce study specifically looked at teacher absences due to COVID-19 during 2020 and identified that teachers were more likely to be absent due to being a confirmed case, while students were more likely to be absent due to being a close contact (Sibieta, 2021).

Increased teacher stress and anxiety

Evidence provides a strong sense of the increased teacher stress and anxiety during online and remote education provision (Learning First, 2020). After the initial 2020 lockdown, teacher surveys in Victoria showed that mental health challenges were more predominant amongst new teachers, single parents, and those with pre-existing mental health concerns (Learning First 2020). This corresponds to a survey undertaken with teachers in New Zealand, where 13 per cent of teachers nominated their own mental health as their biggest concern during the 2020 lockdown, which increased to 22 per cent for teachers who were younger (35 years and younger) (Education Review Office, 2020).

Narratives published in an Australian English teachers professional journal show frustration at being unable to deliver high-quality practice, whilst balancing family roles (Owen et al., 2021). Other teachers wrote about the challenges faced in confronting their own 'ideological and pedagogical beliefs about what effective teaching looks like' (Evans, O'Connor, Graves, Kemp, Kennedy, Allen, Bonnar, Reza & Aya, 2020). Teachers in England described how their

stress and anxiety were exacerbated by concerns that they were ‘unable to teach to their usual standards’ (Sharp et al., 2020, p.5).

Findings

21. Teacher wellbeing suffered as a result of the pandemic, but also because of the work required due to the shift to online and remote delivery.

Positive teacher wellbeing effect: proven resilience driving appetite for change

Teachers demonstrated resilience in their shift to remote and online provision with no forewarning. Surveys conducted with teachers in Catholic schools in Melbourne reported that staff collegiality and collaboration ‘soared’ during the initial periods of remote and online learning (Catholic Education Melbourne, 2021). In 2020, QDOS conducted focus groups with Victorian school leaders and teachers who acknowledged that they were exhausted, but despite that they were ‘energised by what they had learned’ and ‘found themselves more capable and adaptable than they had realised’ (QDOS, 2020, p. 13). Longmuir interviewed a select number of school leaders and their perceptions were that despite exhaustion amongst teachers, ‘many returned to school with an amplified appetite for change, having expanded their understanding of what was possible’ (Longmuir, 2021, p.12).

During the consultations, participants spoke of school leaders reporting that despite the very stressful circumstances, the change to remote and online learning had given them the opportunity to make lasting change within the school, whether this be through their flexible learning approach or the way they engage with families. In Victoria, school principals were surveyed throughout 2020 where they rated their wellbeing from 0 to 10. According to information provided during consultations, while the proportion of principals who were ‘struggling’ with lower scores did increase through the period, there were consistently between 10 and 30 per cent of principals ‘thriving’, rating their wellbeing at 8, 9 or 10.

International studies similarly chart the positive effects amongst the teaching workforce which occurred as a function of the pandemic, including a sense of their strength and resolve (Bubb & Jones, 2020; Mueller & Goldenberg 2020).

Parent and carer wellbeing

Compromised mental health

There were ‘unprecedented demands’ made on parents and carers during the COVID-19 pandemic (Evans et al., 2020). A qualitative study with Australian parents of children aged 0 to 18 years revealed that many experienced mental health difficulties and strained family relationships during the pandemic (Evans et al., 2020).

Both overseas and in Australia, remote and online learning was particularly challenging for families of students with special needs, especially for high-care students who lost services they regularly received at school (Averett, 2021; QDOS, 2020; Sharp & Skipp, 2022). A survey

of Australian families of students with disabilities found that they felt unsupported during the time of remote and online learning (Dickinson, Smith, Yates & Bertuol, 2020). Four in five families reported that they had to spend significant time adjusting learning materials, because often they received the same materials and support as those provided to students without disabilities. Consequently, many families of students with a disability reported excessive negative impacts on their mental health (Dickinson et al., 2020).

Some families reported positive benefits during the periods of remote and online learning, with a certain level of intimacy developed through the sustained periods at home (Evans, Mikocka-Walus, Klas, Olive, Sciberras, Karantzas & Westrupp, 2020). For example, in parent surveys undertaken by Catholic schools in Melbourne, over half (53 per cent) reported that remote learning was a positive experience for their family (Catholic Education Melbourne, 2021).

Findings

22. Families had to support their children in remote and online learning through the pandemic, and some felt unprepared and unsupported to do so.

Challenges in providing home support for remote and online learning

Pre-pandemic, options to learn either remotely or online were often a deliberate choice negotiated between students and their families. In the School of the Air, parents (typically mothers) support the educational program, by taking on responsibilities as the 'home tutor' (Rivalland, Rohl & Smith, 2001). Studies show that families often put more time into their children's learning in an online school, than if their child was enrolled at a traditional school (Curtis & Werth, 2015).

The quick shift to remote and online provision brought about by COVID-19 meant many families were unprepared for the challenge of supporting learning at home. Parents and carers, particularly at the start of remote and online learning, had to adjust to taking up a new role with their children and providing more direct assistance with formal education. An Australian study for ACARA found that 'parents had varying experiences with remote learning – many felt a sense of frustration that the role of the teacher had fallen on their shoulders, particularly for those who had to continue working full time during shutdowns' (EY Sweeney, 2020, p.20). Focus groups in Victoria identified that parents of early primary school years students felt the greatest pressure, due to the heightened degree of assistance and supervision required (QDOS, 2020).

A report by the Parliamentary Secretary for Schools in Victoria found that family supports varied depending on labour market circumstances, levels of educational attainment (including English literacy), capacity in the digital environment, their own additional needs, and family size and housing arrangements (Parliamentary Secretary for Schools, 2020, p.7). During the pandemic parents and carers were restricted from entering school grounds, possibly leading to a lack of connectedness with schooling, particularly those with children who were

transitioning into primary school (Prep to Year 2) or secondary school (Year 7 and 8).

The challenges faced by families in supporting learning at home was also a feature of the international remote and online learning provision during COVID-19 (Andrew et al., 2020; Scarpellini et al., 2021; Misirli & Ergulec, 2021). A survey of time-use in the United Kingdom identified that ‘60 per cent of parents of primary school children and nearly half of parents of secondary school children report that they are finding it quite or very hard to support their children’s learning at home’ (Andrew et al., 2020). Research from a nationally representative sample in the Netherlands of primary and secondary school parents identified a large gap between parents with a higher education degree and less educated parents (Bol, 2020). In secondary school, three-quarters of parents with an academic education felt able to support their children with schoolwork, compared with only 40 per of less educated parents (Bol, 2020, p.15). Disadvantaged families in the United Kingdom also spent less time on home learning, and when they did intervene, the activities that they did were less likely to benefit their child’s educational attainment (Andrew, 2020). These findings show the difficulties that follow periods of remote and online learning, as certain families are more able to engage with remote and online learning due to social, economic and educational factors.

Positive parent wellbeing effect: greater involvement in schooling

Parent and carer engagement in their child’s schooling during the period of remote and online provision was found to be central to the quality of student learning and the overall experience of learning at home (Domina, Renzulli, Murray, Garza & Perez, 2021; QDOS 2020).

A key positive effect of the remote and online learning experience through COVID-19 was that greater interconnections were built between schools and families (Bubb & Jones, 2020). Many families felt that it was a positive opportunity to become more involved in their child’s development, particularly in gaining insight into the curriculum and the social aspects of classrooms (EY Sweeney, 2020). In focus groups, Victorian families praised the work of teachers and how they communicated during periods of remote and flexible learning (Learning First, 2020; QDOS, 2020). Participants in consultations spoke of the strengthened relationship between schools and parents fostered through the remote learning periods, and a sense that parents obtained a greater understanding and appreciation of teacher roles.

Conclusion

Remote and online schooling is a collective endeavour. For it to work well, students, teachers and families need to feel positive about their capacity to undertake remote and online learning together. Unfortunately during the pandemic, the wellbeing effects of remote and online schooling – in Australia and internationally – were mostly negative. It is difficult to extricate how much this is due to the pandemic itself, and how much of this effect is associated with the shift to remote and online learning.

This chapter has identified various wellbeing effects for students, teachers and parents largely evidenced through the COVID-19 pandemic. There are a number of resultant emergent policy and research opportunities.

Section 4 policy opportunities

(PO9) Ensure wellbeing-focussed activities and surveys are monitoring the longer-effects of the COVID-19 pandemic.

(PO10) Evaluate the transferability of school-based wellbeing supports into the online and remote environment and consider whether there is any potential to scale up the ones that were effectively delivered online.

Section 4 research opportunity

(RO2) Improving wellbeing services delivered during remote and online learning

While systems and schools made changes to how mental health and wellbeing services could be accessed by students during remote learning, no evaluations of the effectiveness of these arrangements have been undertaken and we do not know whether these additional supports helped to mitigate effects of the COVID-19 pandemic or led to improved student wellbeing. The effectiveness of wellbeing services delivered in a remote and online setting could particularly impact students from disadvantaged families who may be more reliant on services delivered through schools.

A potential avenue for further research is examining best practice models for how schools can deliver essential wraparound support services to students in times of crisis and through periods of conventional remote and online learning. This would include evaluating the transferability of school-based wellbeing supports into the online and remote environment, particularly those that are most critical for students, such as school counselling. This research should provide information to school leaders and school-based services to guide how they deliver these services in future remote and online learning contexts. These evaluations may also provide guidance to systems on whether there is potential to scale up services that can be effectively delivered online. A further consideration would be identifying how services need to be adapted for students at different age levels, EAL/D students, students with disability and their parents and carers.

5. Academic outcomes during remote and online learning

Section 5 Findings

23. Pre-COVID-19 evaluations of virtual schools in the United States found that students achieved less learning growth and lower on-time graduation rates than those in traditional face-to-face classrooms. International research also finds that students learning online achieved less than matched students in previous years.
24. While NAPLAN data shows no major changes in student learning achievement in reading and numeracy across states and territories, analyses of other data sources such as 'Check-in Assessments' in NSW highlight that secondary students may have been negatively impacted by remote and online learning.
25. Some early evidence suggests that particular cohorts of students may be more negatively impacted by remote and online learning. One study based on Progressive Achievement Tests² (PATs) showed that Year 3 students from low SES backgrounds achieved less learning growth than their peers from high SES backgrounds.
26. ACARA data highlight no differences in certification rates in jurisdictions that experienced the longest periods of remote and online learning such as Victoria and NSW.
27. Relative to previous years, in 2021, more Victorian Year 12 completers and school leavers enrolled in vocational training and higher education, rather than taking up employment.

This section reviews research conducted in Australia on the impact of remote and online learning on student academic outcomes, both overall and for different student cohorts. The focus is primarily on student academic achievement as measured in standardised tests (numeracy and reading). This section draws on the available research and published data, focusing firstly on student achievement, followed by other student outcomes such as Year 12 completion and student post-school destinations.

Research prior to COVID-19

Prior to COVID-19 researchers were interested in examining the effectiveness of face-to-face teaching compared to remote and online learning (Heissel, 2016; Means, Toyama, Murphy & Bakia, 2013) and distance education more broadly (Cavanaugh, 2001; Rice, 2006). Meta-analyses concerning primary and secondary students enrolled in remote and online learning compared to face-to-face classrooms suggest no significant differences between the two forms of schooling on student academic achievement on standardised tests and school assessments (Cavanaugh, 2001; Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004).

2 PATs measure a range of key learning areas and are used by half of Australian schools. See <https://www.acer.org/au/pat/assessments> for more information.

International models and examples

Virtual schools ‘deliver all curriculum and instruction via the Internet and electronic communication, usually asynchronously with students at home and teachers at a remote location’ (Miron & Gulosino, 2016, p.3). To evaluate their effectiveness, the United States National Education Policy Center produced annual reports on virtual schools.³ In the most recent of these studies (Molnar et al., 2017), the academic performance of almost 200,000 students in the United States were analysed from the 2009-10 to 2012-13 school years. Students were matched on grade level, gender, race/ethnicity, free lunch eligibility, English learner status, special education status, and prior achievement. The researchers concluded that full-time primary and secondary students attending virtual schools achieved less learning growth in mathematics and reading compared to traditional face-to-face schools.

This finding is consistent with studies of virtual schools in individual American states (Chingos & Schwerdt, 2014). For example, based on a sample of 1.7 million students (Years 3 to 8) attending virtual, traditional face-to-face public, and face-to-face charter schools in Ohio in the 2009–10 and 2012–13 school years, Ahn and McEachin (2017) found that virtual schools performed worse than face-to-face schools on state-wide standardised tests for mathematics, reading, science and history. Further, Miron and Gulosino (2017) found that only 40.6 per cent of full-time virtual schools were associated with on-time graduation rates, which was less than the national average of 81.0 per cent.

Taken together, the findings of these studies suggest that students enrolled in virtual schools could be worse off in terms of student academic outcomes and on-time graduation rates than students in traditional schools. This relates to findings in overseas studies which generally show that students achieved less learning growth in countries with comparable periods of lockdown to some Australian states and territories, such as the United States, England, Germany and the Netherlands (please see Appendix H). However, as Rice (2006) argues, the effectiveness of online learning may have more to do with who is learning, ‘who is teaching’, and ‘how learning is accomplished’ rather than the mode of delivery itself (p. 440). Although there were efforts to control for the influences of student background and prior achievement, it is very difficult to control for the teaching and learning that took place within virtual and face-to-face schools that may influence the results.

Findings

23. Pre-COVID-19 evaluations of virtual schools in the United States found that students achieved less learning growth and lower on-time graduation rates than those in traditional classrooms. Other international research also found that students learning online achieved less than matched students in previous years.

3 Please see Miron & Gulosino, 2016; Molnar, Miron, Huerta, Cuban, Horvitz, Gulosino, Rice, & Shafer, 2013; Molnar, Rice, Huerta, Shafer, Barbour, Miron, Gulosino & Horvitz, 2014; Molnar, Huerta, Shafer, Barbour, Miron, Gulosino, 2015; Molnar, Miron, Gulosino, Shank, Davidson, Barbour, Huerta, Shafer, Rice & Nitkin, 2017.

Australian research during the COVID-19 period

Analysis of student academic achievement has typically set out to explore two questions:

- whether there has been a decline in achievement in the pandemic years (2020 and 2021) compared to previous years,
- and whether remote and online learning resulted in widened achievement gaps between low SES and high SES students.

There are five main reports and studies informing this analysis of Australian student academic achievement. ACARA, the NSW Department of Education, and a university research team produced these reports, which are summarised in Table 5-1 below. They analysed data from a range of sources, including NAPLAN, 'Check-in assessments' and Progressive Achievement Tests (PATs) from 2016 to 2021. Most of the reports focus upon student achievement in the pandemic years of 2020 and 2021, and are concentrated in NSW. Overall, the findings from the available reports are inconclusive in relation to both questions.

Table 5-1 Summary of Australian evidence on achievement

Author/organisation	Source type	Jurisdiction	Data	Focus and year of data	Findings	Reliability
ACARA (2022)	Website	Australia-wide and states and territories	NAPLAN Years 3, 5, 7 and 9 in numeracy and reading	Overall achievement between 2019 and 2021	No major differences in achievement Australia wide and within states and territories.	🟡
NSW Department of Education (2020)	Report	New South Wales	'Check-in assessments' Years 3, 5 and 9 in numeracy and reading	Overall achievement between 2019 and 2020	Learning loss reported for Year 3 reading, Year 5 reading and numeracy and Year 9 numeracy.	🟡
NSW Department of Education (2022c)	Report	New South Wales	'Check-in assessments' Years 3 to 9 in numeracy and reading	Overall achievement between 2019 and 2021	Year 3, 5, 7, 8, and 9 performed lower than predicted by NAPLAN in numeracy and reading	🟠
Gore et al. (2020)	Peer reviewed paper	New South Wales	PAT Years 3 and 4 mathematics and reading	Exploring achievement gap widening in 2019 and 2020	2 months learning loss in Year 3 mathematics in low SES schools compared to high SES schools	🟠

AERO evidence reliability key: 🟡 = low confidence 🟠 = medium confidence.

The results presented in the ACARA research show no major changes in student achievement. This largely contrasts with international research findings, which generally show less learning growth during remote and online learning compared to non-pandemic years (please see Appendix H for more detail on studies from the United States, England, Germany and the Netherlands). Some interviewees pointed to the narrowing of the curriculum and increased focus on numeracy and literacy during remote and online learning as a possible contributing factor to the relatively stable performance of identified Australian students. It should however also be noted that assessments such as NAPLAN do not measure all key learning areas, all grade levels, or report results for all cohorts.

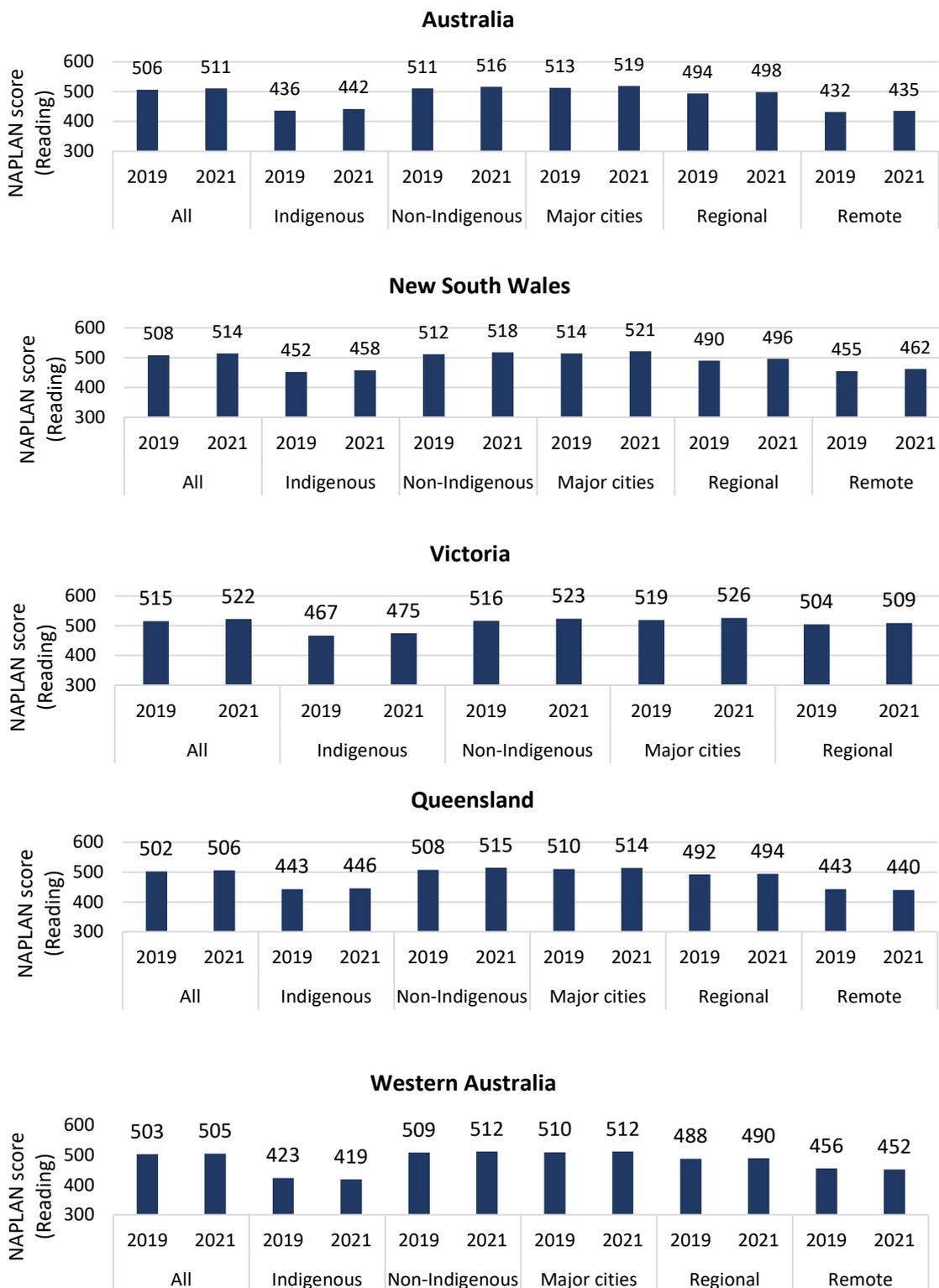
A consistent narrative is yet to emerge on the effect of COVID-19 upon student achievement. This is because each state and territory had a different experience of remote and online learning. Additionally, consultation with some jurisdictions found that available data was yet to be analysed at a cohort level, while some stakeholders noted that research was currently underway which will triangulate results from 2021 NAPLAN tests and internal school-based assessments. Future analyses from individual states and territories utilising a range of data sources may identify new insights into the impacts of COVID-19 upon learning outcomes. At present, some general themes can be highlighted, such as the negative impact upon young primary-age children (notably at Year 3) from low SES backgrounds and secondary level students, in both reading and numeracy. The following sections outline the Australian reports in detail.

Overall student academic achievement

NAPLAN

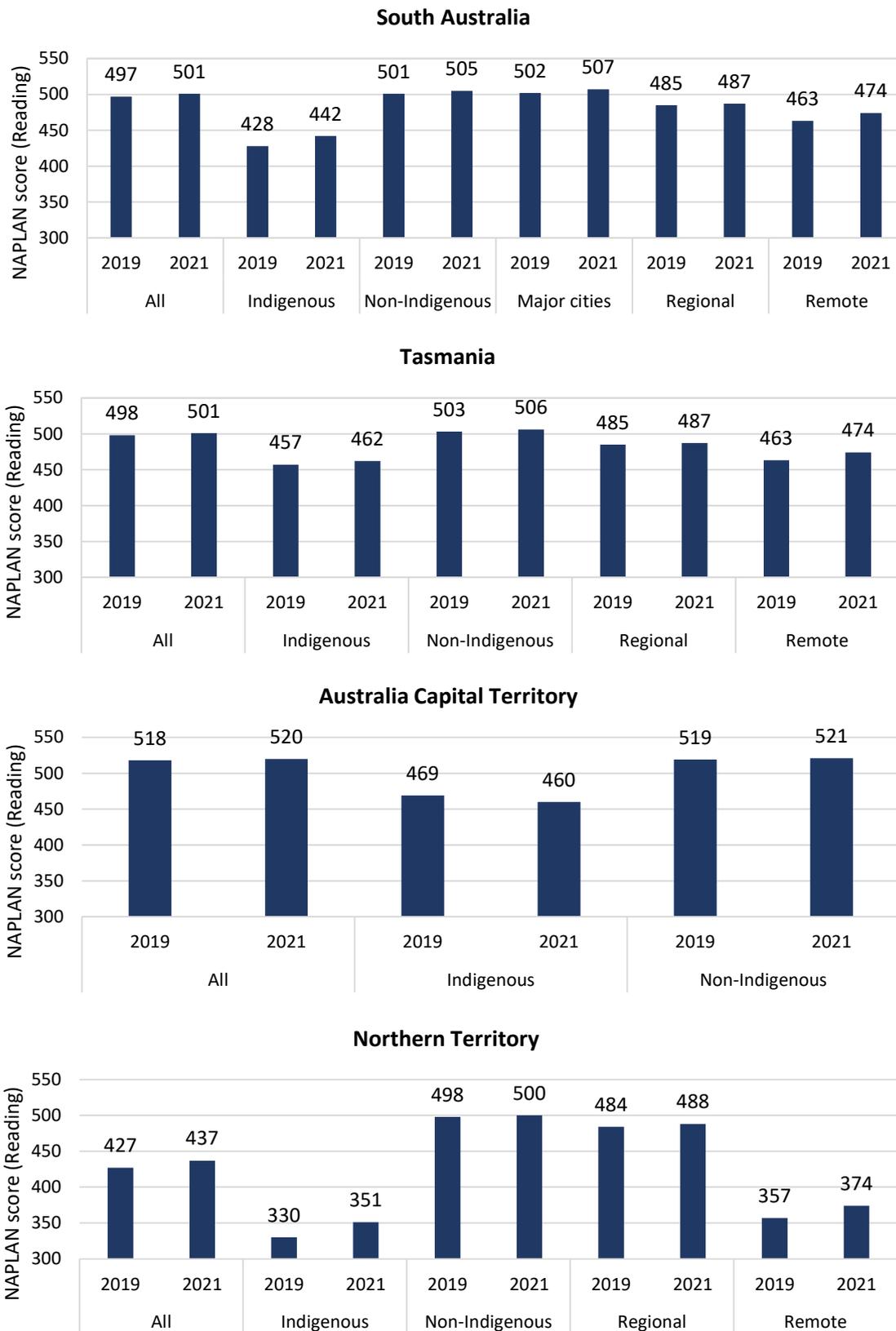
Analysis of NAPLAN data by ACARA (ACARA, 2022) identified no major changes in achievement from 2019 to 2021 Australia-wide and within the individual states and territories, although there were some minor changes observed. The NAPLAN data for Year 5 reading for example, highlights that there were small increases in each of the states and territories, including Victoria, NSW and the ACT which had the longest lockdown periods. Victoria, the state with the longest experience of remote and online learning, reported an increase in mean scale scores from 515 in 2019 to 522 in 2021. Similarly in NSW, Year 5 reading increased from 508 in 2019 to 514 in 2021. Lastly, reading achievement increased two mean scale scores for Year 5 learners in the ACT from 518 in 2019 to 520 in 2021 (ACARA, 2022). Figure 5-1 to Figure 5-4 report the reading outcomes for Year 5 and Year 9 students Australia-wide and within individual state and territories, in 2019 and 2021.

Figure 5-1 Year 5 NAPLAN Reading outcomes, 2019 and 2021, Part 1



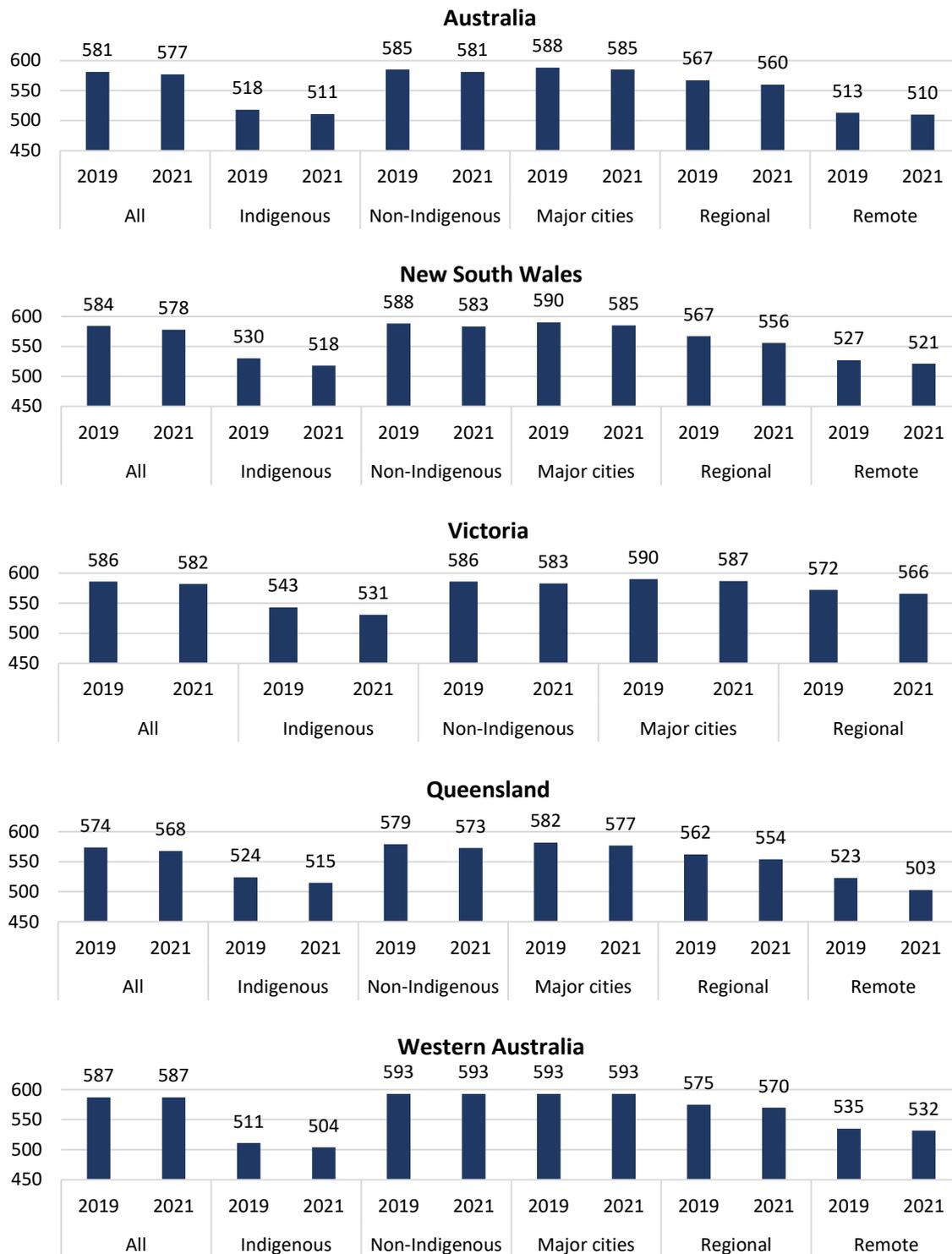
Source: ACARA (2022).

Figure 5-2 Year 5 NAPLAN Reading outcomes, 2019 and 2021, Part 2



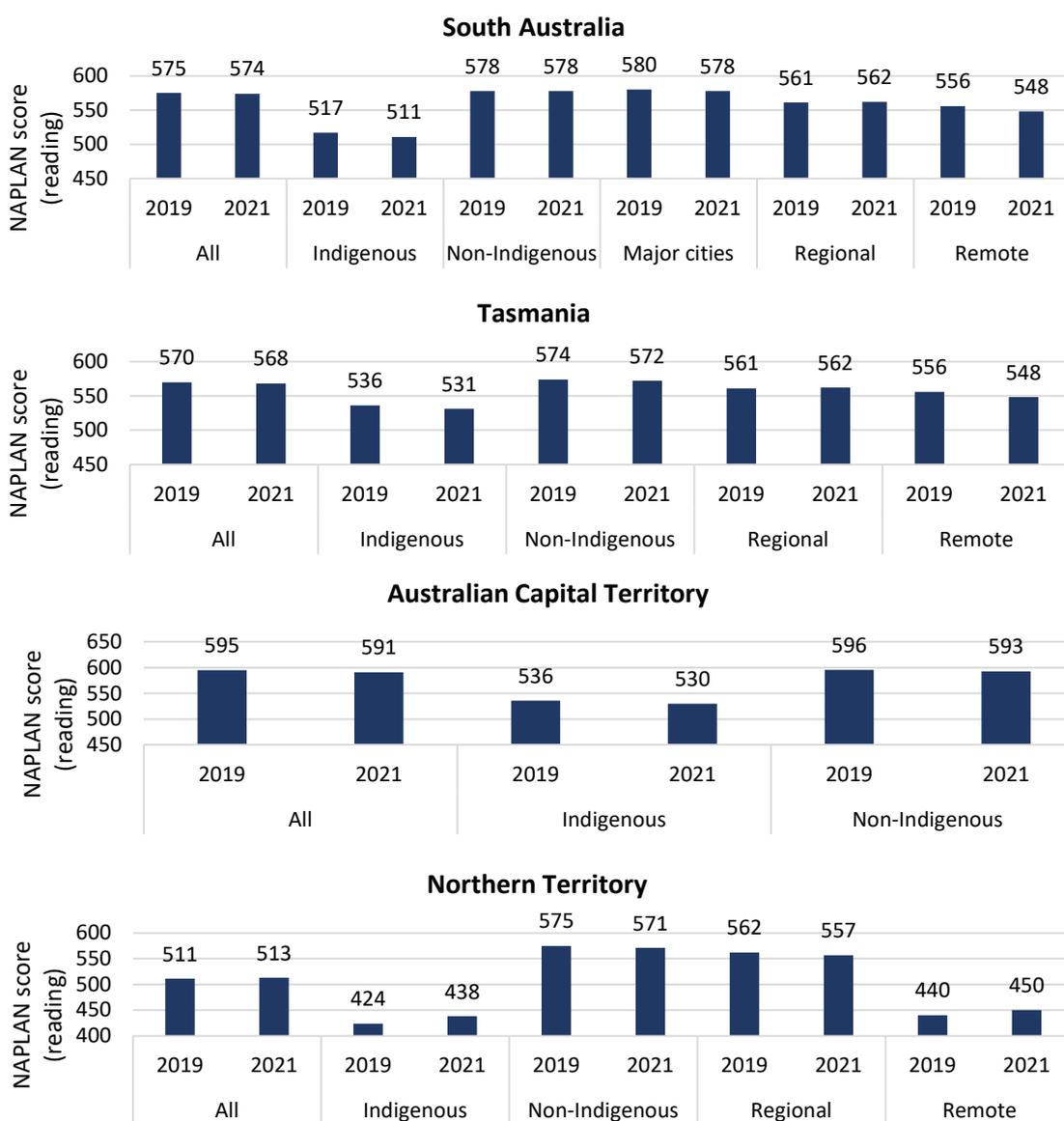
Source: ACARA (2022).

Figure 5-3 Year 9 NAPLAN Reading achievement, 2019 and 2021, Part 1



Source: ACARA (2022).

Figure 5-4 Year 9 NAPLAN Reading achievement, 2019 and 2021, Part 2



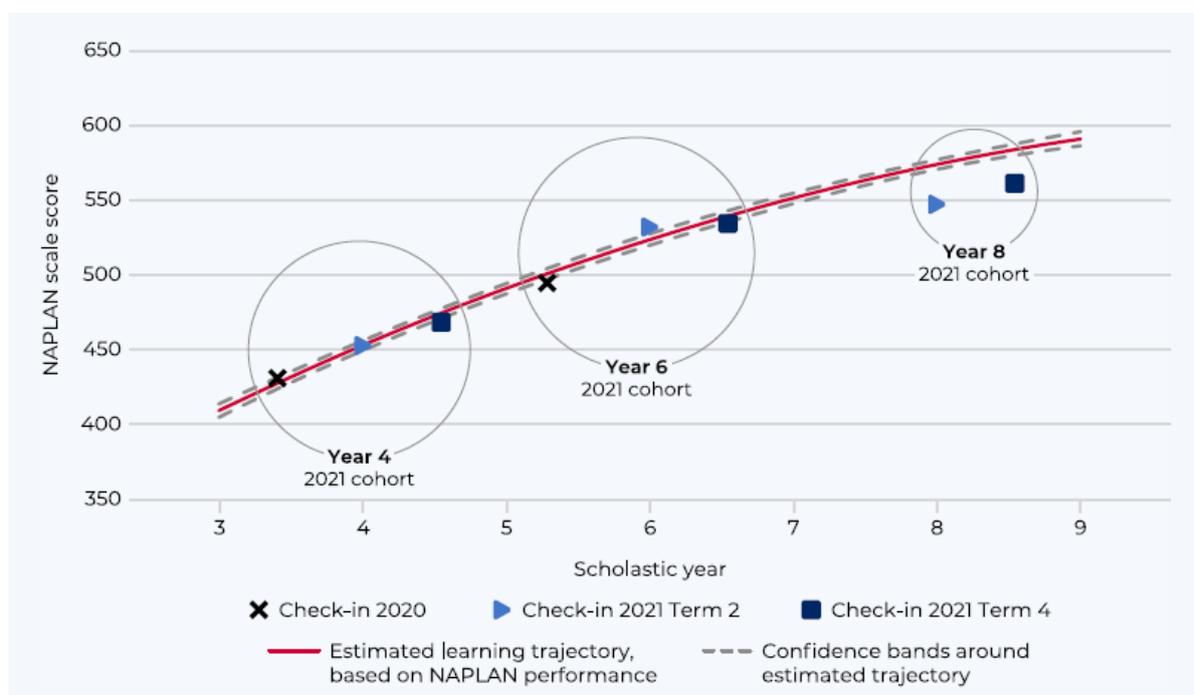
Source: ACARA (2022).

‘Check-in Assessments’ in NSW government schools

The NSW Department of Education utilised ‘Check-in Assessments’ to measure students’ academic outcomes in 2020 and 2021 (NSW Department of Education, 2022c). ‘Check-in Assessments’ were optional online tests covering ‘similar aspects of literacy and numeracy as in NAPLAN reading and numeracy tests’ (NSW Department of Education, 2020, p. 1), with one quarter of the items reflecting statistically reliable NAPLAN test items (NSW Department of Education, 2022c). These assessments were initially used to provide teachers and schools with feedback on student learning progress, in the absence of NAPLAN, which was cancelled in 2020. Around 83 per cent of NSW government schools participated in 2020.

As stated, ‘the ‘Check-in Assessments’ were first held in Terms 3 and 4 of 2020 for Years 3, 5 and 9. Following the success of the trial in 2020, they were offered again to Years 4, 6 and 8 in early Term 2 2021 and Years 3 to 9 in Term 4 2021’ (NSW Department of Education, 2020, p. 1). The results were weighted at the student level by prior performance band in NAPLAN and level of remoteness to calculate population estimates of academic performance. In 2020, the NSW Department reports that on average ‘students have fallen approximately 3-4 months behind in Year 3 reading, and 2-3 months behind in Year 5 reading and numeracy and Year 9 numeracy’ (NSW Department of Education, 2020, p. 3). A more complete picture was available by tracking the Years 3 and 5 cohorts into Years 4 and 6 respectively, drawing on ‘Check-in Assessments’ in Term 4 of 2021. For numeracy and reading, these two primary level cohorts are progressing in their learning as predicted (please see Figure 5-5 and 5-6 below for numeracy only).

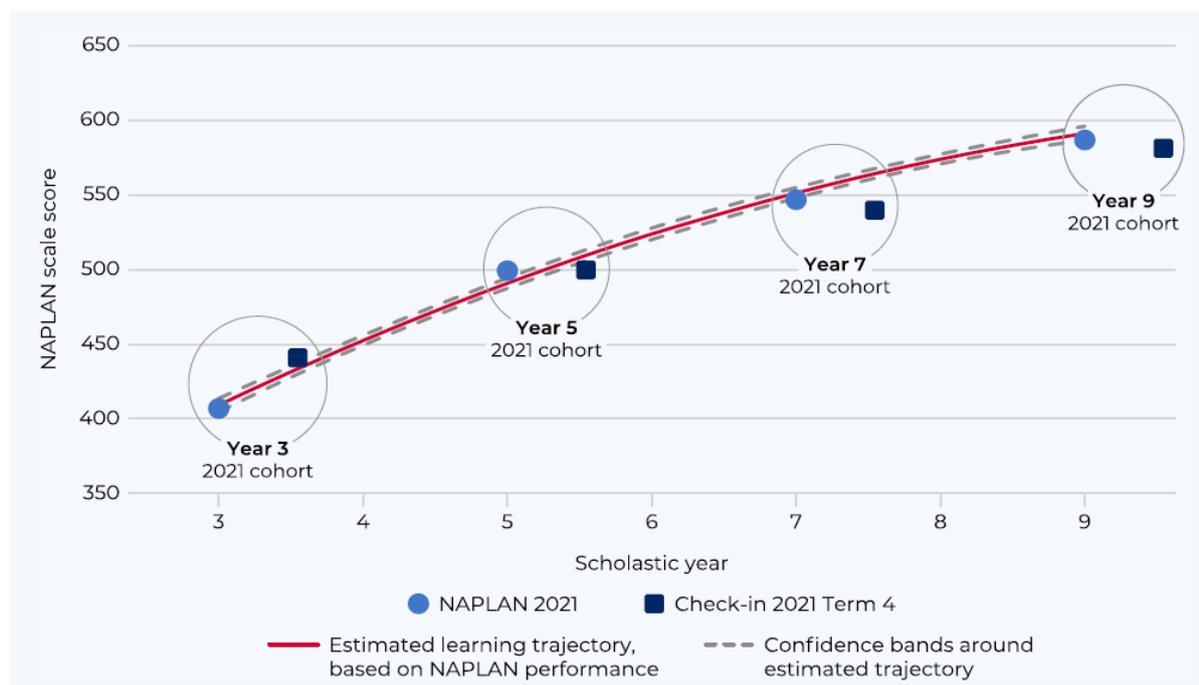
Figure 5-5 NSW Check-in performance: trajectory of mean NAPLAN numeracy scores, Years 4, 6 and 8, 2020 and 2021



Source: NSW Department of Education, 2022c.

In Figure 5-6, it can be observed that Year 3 students exhibited learning growth, but Years 5, 7 and 9 achieved less learning growth in both numeracy (and reading) than predicted by NAPLAN data. These cohorts did not have baseline data from 2020. Similarly, Year 8 learners were also tested in 2021 and were found to perform lower than predicted by NAPLAN for both numeracy and reading (please see Figure 5-5 above) It is noted that ‘ceiling effects’ (NSW Department of Education, 2022c, p. 6) or issues related to the measurement of achievement for high performers may have contributed to the results for secondary students, but nevertheless the data show that secondary students may be a cohort that requires additional support.

Figure 5-6 NSW Check-in performance: trajectory of mean NAPLAN numeracy scores, Years 3, 5, 7, and 9, 2021



Source: NSW Department of Education, 2022c.

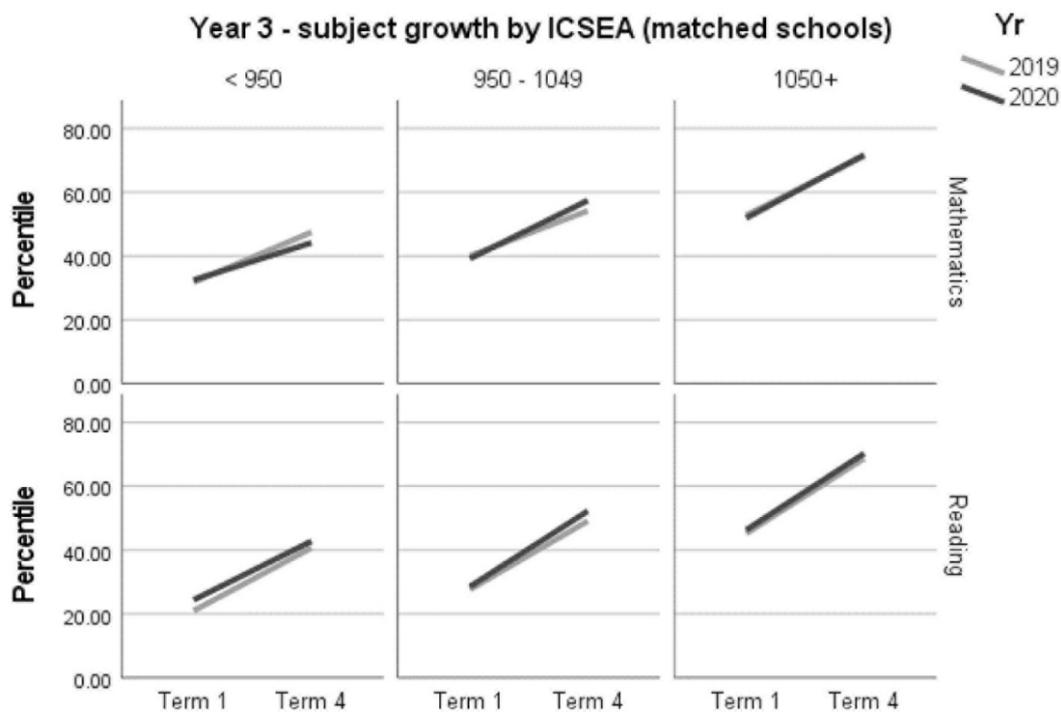
Disadvantaged students and educational equity

Gore et al. (2020) examined the effect of remote and online learning on student mathematics, reading and science achievement by analysing primary school PATs. 51 schools delivering remote and online learning in 2020 were compared to schools delivering face-to-face learning in 2019. The schools were matched by location (major cities, inner regional and outer regional) and school SES, as measured by the Index of Community Socio-Educational Advantage (ICSEA) to calculate relative changes in learning across year levels and key learning areas.⁴

Significant differences were reported for Year 3 students in mathematics. Mid-SES schools (ICSEA of 950 - 1050) that had undertaken remote learning in 2020 achieved two months of learning gains compared to matched schools in 2019. In contrast, for Year 3 mathematics, low-ICSEA schools (<950), were two months behind matched schools in 2019, suggesting that remote learning can have a more negative effect upon disadvantaged schools for this particular year level and key learning area. These are highlighted in Figure 5-7.

⁴ The ICSEA is a relative measure of socioeconomic advantage used to compare schools. The average value is 1000, with a standard deviation of 100.

Figure 5-7 New South Wales PAT assessments by ICSEA, 2019 and 2020



Source: Gore et al. (2020).

The research also highlighted that the performance of students in inner or outer regional schools did not differ significantly from those in metropolitan schools, and students from Indigenous backgrounds did not perform significantly worse during remote and online learning conditions compared to on-site learning. The researchers point out that small sample sizes may have been a factor influencing these results.

Findings

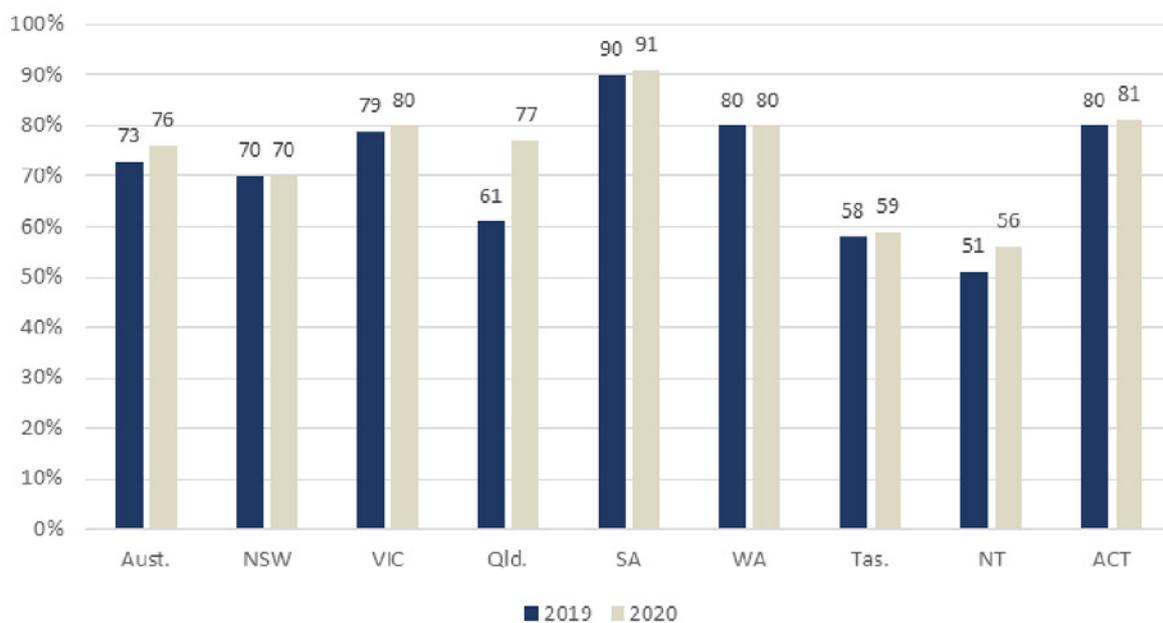
24. While NAPLAN data shows no major changes in student learning achievement in reading and numeracy across states and territories, analyses of other data sources such as 'Check-in Assessments' in NSW highlight that secondary students may have been negatively impacted by remote and online learning.
25. Some early evidence suggests that particular cohorts of students may be more negatively impacted by remote and online learning. One study based on Progressive Achievement Tests⁵ (PATs) showed that Year 3 students from low SES backgrounds achieved less learning growth than their peers from high SES backgrounds.

5 PATs measure a range of key learning areas and are used by half of Australian schools. See <https://www.acer.org/au/pat/assessments> for more information.

Year 12 completion

Year 12 completion rates vary between states and territories in Australia, with ACARA data for 2020 indicating that the shift to remote and online learning did not impact on these rates. ACARA reports Year 12 completion rates as ‘certification rates’, which ‘are estimated by calculating the number of students who meet the requirements of a Senior Secondary Certificate or equivalent expressed as a percentage of the potential Year 12 population’ (ACARA, 2020a). Overall, jurisdictions that experienced the longest periods of remote and online learning such as Victoria and NSW did not report major changes in certification rates in 2020 compared to the previous year. Queensland reported the largest change, with 61 per cent in 2019 compared to 77 per cent in 2020; however, this was related to a technical change⁶ that occurred in 2005 that impacted completions in 2019. Figure 5-8 summarises the completion rates across jurisdictions.

Figure 5-8 Year 12 certification rates, 2019 and 2020 (per cent)



Source: ACARA (2020a).

Findings

26. ACARA data highlight no differences in certification rates in jurisdictions that experienced the longest periods of remote and online learning such as Victoria and NSW.

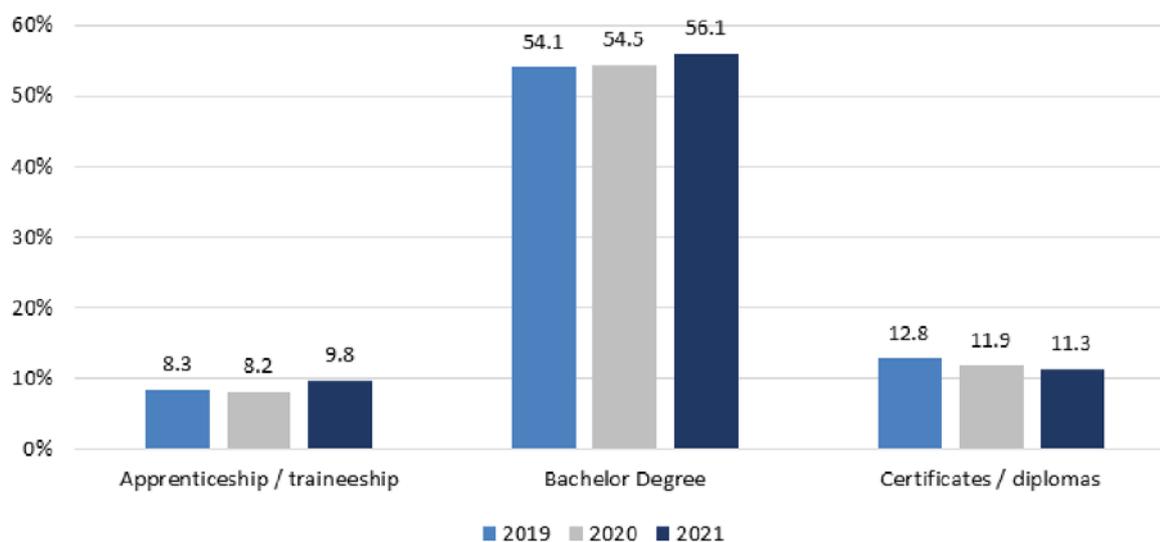
⁶ In 2019 Queensland had a ‘half cohort’ complete Year 12. This was due to the introduction of pre-year 1 in 2007 where students must have turned 5 by June 30. This effectively halved the cohort for that year only. This has flowed through to completions in 2019. This also affects the Year 12 certification rate for Australia in 2019 (ACARA, 2020).

Post-school transitions in Victoria

Another aspect of student outcomes includes post-school destinations. Jurisdictions such as Queensland, NSW and the ACT have publicly available data on the post-school destinations of school students who either completed Year 12 or did not complete Year 12 (early school leavers) in 2019. Data from the pandemic years, 2020 and 2021, were available from Victoria's On Track survey, which tracks Year 12 completers and early leavers. The survey gathers information about their education, training and employment status six months after leaving school (DET, 2022a). Between April and July 2021, 27,085 Year 12 completers and 1,678 early school leavers participated in the survey (DET, 2021b). The following paragraphs outline the key changes observed in post-school destinations in Victoria.

The potential impact of the pandemic on post-school destination choices can be observed by exploring the change in outcomes from 2019 to 2021. There has been a 1.5 percentage point growth of Year 12 completers undertaking apprenticeships or traineeships in 2021 compared to 2019. Bachelor's degrees saw a larger net increase of 2 percentage points in 2021 compared to 2019. Certificates and diplomas on the other hand saw a small decrease to 11.3 per cent in 2021 compared to 12.8 per cent in 2019 (see Figure 5-9). These results signify that more young Victorians in transition during the pandemic may have responded to instability in the labour market by seeking longer-term education and training options rather than enrolling in short courses.

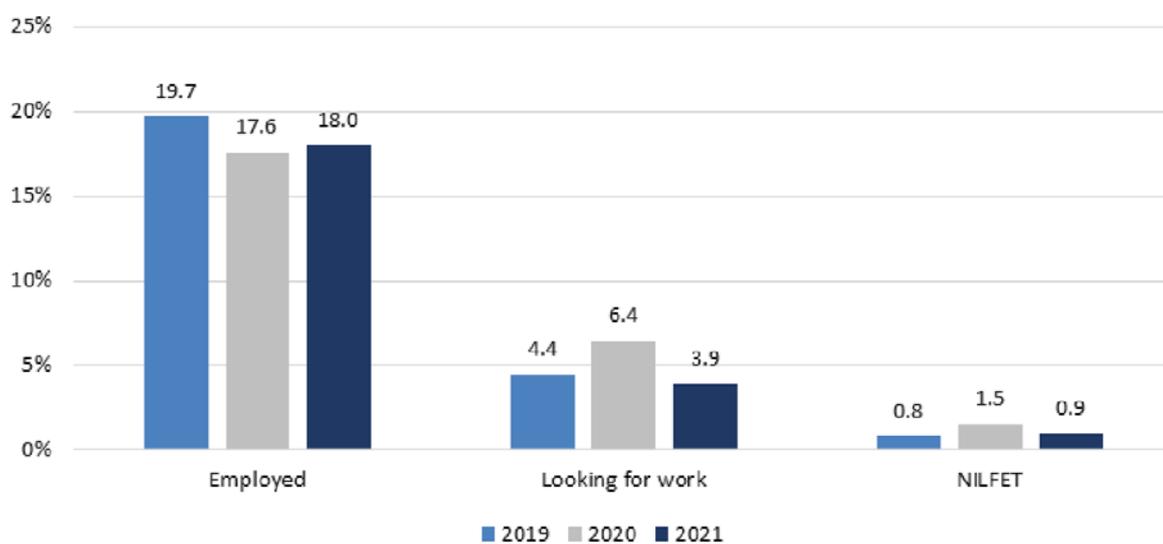
Figure 5-9 Post-school destinations Victorian Year 12 completers, 2019-2021, per cent



Source: Department of Education and Training (2021b).

Figure 5-10 shows that a lower proportion of Year 12 completers not in education or training were employed in 2021, 18 per cent compared to 19.7 per cent in 2019. While 6.4 per cent of young people were looking for work during 2020 compared to 4.4 per cent in 2019, this decreased further to 3.9 per cent in 2021. Similarly, the proportion of young people who were not in the labour force, education or training (NILFET) increased in 2020 compared to 2019, but has since returned to almost pre-pandemic levels, at 0.9 per cent. The data indicates that more young people in Victoria who have completed their Year 12 certificate may be choosing to enrol in vocational training and higher education, and are less likely to transition straight into employment.

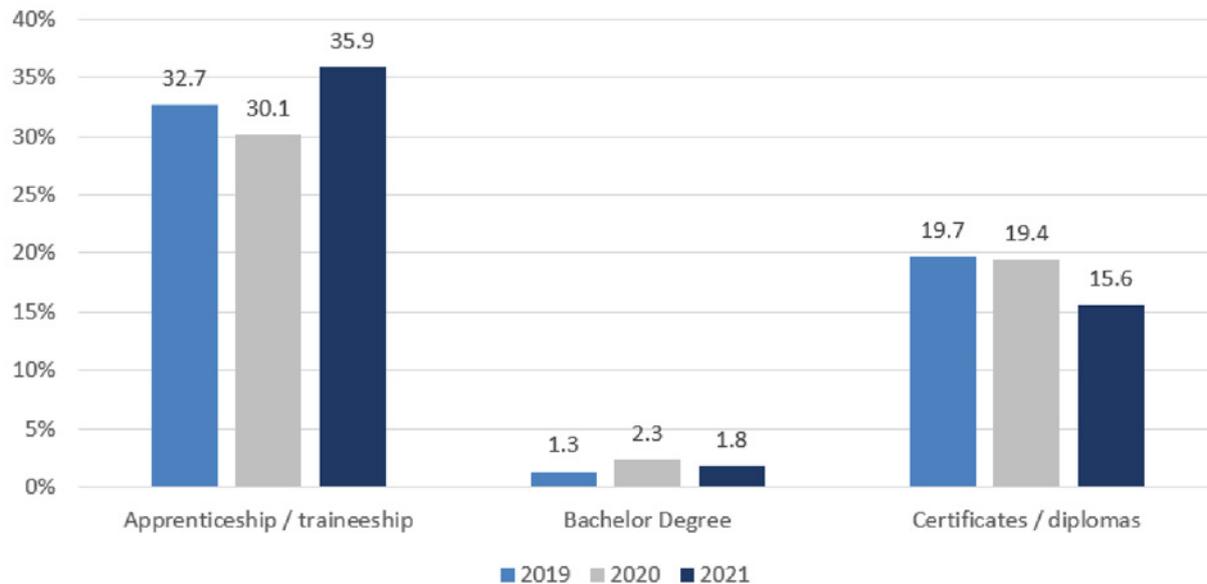
Figure 5-10 Post-school destinations Victorian Year 12 completers not in education or training, 2019-2021, per cent



Source: Department of Education and Training (2021b).
 Notes: NILFET = Not in labour force education or training

Similar patterns in post-school destinations are also observed in early school leavers, or those who did not complete their senior secondary certificate. The proportion of those undertaking an apprenticeship or traineeship saw a net increase in 3.2 percentage points in 2021 compared to 2019 and a slight increase in bachelor’s degree enrolments, of 0.5 percentage points. The largest change in destinations in Year 12 non-completers is a 4.1 percentage point decrease for certificates and diplomas, which is the largest overall change in both groups (see Figure 5-11).

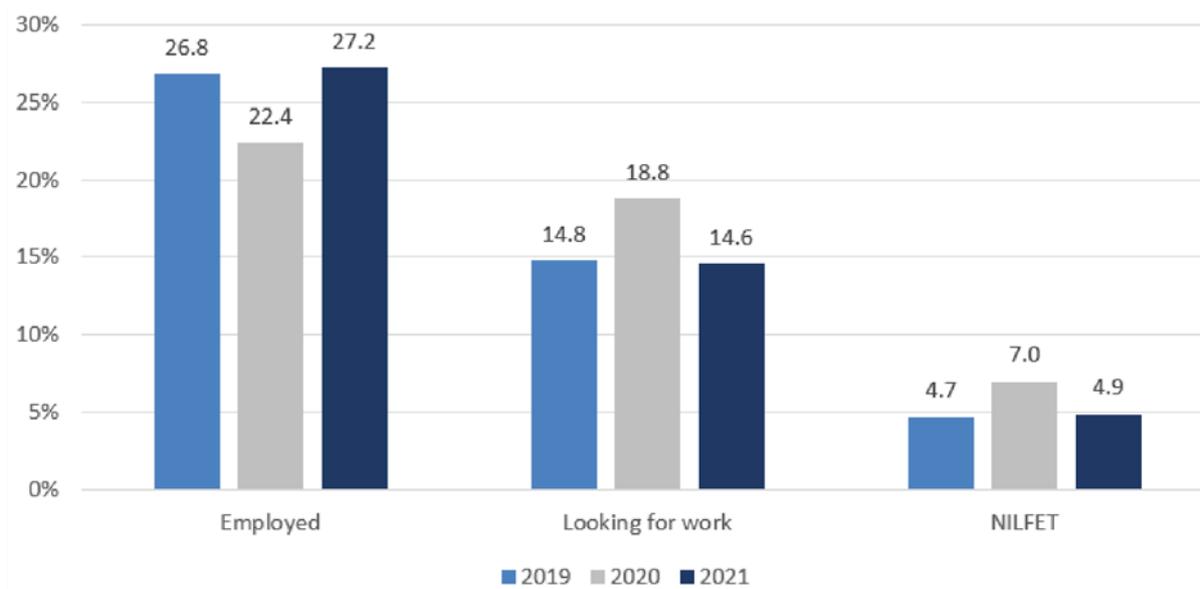
Figure 5-11 Post-school destinations Victorian Year 12 non-completers in education or training, 2019-2021, per cent



Source: Department of Education and Training (2021b)

Figure 5-12 below outlines the proportion of Year 12 non-completers not in education or training. There were more non-completers employed, looking for work and NILFET in 2020 compared to 2019, however the post-school destinations in 2021 are returning to pre-pandemic levels for all destinations. This data highlights an opportunity for future longitudinal research into the long-term academic outcomes associated with remote and online learning during the COVID-19 pandemic.

Figure 5-12 Post-school destinations Victorian Year 12 non-completers not in education or training, 2019-2021, per cent



Source: Department of Education and Training (2021b).

Findings

27. Relative to previous years, in 2021, more Victorian Year 12 completers and school leavers enrolled in vocational training and higher education, rather than taking up employment.

Conclusion

The available data so far suggests that student learning in Australia was not as negatively impacted by remote and online learning compared to students located overseas. Contextual factors vary considerably across Australian states and territories, such as the data utilised, the lengths of time spent in lockdown, and the teaching and learning conditions as part of remote and online learning. Importantly, COVID-19 meant that schools and teachers had to prepare and deliver lessons under emergency conditions, without warning or time to plan. As a result, it is difficult to compare the findings of pre-COVID-19 literature to those written under pandemic teaching and learning conditions. As such, any findings need to be interpreted and compared carefully.

Section 5 research opportunity

(RO3) Develop a more sophisticated understanding of the impacts of remote and online learning

The Review was unable to find conclusive evidence of the academic impacts of the 2020 to 2021 remote and online learning period, due to limitations in Australian data and research available. Further research is required to understand the broader impacts of this period and target support to address learning loss. Examples of potential research streams that could be explored are:

1. Conducting a targeted analysis of ACARA's NAPLAN data, with a particular focus on vulnerable student cohorts. This would consist of comparing empirical learning trajectories estimated from using historical NAPLAN data against the data obtained for 2021 and 2022 to start assessing the longer-term impact of the disruption to learning caused by COVID-19. Specifically, this includes contrasting the trajectories of students who may have undergone significant remote learning periods with those of statistically similar students in other jurisdictions that had less strict COVID restrictions
2. Undertaking a detailed analysis of 2021 Australian Early Development Census data, focusing on the vulnerable young learners for example, low-socioeconomic status or EAL/D learners) to facilitate a better understanding of the differential impact of COVID-19 and associated lockdowns on early childhood development. A more nuanced understanding of the strength and vulnerabilities of this cohort, from the time they enrol in schools, will help systems better evaluate any potential longer-term effect of COVID-19 as well as the effectiveness of any system intervention efforts to help students get back on track.

Additionally, teacher shortages may see systems increasingly having to make decisions on how to deliver secondary schooling (particularly in rural areas for certain subjects) where the ideal scenario, the employment of a suitably trained teacher, cannot be achieved. If both online and remote delivery and in-person provision with an out-of-field teacher are viable alternatives, studies to capture the relative impact of each approach (across achievement and wellbeing outcomes) should be undertaken. These would be compared to face-to-face teaching with a qualified teacher. Such evaluations could also explore whether outcomes differ for online and remote delivery of subjects with practical or applied elements like science, the performing arts and Vocational Education and Training subjects.

6. Policy and research opportunities

Remote and online learning is increasingly becoming an important component of education in Australia. Despite this, there is a consensus among the consulted education stakeholders that on-site classrooms remain the best option for giving all students the opportunity to access a quality education. As the COVID-19 pandemic showed, this is not always possible.

This section identifies policy and research opportunities arising from the project findings that relate to the application of remote and online learning as part of 'standard' schooling, as well as for future crises. Events could include a state-wide or national move to remote and online schooling, such as in the COVID-19 pandemic, or a more localised move in response to natural disasters such as flooding or bushfires, or in response to teacher shortages.

Categorising opportunities

A set of 10 actionable policy opportunities and 3 research opportunities were drawn from the findings detailed across each of the Report's sections.

The policy opportunities were collectively assessed, leading to the following groupings being identified:

1. Support the current and future teacher workforce
2. Enhance student wellbeing
3. Strengthen online and remote learning resources and infrastructure

It is a collective responsibility to ensure that the learnings from remote and online education provision developed during the COVID-19 pandemic are not lost. The responsibility to engage with and implement the various policy opportunities sits not only with the Australian Government, but with each jurisdiction's education department, non-government school system authorities, and other key stakeholders. These opportunities are presented in Table 6-1. Also included is the rationale and context for each grouping, alongside the potential outcomes expected from acting upon each opportunity.

Research opportunities

Subject to the agreement of Education Ministers, new research will need to be conducted for systems and schools to better understand how online and remote learning can be most effectively delivered; how it compares to classroom delivery; and the extent to which the answers to these questions vary by student cohort, year level and subject. Details on the research opportunities are provided below.

Research opportunity 1: Conduct new research to determine effective remote and online learning practices

The current evidence base on remote and online teaching practices is too immature for detailed guidance for teachers to be confidently developed. Conducting new research will

enable teachers, school leaders and systems to make more informed decisions in the event of future crisis situations, and improve the quality of standard online and remote schooling provision.

This research should prioritise evaluations of both widely used and promising online and remote teaching approaches. In particular, the appropriate mix of synchronous and asynchronous delivery for school-aged children should be investigated. Where possible, these should use evaluation techniques that would be classed as High Confidence under AERO's Standards of Evidence, to provide causal evidence on 'what works' in this space. These evaluations should explore whether particular approaches (e.g. varying the structure of the school day to suit online and remote provision) have different impacts across different student cohorts (e.g. English as an Additional Language / Dialect (EAL/D) students, students with disability, at-risk students or those who may disengage or dropout of school) and across different age-ranges.

Research opportunity 2: Improving wellbeing services delivered during remote and online learning

While systems and schools made changes to how mental health and wellbeing services could be accessed by students during remote learning, no evaluations of the effectiveness of these arrangements have been undertaken and we do not know whether these additional supports helped to mitigate effects of the COVID-19 pandemic or led to improved student wellbeing.

The effectiveness of wellbeing services delivered in a remote and online setting could particularly impact students from disadvantaged families who may be more reliant on services delivered through schools.

A potential avenue for further research is examining best practice models for how schools can deliver essential wraparound support services to students in times of crisis and through periods of conventional remote and online learning. This would include evaluating the transferability of school-based wellbeing supports into the online and remote environment, particularly those that are most critical for students such as school counselling.

This research should provide information to school leaders and school-based services to guide how they deliver these services in future remote and online learning contexts. These evaluations may also provide guidance to systems on whether there is potential to scale up services that can be effectively delivered online. A further consideration would be identifying how services need to be adapted for students at different age levels, EAL/D students, students with disability and their parents and carers.

Research Opportunity 3: Develop a more sophisticated understanding of the impacts of remote and online learning

The Review was unable to find conclusive evidence of the academic impacts of the 2020-2021 remote and online learning period, due to limitations in Australian data and research available. Further research is required to understand the broader impacts of this period and

to target support to address learning loss. Examples of potential research streams that could be explored are:

- Conducting a targeted analysis of ACARA's NAPLAN data, with a particular focus on vulnerable student cohorts. This would consist of comparing empirical learning trajectories estimated from using historical NAPLAN data against the data obtained for 2021 and 2022 to start assessing the longer-term impact of the disruption to learning caused by COVID-19. Specifically, this includes contrasting the trajectories of students who may have undergone significant remote learning periods with those of statistically similar students in other jurisdictions that had less strict COVID restrictions.
- Undertaking a detailed analysis of 2021 AEDC data, focusing on the vulnerable young learners (e.g. low SES or EAL/D learners) to facilitate a better understanding of the differential impact of COVID and associated lockdowns on early childhood development. A more nuanced understanding of the strength and vulnerabilities of this cohort, from the time they enrol in schools, will help systems better evaluate any potential longer-term effect of COVID as well as the effectiveness of any system intervention efforts to help students get back on track.

Additionally, teacher shortages may see systems increasingly having to make decisions on how to deliver secondary schooling (particularly in rural areas for certain subjects) where the employment of a suitably trained teacher, cannot be achieved. If both online or remote delivery, and in-person provision with an out-of-field teacher, are viable alternatives, studies to capture the relative impact (across both achievement and wellbeing outcomes) of each approach should be undertaken. These results would be compared to face-to-face teaching with a qualified teacher. Such evaluations could also explore whether outcomes differ for online and remote delivery of subjects with practical or applied elements like science, the performing arts and Vocational Education and Training subjects.

Future directions

The nature of the COVID-19 pandemic meant that significant levels of high-quality research was not able to be undertaken. As a result, the identified policy opportunities seek to build upon existing evidence-based practice, as well as develop both workforce and infrastructure capacity to implement remote and online learning in the future. Given the ongoing challenges faced by Australian schools in relation to COVID-19, illness, natural disasters, and staff shortages, there is a clear need to plan for future large scale pivots to remote and online education provision.

In light of the limited available evidence, a suite of research opportunities are identified. These seek to develop an evidence base on effective practice across many dimensions of schooling, and specifically remote and online learning. These include evaluating what is an appropriate mix of synchronous and asynchronous delivery for school-aged children, through to investigating the effectiveness of strategies for monitoring wellbeing among school students.

Table 6-1 Rationale, policy opportunities, and potential outcomes

Rationale and context	Policy opportunities	Potential outcomes
<i>1. Support the current and future teacher workforce</i>		
<p>The COVID-19 period highlighted the importance of a ‘digital ready’ workforce.</p> <p>Many school systems had challenges in teacher staffing and technological capabilities during the initial stages of the pandemic. Teachers hold various levels of capability in online and remote technologies and pedagogical practice.</p> <p>Upcoming releases of the Australian teacher workforce study will be able to capture the perspective of the current workforce. Future teacher workforce capability is essential too, with ITE courses playing an important preparatory role.</p>	<p>(PO2) Facilitate ongoing professional learning opportunities for teachers and other school staff to ensure that the workforce is ‘digital ready’ and has a knowledge of effective remote and online teaching and learning approaches.</p> <p>(PO3) Examine whether the Australian Standards of Professional Practice appropriately articulates levels of capability in remote and online teaching.</p> <p>(PO4) Investigate the extent to which quality remote and online teaching and learning practices are incorporated into Initial Teacher Education courses.</p> <p>(PO8) Scale up effective online initiatives that provide teachers with ways to collaborate with one another, potentially to assist teachers working in regional/ remote areas or out-of-field teaching.</p>	<p>‘Digital ready’ teachers who are equipped with an understanding of best practice in online and remote classrooms may be more likely to deliver quality teaching and learning, leading to improved student achievement and engagement.</p> <p>Teachers who are equipped for online and remote delivery may also experience improved collaboration and overall wellbeing, particularly during any return to online and remote classrooms in the future.</p> <p>Teachers who are experienced in digital tools may be better equipped to support families and their ability to engage with their child’s learning at home.</p>
<i>2. Enhance student wellbeing</i>		
<p>Many approaches were used to monitor and support student wellbeing during COVID-19. However, we do not know whether students felt that their wellbeing was improved as a result of the initiatives brought into schools during recent periods of remote and online learning.</p>	<p>(PO5) Continue to position student wellbeing as a central element of schooling, to be included within system planning and school improvement frameworks.</p> <p>(PO9) Ensure wellbeing-focussed activities and surveys are monitoring the longer-effects of the COVID-19 pandemic.</p>	<p>Schools and education systems that focus on enhanced student wellbeing will have happier students and realise greater student achievement. Wellbeing and achievement are interconnected.</p> <p>Evidence-based and effective wellbeing focused activities delivered by schools assist families and improve their wellbeing.</p>

Rationale and context	Policy opportunities	Potential outcomes
<p>There is scope to improve wellbeing programs, particularly for students who are reliant on wraparound wellbeing services provided by schools (e.g. disadvantaged students and families, and students with disability).</p> <p>Students and families will benefit from applying the lessons learned from COVID-19 and continuing to refine and implement beneficial strategies.</p>	<p>(PO10) Evaluate the transferability of school-based wellbeing supports into the online and remote environment and consider whether there is any potential to scale up the ones that were effectively delivered online.</p>	
<p><i>3. Strengthen online and remote learning resources and infrastructure</i></p>		
<p>Access to technology and devices is required for online learning, but access can vary across Australian schools due to location and internet access.</p> <p>Each system responded differently to deliver remote and online learning during COVID-19.</p> <p>Planning for future crises that may involve a return to online and remote schooling may limit the negative effects that occurred during the COVID-19 pandemic.</p>	<p>(PO1) Establish, or strengthen existing, consistent ICT infrastructure for students and staff, including device and learning platforms.</p> <p>(PO6) Undertake curriculum planning for future ‘crisis’ events, by identifying content that can be removed while maintaining subject integrity, and adapting aspects of the curriculum which are challenging to deliver online.</p> <p>(PO7) Conduct a critical assessment of the common technological tools purchased by schools and education systems, evaluating their accessibility and impact upon student outcomes.</p>	<p>Schools with robust online and remote learning resources and infrastructure in place can deliver better student achievement and wellbeing outcomes in future crises which may demand a return to online learning.</p> <p>Strong digital programs are also essential for the contemporary ‘onsite’ classroom.</p> <p>Identifying which students were negatively impacted by the shift to online and remote learning, will make it easier to provide targeted support to ensure that any ongoing academic effects can be mitigated.</p> <p>Teacher practice will improve through access to high-quality online and remote learning resources and infrastructure.</p> <p>Family engagement with school may also improve when school systems have consistent and accessible ICT infrastructure.</p>

References

- Affouneh, S., Salha, S. & Khlaif, Z. (2020). 'Designing quality e-learning environments for emergency remote teaching in coronavirus crisis'. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, 11(2). doi: 10.30476/ijvlms.2020.86120.1033
- Ahn, J., & McEachin, A. (2017). Student enrollment patterns and achievement in Ohio's online charter schools. *Educational Researcher*, 46(1), 44-57. doi: 10.3102/0013189X17692999
- Ames, K., Harris, L.R., Dargusch, J. & Bloomfield, C. (2020). 'So you can make it fast or make it up': K-12 teachers' perspectives on technology's affordances and constraints when supporting distance education learning. *The Australian Educational Researcher*. 48, 359-376. <https://doi.org/10.1007/s13384-020-00395-8>
- Andrew, A., Cattan, S., Dias, M.C., Farquharson, C., Kraftman, L., Krutikova, S., Phimister, A. & Sevilla, A. (2020). Learning during the lockdown: real-time data on children's experiences during home learning'. Institute for Fiscal Studies. doi:10.1920/BN.IFS.2020.BN0288
- August, D., Carlson, C., Cieslak, M. Y. & Nieser, K. (2021). Educating English learner students during the pandemic: Remote and in-person instruction and assessment. Centre for Success of English Learners. <https://ies.ed.gov/blogs/research/post/educating-english-learner-students-during-the-pandemic-remote-and-in-person-instruction-and-assessment>.
- Australian Curriculum, Assessment and Reporting Authority (ACARA). (n.d.). *Primary curriculum illustrations of practice: Alice Springs School of the Air*. <https://www.australiancurriculum.edu.au/resources/primary-curriculum/illustrations-of-practice/alice-springs-school-of-the-air/>
- Australian Curriculum, Assessment and Reporting Authority (ACARA). (2020a). *Year 12 certification rates*. <https://www.acara.edu.au/reporting/national-report-on-schooling-in-australia/national-report-on-schooling-in-australia-data-portal/year-12-certification-rates>
- Australian Curriculum, Assessment and Reporting Authority (ACARA). (2020b). *National Report on Schooling in Australia 2020*. https://www.acara.edu.au/docs/default-source/default-document-library/national-report-on-schooling-in-australia-2020.pdf?sfvrsn=3faa4c07_0
- Australian Curriculum, Assessment and Reporting Authority (ACARA). (2021). *NAPLAN 2021 summary results data. No major impacts on learning from COVID-19 evident. Long term trends positive* [Media release]. www.acara.edu.au/docs/default-source/media-releases/20210813-naplan-results-med-rel.pdf

- Australian Curriculum, Assessment and Reporting Authority (ACARA) (2022). *NAPLAN Results* [dataset]. <https://reports.acara.edu.au/Home/Results>
- Australian Education Research Organisation (AERO) (2021). *Standards of evidence*. <https://www.edresearch.edu.au/sites/default/files/2022-04/AERO-Standards-of-evidence-A4-120422.pdf>
- Averett, K.H. (2021). Remote learning, COVID-19 and children with disabilities. *AERA Open*, 7(1). <https://doi.org/10.1177/23328584211058471>
- Barbour, M. (2018). The landscape of K-12 online learning: Examining what is known.' In M. Moore & W. Diehl (Eds). *Handbook of Distance Education. 4th Edition*. (pp.521-542). Routledge.
- Barbour, M., Hodges, C., Trust, T., LaBonte, R., Moore, S., Bond, A., Kelly, K., Lockee, B. & Hill, P. (2020). *Understanding pandemic pedagogy: Differences between emergency remote, remote and online teaching*. Special report of the State of the Nation: K-12 E-learning project in Canada Project. Canadian eLearning Network (CANeLearn)
- Barker, B., Thurbon, J., and Goodhue, R. (2021). *Taking the Pulse of Australian Students: ei Pulse Results March 2020 to March 2021*. Canberra: ARACY. [https://www.aracy.org.au/sb_cache/associationnews/id/295/f/Taking%20the%20Pulse%20of%20Australian%20Students%20\(ARACY\)%202021.pdf](https://www.aracy.org.au/sb_cache/associationnews/id/295/f/Taking%20the%20Pulse%20of%20Australian%20Students%20(ARACY)%202021.pdf)
- Blainey, K. & Hannay, T. (2021). *The effects of educational disruption on primary school attainment in summer 2021*. RS Assessment from Hodder Education & SchoolDash. https://www.risingstars-uk.com/media/Rising-Stars/Assessment/Whitepapers/RSA_Effects_of_disruption_Summer_Aug_2021.pdf
- Blanden, J., Crawford, C., Fumagalli, L & Rabe, B. (2021). *School closures and children's emotional and behavioural difficulties*. Institute for Social and Economic Research. https://www.iser.essex.ac.uk/files/projects/school-closures/SDQnote2021_final.pdf
- Bol, T. (2020). Inequality in homeschooling during the Corona crisis in the Netherlands. First results from the LISS Panel. *Working Paper*. April 30, 2020. doi:10.31235/osf.io/hf32q
- Bond, M. (2020a). *Facilitating student engagement through educational technology: Current research, practices and perspectives* [PhD]. Carl von Ossietzky Universität Oldenburg, Oldenburg, Germany. https://www.researchgate.net/publication/339271967_Facilitating_student_engagement_through_educational_technology_Current_research_practices_and_perspectives
- Bond, M. (2020b). *Facilitating student engagement through the flipped learning approach in K-12: A systematic review*. *Computers & Education*, 151. <https://doi.org/10.1016/j.compedu.2020.103819>.

- Borup, J., Graham, C.R. & Drysdale, J.S. (2014). The nature of teacher engagement at an online high school. *British Journal of Educational Technology*, 45(5), 793-806. doi:10.1111/bjet.12089
- Brennan, R. (2003). One size doesn't fit all: pedagogy in the online environment – Volume 1. *NCVER Research report*. https://www.ncver.edu.au/_data/assets/file/0014/4604/nrOf05_1.pdf
- Bubb, S. & Jones, M. (2020). Learning from the COVID-19 home-schooling experience: Listening to pupils, parents/carers and teachers. *Improving Schools*, 23(3), 209-222. <https://doi.org/10.1177/1365480220958797>
- Catholic Education Melbourne. (2021). *Session 1 – the evidence base – what have we learnt about remote learning/working?* Unpublished presentation.
- Cavanaugh, C. (2001). Effectiveness of interactive distance education technologies in K-12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, 7(1), 73–88. <https://www.learntechlib.org/primary/p/8461/>.
- Cavanaugh, C., Gillan, K. J., Kromrey, J., Hess, M. & Blomeyer, R. (2004). The effects of distance education on K–12 student outcomes: A meta-analysis. *Naperville, Ill.: Learning Point Associates*. <http://www.ncrel.org/tech/distance/index.html>.
- Cavanaugh, C. (2013). Student achievement in elementary and high school. In M.G. Moore. (Ed). *Handbook of distance education* (pp. 188-202). New York: Routledge.
- Cavanaugh, C., Repetto, J., Wayer, N. & Spitler, C. (2013). Online learning for students with disabilities: a framework for success. *Journal of Special Education Technology*, 28(1), 1-8. doi: 10.1177/016264341302800101
- Chingos, M. M., & Schwerdt, G. (2014). *Virtual schooling and student learning: Evidence from the Florida Virtual School*. Cambridge, MA: Harvard Kennedy School.
- Chiu, T. (2021). 'Student engagement in K-12 online learning amid COVID-19: A qualitative approach from a self-determination theory perspective'. *Interactive Learning Environments*. <https://doi.org/10.1080/10494820.2021.1926289>
- Christopoulos, A. & Sprangers, P. (2021). Integration of educational technology during the Covid-19 pandemic: An analysis of teacher and student receptions, *Cogent Education*, 8:1, doi: 10.1080/2331186X.2021.1964690
- Clark, K. (2015). 'The effects of the flipped model of instruction on student engagement and performance in the secondary Mathematics classroom'. *Journal of Educators Online* 12(1), 91-115.

- Commissioner for Children and Young People Western Australia. (2020). *COVID-19: As told by WA children and young people*. <https://www.cyp.wa.gov.au/media/4350/covid-19-as-told-by-wa-children-and-young-people-july-2020.pdf>
- Copyright Advisory Group (2022). *Copyright*. National Copyright Unit. Unpublished report.
- Cunningham, K.S. (1931). *Primary education by correspondence*. Melbourne, Australia. https://research.acer.edu.au/cgi/viewcontent.cgi?article=1026&context=learning_processes
- Curriculum Associates (2021). *About i-Ready assessment*. <https://www.curriculumassociates.com/programs/i-ready-assessment>
- Curtis, H. & Werth, L. (2015). 'Fostering student success and engagement in a K-12 online school' *Journal of Online Learning Research*, 1(2), 163-190.
- Darling-Hammond, L., Schachner, A., Edgerton, A. K., Badrinarayan, A., Cardichon, J., Cookson, P. W., Jr., Griffith, M., Klevan, S., Maier, A., Martinez, M., Melnick, H., Truong, N., Wojcikiewicz, S. (2020). *Restarting and reinventing school: Learning in the time of COVID and beyond*. Palo Alto, CA: Learning Policy Institute.
- Department of Education (2020a). *Digital Technology in Education Hearing*. Education and Health Standing Committee. Unpublished report. Western Australia.
- Department of Education (2020b). *Term 2, 2020. Operating guidelines for Queensland state schools*.
- Department of Education and Training (DET). (2020). *Operations Guide*. Victorian Government Schools. From 18 August 2020.
- Department of Education and Training (DET). (2021a). *Annual Report 2020-21*. Department of Education and Training, Melbourne. <https://www.education.vic.gov.au/Documents/about/department/Department%20of%20Education%20and%20Training%20Annual%20Report%202020-21.pdf>
- Department of Education and Training (DET). (2021b). *On Track 2021: Destinations of Victorian School Leavers*. https://www.education.vic.gov.au/Documents/about/research/OnTrack2021/On_Track_2021-summary-report.pdf
- Department of Education and Training (DET). (2021c). *Top tips for effective online teaching*. Victoria <https://www.education.vic.gov.au/school/teachers/classrooms/Pages/approachesonlinelearningtoptips.aspx>
- Department of Education and Training (DET). (2022a). *On Track*. Victoria. <https://www.vic.gov.au/on-track-survey>

- Department of Education and Training (DET). (2022b). *Term 4 Guidance – Guidance from Schools to Schools – School vignettes*. Victoria. <https://fuse.education.vic.gov.au/Pages/learning-wellbeing>
- Dickinson, H., Smith, C., Yates, S., Bertuol, M. (2020). *Not even remotely fair: Experiences of students with a disability during COVID-19*. Report prepared for Children and Young People with Disability Australia (CYDA), Melbourne. https://www.cyda.org.au/images/pdf/not_even_remotely_fair_cyda_education_report.pdf
- DiPietro, M., Ferdig, R.E., Preston, M. & Black, E.W. (2008) Best practices in teaching K-12 online: Lessons learned from Michigan virtual school teachers. *Journal of Interactive Online Learning*, 7(1).
- Domina, T., Renzulli, L., Murray, B., Garza, A.N. & Perez, L. (2021). Remote or removed: Predicting successful engagement with online learning during COVID-19'. *Socius*. January 2021. doi:10.1177/2378023120988200
- Donnelly, R., & Patrinos, H. A. (2021). Learning loss during COVID-19: An early systematic review. *Prospects*, 1-9.
- Douchet, A., Netolicky, D., Timmers, K. & Tuscano, F.J. (2020). *Thinking about pedagogy in an unfolding pandemic*. Independent report to inform the work of Education International and UNSECO. https://issuu.com/educationinternational/docs/2020_research_covid-19_eng?fr=sYTY3OTEwMzc2ODU
- Education Endowment Foundation (EEF). (2020). *Remote Learning: Rapid Evidence Assessment*. London: Education Endowment Foundation.
- Education Services Australia (ESA). (2022). Safer Technologies 4 Schools. <https://st4s.edu.au/>
- Education Review Office. (2020). *COVID-19 learning in lockdown*. New Zealand Government. <https://ero.govt.nz/sites/default/files/2021-03/Covid%2019%20Learning%20in%20Lockdown.pdf>
- Education Week (2020). The Coronavirus Spring: The Historic Closing of U.S. Schools (A Timeline). <https://www.edweek.org/leadership/the-coronavirus-spring-the-historic-closing-of-u-s-schools-a-timeline/2020/07>
- Engzell, P., Frey, A., & Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences*, 118(17).
- Evans, C., O'Connor, C.J., Graves, T., Kemp, F., Kennedy, A., Allen, P., Bonnar, G., Reza, A. & Aya, U. (2020) Teaching under Lockdown: the experiences of London English teachers. *Changing English*, 27(3), 244-254. doi:10.1080/1358684X.2020.1779030

- Evans, S., Mikocka-Walus, A., Klas, A., Olive, L., Sciberras, E., Karantzas, G. & Westrupp, E. (2020), 'It has stopped our lives' to 'spending more time together has strengthened bonds': The varied experiences of Australian families during COVID-19. *Frontiers in Psychology* 11 <https://doi.org/10.3389/fpsyg.2020.588667>
- Ewing, L., & Cooper, H. (2021). Technology-enabled remote learning during COVID-19: perspectives of Australian teachers, students and parents. *Technology, Pedagogy and Education*. 30(1), 41-57. doi: 10.1080/1475939X.2020.1868562
- EY Sweeney. (2020). *ACARA NAPLAN individual report research. Qualitative report.*
- Flack, C. B., Walker, L., Bickerstaff, A., Earle, H., & Margetts, C. (2020). *Educator perspectives on the impact of COVID-19 on teaching and learning in Australia and New Zealand.* Melbourne, Australia: Pivot Professional Learning. https://pivotpl.com/wp-content/uploads/2020/04/Pivot_StateofEducation_2020_White-Paper-1.pdf
- Gallagher, H.A. & Cottingham, B. (2020). *Improving the quality of distance and blended learning.* EdResearch for Recovery. Policy Analysis for California Education, Stanford University. Brief No. 8. <https://files.eric.ed.gov/fulltext/ED607718.pdf>
- Gore, J., Fray, L., Miller, A., Harris, J., & Taggart, W. (2021). The impact of COVID-19 on student learning in New South Wales primary schools: an empirical study. *The Australian Educational Researcher*, 48(4), 605-637.
- Goss, P., Sonnemann, J., and Griffiths, K. (2017). *Engaging students: creating classrooms that improve learning.* Grattan Institute. <https://grattan.edu.au/wp-content/uploads/2017/02/Engaging-students-creating-classrooms-that-improve-learning.pdf>
- Hammerstein, S., König, C., Dreisörner, T., & Frey, A. (2021). Effects of COVID-19-Related School Closures on Student Achievement-A Systematic Review. *Frontiers in Psychology*, 4020.
- Hawrilenko, M., Kroshus, E., Tandon, P. & Christakis, D. (2021). 'The association between school closures and child mental health during COVID-19'. *Jama Network Open*.
- Heissel, J. (2016). The relative benefits of live versus online delivery: Evidence from virtual Algebra I in North Carolina. *Economics of Education Review*, 53, 99-115. <https://doi.org/10.1016/j.econedurev.2016.05.001>
- Higgins, S., Xiao, Z., Katsipataki, M. (2012). *The impact of digital technology on learning. A summary for the Education Endowment Foundation. Full Report.* <https://files.eric.ed.gov/fulltext/ED612174.pdf>
- Hough, H., Witte, J., Wang, C. & Calhoun, D. (2021). Evidence-based practices for assessing students' social and emotional well-being. *EdResearch for Recovery*. Brief No. 13. https://annenberg.brown.edu/sites/default/files/EdResearch_for_Recovery_Brief_13.pdf

- Independent Schools Victoria. (2021). *Remote learning during COVID-19: insights from Victorian independent schools*. <https://is.vic.edu.au/wp-content/uploads/2021/06/remote-learning-during-COVID-june-2021.pdf>
- International Labour Organisation (ILO). (2020). *Youth and Covid-19. Impacts on Jobs, Education, Rights and Mental Well-being. Survey report 2020*. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_753026.pdf
- Johnson, A., & Kuhfeld, M. (2020). *Fall 2019 to Fall 2020 MAP Growth attrition analysis*. NWEA. <https://www.nwea.org/content/uploads/2020/11/Technical-brief-Fall-2019-to-fall-2020-MAP-Growth-attrition-analysis-NOV2020.pdf>
- Juniper Education. (2021). *National Dataset Report 2022. The Impact of the Covid-19 pandemic on primary school children's learning*. <https://junipereducation.org/wp-content/uploads/2022/03/national-dataset-report-march-2022.pdf>
- Kearney, M., Schuck, S., Fergusson, J. & Perry, R. (2021). *Digital learning practices during remote learning and beyond: A case study of four schools*. Sydney, Australia: Association of Independent Schools New South Wales. <https://bit.ly/aisnswcases>
- König, C., & Frey, A. (2022). The Impact of COVID-19-Related School Closures on Student Achievement—A Meta-Analysis. *Educational Measurement: Issues and Practice*. 1-7. <https://doi.org/10.1111/emip.12495>
- Kuhfeld, M., Tarasawa, B., Johnson, A., Ruzek, E. & Lewis, S. (2020). Learning during COVID-19: Initial findings on students' reading and math achievement and growth. NWEA research. <https://www.nwea.org/research/publication/learning-during-covid-19-initial-findings-on-students-reading-and-math-achievement-and-growth/>.
- Learning First. (2020). *The experience of remote and flexible learning in Victoria*. <https://www.education.vic.gov.au/Documents/about/department/covid-19/experience-of-remote-and-flexible-learning-report.pdf>
- Lewis, K., & Kuhfeld, M. (2021). *Learning during COVID-19: An update on student achievement and growth at the start of the 2021-22 school year*. Center for School and Student Progress, NWEA Brief. <https://www.nwea.org/content/uploads/2021/12/Learning-during-COVID19-An-update-on-student-achievement-and-growth-at-the-start-of-the-2021-2022-school-year-Research-Brief.pdf>
- Liao, Y., Ottenbreit-Leftwich, A., Zhu, M., Jantaraweragul, K., Christie, L., Krothe, K. & Sparks, K. (2021). 'How can we support online learning for elementary students? Perceptions and experiences of award-winning K-6 teachers'. *TechTrends*. 65, 939-951. <https://doi.org/10.1007/s11528-021-00663-z>

- Longmuir, F. (2021). Leading in lockdown: Community, communication and compassion in response to the COVID-19 crisis. *Educational Management*. 1-17. doi:10.1177/17411432211027634
- Louwrens, N., & Harnett, M. (2015). 'Student and teacher perceptions of online student engagement in an online middle school'. *Journal of Open, Flexible and Distance Learning*, 19(1).
- Lucas, M., Nelson, J. & Sims, D. (2020). *Pupil engagement in remote learning. Schools' response to COVID*. National Foundation for Educational Research. Nuffield Foundation. https://www.nuffieldfoundation.org/wp-content/uploads/2020/06/NFER_-_schools_responses_to_covid_19_pupil_engagement_in_remote_learning.pdf
- Means, B., Toyama, Y., Murphy, R. F., & Bakia, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, 115(3), 1–47.
- Miron, G. & Gulosino, C. (2016). *Virtual schools report 2016: Directory and performance review*. Boulder, Colorado: National Education Policy Center. <http://nepc.colorado.edu/publication/virtual-schools-annual-2016>
- Misirli, O. & Ergulec, F. (2021). Emergency remote teaching during the COVID-19 pandemic: Parent experiences and perspectives. *Education and Information technologies*. 26: 6699-6718.
- Mission Australia. (2021). *Mission Australia, Youth survey report 2021*. <https://www.missionaustralia.com.au/publications/youth-survey/2087-mission-australia-youth-survey-report-2021/file>
- Molnar, A. (Ed.); Miron, G., Huerta, L., Cuban, L., Horvitz, B., Gulosino, C., Rice, J. K., & Shafer, S. R. (2013). *Virtual Schools in the U.S. 2013: Politics, performance, policy, and research evidence*. Boulder, Colorado: National Education Policy Center. <http://nepc.colorado.edu/publication/virtual-schools-annual-2013>
- Molnar, A., Rice, J. K., Huerta, L., Shafer, S. R., Barbour, M. K., Miron, G., Gulosino, C., Horvitz, B. (2014). *Virtual schools in the U.S. 2014: Politics, performance, policy, and research evidence*. Boulder, Colorado: National Education Policy Center. <http://nepc.colorado.edu/publication/virtual-schools-annual-2014>
- Molnar, A., Huerta, L., Shafer, S. R., Barbour, M. K., Miron, G., Gulosino, C. (2015). *Virtual schools in the U.S. 2015: Politics, performance, policy, and research evidence*. Boulder, Colorado: National Education Policy Center. <http://nepc.colorado.edu/publication/virtual-schools-annual-2015>
- Molnar, A., Miron, G., Gulosino, C., Shank, C., Davidson, C., Barbour, M. K., Huerta, L., Shafer, S. R., Rice, J. K., & Nitkin, D. (2017). *Virtual schools in the U.S. 2017*. Boulder, Colorado: National Education Policy Center. <http://nepc.colorado.edu/publication/virtual-schools-annual-2017>

- Mueller, L & Goldenberg, G. (2020). *Education in times of crisis: Teachers' views on distance learning and school re-opening plans during COVID-19*. Analysis of responses from an online survey and focus groups. Chartered College of Teaching. https://chartered.college/wp-content/uploads/2021/02/EducationInTimesOfCrisisII_20200708_final.pdf
- Murphy, E., Rodríguez-Manzanares, M. & Barbour, M. (2011). Asynchronous and synchronous online teaching: Perspectives of Canadian high school distance education teachers. *British Journal of Educational Technology*, 42(4), 583-591. <https://doi.org/10.1111/j.1467-8535.2010.01112.x>
- Musgrove, A. & Musgrove, G. (2004). Online learning and the younger student – theoretical and practical applications. *Information Technology in Childhood Education Annual*, 1, 213-225.
- Naidoo, L., D'warte, J., Gannon, S. & Jacobs, R. (2021). Sociality, resilience and agency: how did young Australians experience online learning during COVID-19? *The Australian Educational Researcher*. <https://doi.org/10.1007/s13384-021-00500-5>
- New South Wales (NSW) Department of Education. (n.d.) Aurora College. About our school. <https://aurora.schools.nsw.gov.au/about-our-school.html>
- New South Wales (NSW) Department of Education. (2020). *Check in assessments – Years 3, 5, and 9*. Retrieved from New South Wales. www.education.nsw.gov.au/content/dam/main-education/about-us/educational-data/cese/2020-check-in-assessments.pdf
- New South Wales (NSW) Department of Education. (2022a). *Annual Report 2021*. https://education.nsw.gov.au/content/dam/main-education/en/home/about-us/strategies-and-reports/annual-reports/DOE_Annual_Report_2021_20220531.pdf
- New South Wales (NSW) Department of Education. (2022b). *Minimum expectations for schools during learning from home*.
- New South Wales (NSW) Department of Education. (2022c). *2021 Term 2 and Term 4 Check-in assessments*. <https://education.nsw.gov.au/about-us/educational-data/cese/publications/research-reports/check-in-assessments-2021#Download0>.
- OECD. (2017). “Students’ well-being: What it is and how it can be measured”, in *PISA 2015 Results (Volume III): Students’ Well-Being*. OECD Publishing, Paris. <https://doi.org/10.1787/9789264273856-6-en>

- OECD (2020a). "Schooling disrupted, schooling rethought: How the Covid-19 pandemic is changing education", OECD Policy Responses to Coronavirus (COVID-19), OECD Publishing, Paris, <https://doi.org/10.1787/68b11faf-en>.
- OECD. (2020b). *The impact of COVID-19 on student equity and inclusion: Supporting vulnerable students during school closures and school re-openings*. OECD Policy Responses to Coronavirus (COVID-19). https://read.oecd-ilibrary.org/view/?ref=434_434914-59wd7ekj29&title=The-impact-of-COVID-19-on-student-equity-and-inclusion
- Orima Research. (2021a). *2021 Stakeholder Survey. Stakeholder view on the impact of COVID-19*. AITSL. https://www.aitsl.edu.au/docs/default-source/research-evidence/impact-of-covid-19-stakeholder-report.pdf?sfvrsn=7bdac3c_2
- Orima Research. (2021b). *The Impact of Covid-19 on Teaching in Australia. A literature synthesis*. AITSL.
- Owen, C., Enticott, E., Harlowe, J., Kolber, S., Reese, E. & Wood, A. (2021). Teaching during lockdown: English teachers' experiences in the time of COVID-19. *English in Australia*. 56(2). 7-19.
- Parliamentary Secretary for Schools. (2020). *Lessons Learned from coronavirus (COVID-19). Findings from the experience of remote and flexible learning in schools*. Victoria. <https://www.education.vic.gov.au/Documents/about/department/covid-19/lessons-learned-from-covid19.pdf>
- Parliament United Kingdom (2022). *Coronavirus and schools: research briefing*. <https://commonslibrary.parliament.uk/research-briefings/cbp-8915/>
- Pier, L., Christian, M., Tymeson, H., & Meyer, R. H. (2021). COVID-19 impacts on student learning: Evidence from interim assessments in California. Policy Analysis for California Education. <https://edpolicyinca.org/publications/covid-19-impacts-student-learning>
- QDOS. (2020). *Remote and Flexible Learning Qualitative Research*. Report to the Victorian Department of Education and Training. <https://www.education.vic.gov.au/Documents/about/department/covid-19/remote-and-flexible-learning-qualitative-research.docx>
- Rehn, N., Maor, D. & McConney, A. (2018). The specific skills required of teachers who deliver K–12 distance education courses by synchronous videoconference: implications for training and professional development. *Technology, Pedagogy and Education*, 27(4), 417-429, doi: 10.1080/1475939X.2018.1483265
- Renaissance Learning & Education Policy Institute (2021). *Understanding progress in the 2020/21 academic year: Findings from the summer term and summary of all previous findings*. <https://eric.ed.gov/?id=ED612437>

- Renaissance Star Assessment. (2021). *Key reports and dashboards: Assessment and data journeys for supporting student growth*. https://renaissance.widen.net/s/rrk6jqmn5k/414100-star-key-reports-digital_2021
- Rice, K. (2006). A comprehensive look at distance education in the K-12 context. *Journal of Research on Technology in Education*, 38(4), 425-448. <https://www.learntechlib.org/j/ISSN-1539-1523>.
- Rivalland, J., Rohl, M. & Smith, P. (2001). *Supporting students with learning difficulties in a school of the air*. <https://ro.ecu.edu.au/cgi/viewcontent.cgi?article=8283&context=ecuworks>
- Roberts, P. & Downes, N. (2020). Online schooling and distance ed? Don't be afraid, we've been doing and improving it for 100 years. *EduResearch Matters*. AARE blog. <https://www.aare.edu.au/blog/?p=5305>
- Rose, S., Twist, L., Lord, P., Rutt, S., Badr, K., Hope, C., & Styles, B. (2021). *Impact of school closures and subsequent support strategies on attainment and socio-emotional wellbeing in Key Stage 1: Interim Paper 1*. National Foundation for Educational Research. https://educationendowmentfoundation.org.uk/public/files/Publications/Covid-19_Resources/Impact_of_school_closures_KS1_interim_findings_paper_-_Jan_2021.pdf
- Save the Children. (2021). *Back-to-School is not enough: Australian parents and children have their say on COVID recovery plan* [Media release]. 31st January. <https://www.savethechildren.org.au/media/media-releases/back-to-school-is-not-enough>
- Scarpellini, F., Segre, G., Cartabia, M., Zanetti, M., Campi, R., Clavenna, A. & Bonati, M. (2021). 'Distance learning in Italian primary and middle school children during the COVID-19 pandemic: a national survey'. *BMC Public Health*.
- Schult, J., Mahler, N., Fauth, B., & Lindner, M. A. (2022). Did students learn less during the COVID-19 pandemic? Reading and mathematics competencies before and after the first pandemic wave. *School Effectiveness and School Improvement*, 1-20.
- Sharp, C. & Nelson, J. (2021). *Recovering from Covid-19: what pupils and schools need now*. National Foundation for Education Research, Ask Research and Nuffield Foundation. https://www.nfer.ac.uk/media/4593/covid19_what_schools_and_pupils_need_now_policy_briefing.pdf
- Sharp, C., Nelson, J., Lucas, M., Julius, J., McCrone, T. & Sims, D. (2020). The challenges facing schools and pupils in September 2020. National Foundation for Educational Research and the Nuffield Foundation. https://www.nfer.ac.uk/media/4119/schools_responses_to_covid_19_the_challenges_facing_schools_and_pupils_in_september_2020.pdf

- Sharp, C. & Skipp, A. (2022). *Four things we learnt about the impact of COVID-19 on mainstream schools and special education settings in 2020 and 2021*. National Foundation for Education Research, Ask Research and Nuffield Foundation. <https://www.nuffieldfoundation.org/wp-content/uploads/2022/02/COVID-19-impact-on-mainstream-and-special-schools.pdf>
- Sibieta, L. (2021). *COVID-related teacher and pupil absences in England over 2020 autumn term*. Education Policy Institute. https://epi.org.uk/wp-content/uploads/2021/01/Teacher-absence-analysis_EPI.pdf
- Smith, S. J., Burdett, P. J., Cheatham, G.A., Harvey, S. P. (2016). Parental role and support for online learning of students with disabilities: a paradigm shift. *Journal of Special Education Leadership*. 29(2).
- South Australian Commissioner for Children and Young People. (2021). *COVID-19 survey: Key findings. What do young people in South Australia think about COVID-19 vaccines and restrictions?* <https://www.cyp.com.au/wp-content/uploads/2022/03/COVID-19-Survey-Report-on-Key-Findings.pdf>
- Stacey, E. & Visser, L. (2005). 'The history of distance education in Australia'. *Quarterly Review of Distance Education*. 6(3).
- Thomas, D. R. (2006). 'A general inductive approach for analyzing qualitative evaluation data'. *American Journal of Evaluation*. 27(2). 237-246. doi: 10.1177/1098214005283748
- Tomasik, M. J., Helbling, L. A., & Moser, U. (2021). Educational gains of in-person vs. distance learning in primary and secondary schools: A natural experiment during the COVID-19 pandemic school closures in Switzerland. *International Journal of Psychology*, 56(4), 566-576.
- Tomaszewski, W., Zajac, T., Rudling, E., te Riele, K., McDaid, L. & Western, M. (2022). Uneven impacts of COVID-19 on the attendance rates of secondary school students from different socioeconomic backgrounds in Australia: A quasi-experimental analysis of administrative data. *Australian Journal of Social Issues*. <https://doi.org/10.1002/ajs4.219>
- UNICEF Australia. (2020). 'Swimming with sandbags'. *The views and experiences of young people in Australia five months into the COVID-19 pandemic*. <https://www.unicef.org.au/our-work/unicef-in-emergencies/coronavirus-covid-19/swimming-with-sandbags>
- Yates, A., Starkey, L., Egerton, B. & Flueggen, F. (2020). High school students' experiences of online learning during COVID-19: the influence of technology and pedagogy. *Technology, Pedagogy and Education*. doi: 10.1080/1475939X.2020.1854337

- Youth Liberty Squad & American Civil Liberties Union (ACLU). (2020). Summary of student mental health survey results. <https://www.schoolcounselor-ca.org/Files/Student%20Wellness%20Survey%20Summary%205-08-20.pdf>
- Wagner, C. J. (2021). PK-5 teacher perspectives on the design of remote teaching: pedagogies and support structures to sustain student learning online. *Journal of Research on Technology in Education*, 54:sup1, S132-S147, doi: 10.1080/15391523.2021.1888340
- Wang, C., Pier, L., Meyer, R. H., & Webster, N. (2021). *Student well-being and learning conditions during the pandemic: Evidence from the CORE districts. Policy Analysis for California Education*. <https://edpolicyinca.org/publications/student-well-being-and-learning-conditions-pandemic>
- Weidmann, B., Allen, R., Bibby, D., Coe, R., James, L., Plaister, N. & Thomson, D. (2021) *Covid-19 disruptions: Attainment gaps and primary school responses*, Education Endowment Foundation. https://dera.ioe.ac.uk/37913/1/Covid-19_disruptions_attainment_gaps_and_primary_school_responses_-_May_2021.pdf
- Wilson, R., Stacey, M. & McGrath-Champ, S. (2020). *Teachers' work during the COVID-19 pandemic: Shifts, challenges and opportunities*. Centre for Strategic Education, Occasional Paper 169.
- van der Velde, M., Sense, F., Spijkers, R., Meeter, M., & van Rijn, H. (2021). Lockdown learning: Changes in online foreign-language study activity and performance of Dutch secondary school students during the covid-19 pandemic. *Frontiers in Education* (6).
- Victorian Commission for Children and Young People. (2020). *Impact of COVID-19 on children and young people. Education. Snapshot*. <https://ccyp.vic.gov.au/assets/COVID-Engagement/CCYP-Education-Snapshot-web.pdf>
- Victorian Student Representative Council (VicSRC). (2020). *Learning from Remote Learning*. https://files.vicsrc.org.au/web/Learning_From_Remote_Learning_Report.pdf
- Vincent-Lancrin, S., Cobo Romani, C. & Reimers, F. (eds.) (2022). *How learning continued during the COVID-19 pandemic: Global lessons from initiatives to support learners and teachers*. OECD Publishing, Paris. <https://doi.org/10.1787/bbeca162-en>.
- Zaccoletti S., Camacho, A., Nadine, C., Aguiar, C., Mason, L., Alves, R., Daniel, J. (2020). Parents' perceptions of student academic motivation during the COVID-19 lockdown: A cross-country comparison, *Frontiers in Psychology*. (11). <https://doi.org/10.3389/fpsyg.2020.592670>
- Ziebell, N., Acquaro, D., Seah, W. T. & Pearn, C. (2020). *Australian Education Survey, Examining the impact of COVID-19. Report summary*. The University of Melbourne. <http://hdl.handle.net/11343/276287>

Zviedrite, N., Hodis, J. D., Jahan, F., Gao, H., & Uzicanin, A. (2021). COVID-19-associated school closures and related efforts to sustain education and subsidized meal programs. *PloS one*, 16(9), e0248925.

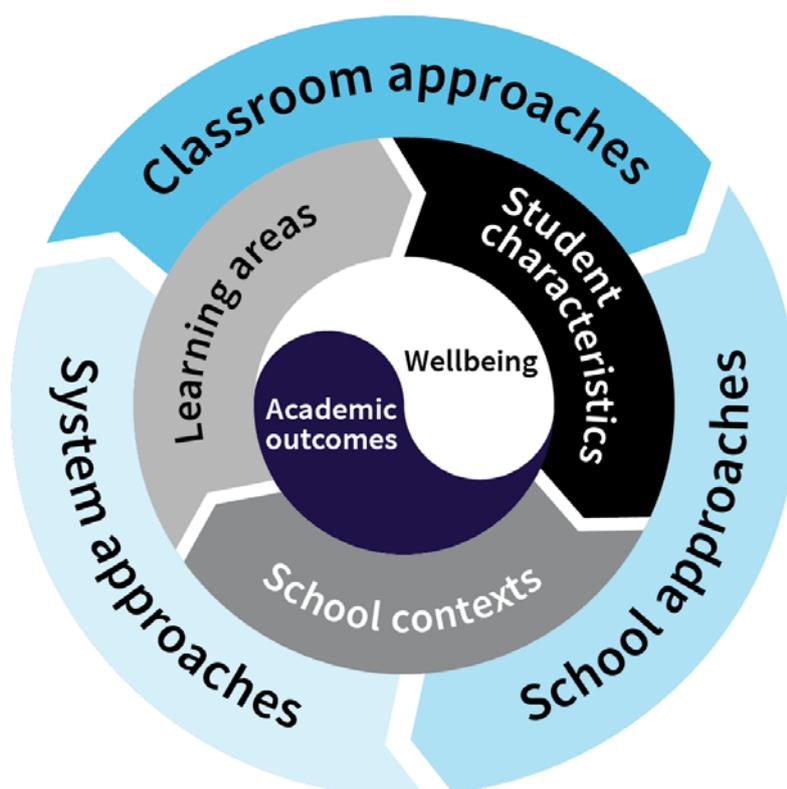
Appendix A. Methodology

Review framework

A framework was developed to guide the Review, detailing how academic outcomes and student, staff and parent wellbeing are the core focus of the Review. The Review identified how outcomes may vary on the basis of student characteristics, school contexts and learning area. Finally, the Review documented system, school and classroom approaches to remote and online learning (see Figure A-1).

System level approaches comprise actions implemented across multiple schools within a school system, and have been identified mostly through stakeholder consultations. School-level approaches include actions strengthening and supporting quality teaching and learning. Finally, classroom level approaches include teaching and learning practices in the virtual 'classroom', or how technologies can be used by teachers to engage students in remote and online learning.

Figure A-1 Review framework



Research stages

The Review considered the research questions through three inter-related stages. The first stage was a desktop evidence review of Australian and international academic literature and key research reports. This literature encompasses the COVID and pre-COVID period, and

was identified using academic databases, online resources, and websites from government agencies, think tanks and other organisations.

The second stage comprised analysis of system and stakeholder experiences identified through publicly available documents alongside targeted consultations. Consultations were undertaken with state and territory education departments, the peak bodies for Catholic, independent schools and key school system organisations.

The third stage comprised the synthesis of findings from both stage one and two. This comprised synthesising stage one findings that were then complemented by findings from consultations.

As the project involved interviews, it was overseen by the Victoria University Human Research Ethics Committee (VUHREC). Specific jurisdictional research approvals were also required for the education departments in the Northern Territory and Queensland.

Literature review

The literature review applied several methods to identify relevant literature. This included searching academic databases such as A+ Education/Informit, Educational Resource Information Centre (ERIC), EBSCO, Frontiers, Google Scholar, Overton, ProQuest, Scopus, Springer, and Web of Science. These databases identified peer-reviewed scholarship on effective approaches in remote and online learning, both prior to and during the COVID-19 pandemic. Scholarship and 'grey literature' on the academic outcomes and wellbeing effects of delivery via remote and online technologies were also collated. The literature review made use of internet search engines, and visited the internet sites of education departments, curriculum authorities, and other youth-focussed government departments nationally as well as within every state and territory. Teacher unions and professional association websites were also searched for relevant materials.

The websites of international organisations such as the OECD, UNESCO and World Bank were reviewed, alongside international think tanks and philanthropic groups. Resources from overseas educational research organisations including the National Foundation for Educational Research, the Education Endowment Foundation and the Institute for Education Sciences were also scoped. All international resources, where used, have been contextualised appropriately.

The literature review excluded research covering non-school remote and online learning, such as higher education and adult professional development. Contemporary resources using modern technologies were prioritised.

The various search terms applied were defined by the parameters of the Review's framework and central research questions.

Stakeholder consultations

The project used consultations to ensure it had a firm understanding of the experiences of Australian school systems with remote and online learning, both prior to, and during COVID-19. A list of stakeholder organisations and contacts was provided by AERO (see Appendix B). Additional interviews were sought in jurisdictions with the greater experience of remote learning. Interviews were conducted between late March and early June 2022, with stakeholders able to submit relevant documents or evidence concerning their experience of remote and online learning, and any resources that they may have developed to support schools. All interviews were conducted using internet video conferencing platforms including Zoom or Microsoft Teams. Almost 20 interviews were undertaken, where numerous documents and reports were provided.

Stakeholders were asked to reflect on what they have learnt during the switch to remote and online learning necessitated by the COVID-19 pandemic, and to point the review towards new innovations. The interviews also asked stakeholders to reflect upon whether the effectiveness of approaches to delivering remote and online learning varied by contextual, student or other factors. The questions that guided the interviews are provided in Appendix C. The documents and evidence supplied by the stakeholders, as well as interview notes, were analysed using an inductive qualitative approach. This approach is well suited to establishing links between research objectives and emergent findings within raw data and evidence (Thomas, 2006). All interview notes were coded and classified according to the research questions and key reporting themes, and analysed to inform the development of the project findings.

Synthesising research findings

The materials gathered through the literature search as well as the evidence provided by the Stakeholder consultation were evaluated individually. The Review synthesised all the materials collated for the Review thematically, in a process guided by the central research questions.

Research identified in the literature review

A wide-range of methods and techniques were applied in the research identified in the Review. These range from analysis reporting the qualitative perceptions of students, teachers or parents, through to quantitative analysis of assessment data. The nature of the COVID-19 pandemic meant studies applying 'gold standard' approaches, such as random assignment and a control group, were not feasible.

The two research questions guiding the Review are covered by sufficient literature, interview materials and evidence supplied from the stakeholder consultations (Table A-2). The sub-questions have less coverage in the available Australian and overseas literature and findings from the stakeholder consultations. A separate challenge is the limited pool of research of high or very high confidence. This has long been a constraint within this research field (Rice, 2006).

The majority of the research identified in the literature review is from the United States. This includes literature examining ‘virtual’ schools, where students took one or more courses online, alongside ‘cyber’ schools where the full curriculum and teaching program is offered online (Barbour, 2018).

Literature in English from other jurisdictions has also been used where appropriate. A number of meta-analyses were identified examining remote and online learning, however these were typically focused on the higher education sector. Other meta-analyses combined empirical studies of online learning in both school and higher education, diminishing their relevance for the Review.

Older papers and studies were excluded that discussed outdated technologies which infer radically different ways of online learning.

The nature of the available research

The Review adopted AERO’s Standards of Evidence, providing a framework for determining *rigorous* and *relevant* evidence (AERO, 2021). Identifying rigorous and relevant evidence was necessary to assess whether approaches to remote and online learning affected academic outcomes or wellbeing. AERO’s Standards of Evidence comprises four levels of confidence (see Table A-1). All relevant evidence collected in the Review was classified on this basis.

Table A-1 AERO Standards of Evidence: Levels of confidence

	Level of confidence			
	1 : Low	2 : Medium	3 : High	4 : Very high
Features	Research hypothesises why the approach should have positive effects.	Research associates the approach with positive effects.	Research shows the approach causes positive effects.	Research conducted in my context or other contexts similar to mine shows the approach causes positive effects.

Source: AERO (2021), p. 2.

Table A-2 Review research questions and heat map of evidence availability and reliability

Research questions	Australian literature		Overseas literature		Consultations		Supplied documentation	
	Availability	Reliability	Availability	Reliability	Availability	Reliability	Availability	Reliability
What has been the effect of delivering schooling via remote and online learning on a range of outcomes, including achievement and wellbeing?	●	◐	●	◐	●	◐	●	◐
What approaches to remote and online learning are most beneficial for students?	●	◐	●	◐	●	◐	●	◐
How does the effect of remote and online learning vary at a cohort level?	●	◐	●	◐	●	◐	●	◐
Does the effect of remote and online learning vary according to:								
• learning domain or subject area?	●	◐	●	◐	●	◐	●	◐
• year level or phase of schooling?	●	◐	●	◐	●	◐	●	◐
What do we know about the relative efficacy of remote and online learning versus classroom delivery in quantitative terms?	●	◐	●	◐	●	◐	●	◐

Notes: Reliability determined by AERO framework (2021). The rating is a summative estimate of the overall identified literature and determined by at least one document meeting the requirements of the higher evidence threshold.

Evidence reliability key: ◐ = low confidence ◑ = medium confidence.

Evidence availability key: ● = low availability ● = medium availability ● = high availability.

Research provided by stakeholders

A request was made to stakeholders for additional information or evidence that would contribute to an understanding about remote and online learning in each stakeholder's context. It was suggested that the evidence could include case studies, internal or externally delivered reports or evaluations, and analysis of survey or achievement data on remote and online schooling prior to and during the COVID-19 pandemic.

Documents were provided by ten stakeholder groups. In three cases, stakeholders provided a written response, which included information about remote learning prior to the pandemic, a summary of the educational response to COVID-19, details of supports supplied, as well as qualitative commentary on outcomes. Other information provided included reports and presentations on the resources provided by education departments during remote and online learning, relevant policy responses and various information about technology use during 2020-2021. Case studies were also received from three stakeholders. Most provided reports were qualitative in nature; three stakeholders provided results of internal survey findings. Stakeholders also provided examples of information resources prepared and provided to schools during the remote learning period.

Appendix B. Stakeholder consultation

Table B-1 Consulted stakeholders and interview date

Key stakeholders	Interview date
Australian Capital Territory Education Directorate	17 March 2022
Australian Curriculum, Assessment and Reporting Authority (ACARA)	7 June 2022
Australian Institute for Teaching and School Leadership (AITSL)	9 May 2022
Catholic Schools NSW	17 May 2022
Education Services Australia (ESA)	26 April 2022
Independent Schools Australia	4 April 2022
Melbourne Archdiocese Catholic Schools	4 May 2022
National Catholic Education Commission	18 March 2022
New South Wales Department of Education	4 April 2022
Northern Territory Department of Education	17 March 2022, 8 April 2022
Queensland Department of Education	10 June 2022
South Australia Department of Education	29 March 2022
Tasmanian Department of Education	30 March 2022
Victorian Curriculum and Assessment Authority	9 May 2022
Victorian Department of Education and Training	25 March 2022, 29 April 2022
Western Australian Department of Education	20 May 2022

Appendix C. Consultation questions

1. Remote and online learning – background and COVID-19 context

- a. Can you tell me about your role in the department you work for?
- b. What is or has been your involvement in the area of remote and online learning?

2. Best practice in remote and online delivery

- a. What experience did you/your organisation/department have of remote and online learning before the COVID-19 pandemic?
- b. Could you identify examples of best practice associated with remote and online learning before the COVID-19 pandemic?
- c. How did you/your organisation support schools in their delivery of remote and online learning during the COVID-19 pandemic?
- d. Did you see any changes in teaching practices, pedagogies and technologies as a result of the shift to remote and online delivery?
- e. What lessons have been identified in the delivery of a full program of remote and online learning?
- f. What are the most effective practices in the delivery of schooling via remote and online delivery? Why?
- g. What evidence about practices of remote and online learning has your department/organisation collected?

3. Outcomes of remote and online learning (e.g., student achievement, wellbeing of students, parents and teachers)

- a. What have been the effects of delivering schooling via remote and online learning on a range of outcomes (including student achievement, wellbeing and attendance)?
- b. What have been the effects of delivering schooling via remote and online learning on teachers?
- c. What have been the effects of delivering schooling via remote and online learning on families?
- d. How can negative effects (i.e. mental health on students, teachers and parents) be mitigated?
- e. Has your department/ organisation collected any specific information about the impacts of remote and online learning (on staff, students and families) during the COVID-19 pandemic?

4. Students and their different experiences of remote and online learning

- a. How does remote and online learning vary across groups of students?
 - i. stages of schooling - primary/secondary;
 - ii. within classes - differentiated learning;
 - iii. different groups, eg disability, Indigenous, EAL/D, etc
- b. Which students are most likely to benefit from remote and online learning?

- c. What adjustments are required for certain students to ensure that they participate and fully engage in remote and online learning?

5. Curriculum coverage

- a. Does the effect of remote and online learning vary according to learning domain or subject area?
- b. Were all subject areas able to be delivered remotely to your knowledge?
- c. Does the curriculum need to change to accommodate online or remote delivery?

6. School conditions and staffing for remote and online delivery

- a. Which schools were most effective in remote and online delivery?
- b. What school conditions are required to be able to successfully deliver teaching and learning online?
- c. Does staffing need to change to be able to deliver schooling in a remote or online model?
- d. How can schools swiftly pivot to remote and online learning in the future?

7. Future directions for remote and online learning

- a. What information/research do you need to make informed decisions about the delivery of online/remote learning?
- b. What don't we know about best practice for remote and online learning?
- c. Can you point us towards any examples of jurisdictions (Australia/Internationally) or specific schools with good practices/or resources concerning remote and online learning?
- d. How has the experiences of remote and online learning prepared schools/ the Department/ your organisation for future crises - pandemics, natural disasters?
- e. Clarification (if required) of supplied evidence/information.

Appendix D. Distance Education in Australia

A long tradition of distance education exists in Australia, as there has always been the need to deliver schooling to students unable to attend traditional classrooms, usually due to their remote location, but also because of illness or travel. Distance education in geographically challenging countries such as Australia, Canada, the United States and New Zealand have histories mirroring one another (Barbour, 2018). Australia was one of the first to demonstrate, from the early 1900s, 'in a systematic way, and on a large scale, that it is possible to provide by correspondence a complete elementary education for children who have never been to school' (Cunningham, 1931, p. 9). The provision of distance education ensures that Australia adheres to its *Education Act 2013 (Cth)*, which stipulates that all students are entitled to a quality education, no matter their location.

Distance education has been instrumental in providing communication and interaction between students in isolated regional areas (Stacey & Visser, 2005), as well as providing a capacity building role across widely dispersed communities (Halsey, 2018). Distance learning is different to home schooling, as distance education involves a qualified teacher while home schooling is predominantly delivered by parents or carers.

Technology has innovated the distance education sector and the teaching and learning it is able to offer (Ames et al., 2020; Halsey, 2018). Once purely postal (correspondence), the sector was a quick adopter of two-way radio to facilitate communication between home and school (Stacey & Visser, 2005). More recently, the internet and communications technologies have enabled distance education providers to evolve further, with teachers and students participating in synchronous and interactive virtual classes (Roberts & Downes, 2020). This relies on consistent performance of ICT infrastructure and services, including bandwidth, which can be limited in some parts of regional and remote Australia where distance education is prevalent (Halsey, 2018).

Prior to the pandemic, remote and online learning was used for a range of purposes across Australia, including:

- the main form of school provision in rural and remote areas of Australia
- curriculum expansion for one or more subjects for both metropolitan and regional students, to complement what is available on-site at school
- providing access to school for students who are travelling
- where schools have been affected by natural disasters.

The current distance education sector includes primary and secondary schools that are mostly public, but there are a few private schools. The jurisdictions with significant regional, remote and very remote areas (e.g., Queensland, Western Australia, Northern Territory) have the greatest number of schools offering distance education as well as a number of Schools of the Air. Schools of the Air provide full education programs for primary and secondary students, up until Year 9 or Year 10. The Alice Springs School of the Air (ASSOA) was exemplified in an ACARA case study, providing a short description of their established teaching and learning practices:

'Each ASSOA student site has a satellite dish and associated computer equipment that allow for a two-way interaction with the distance-learning studios. Students can see and hear their teachers as well as speak to and be heard by other students in their class. The school offers a wide range of educational services to isolated children from pre-school to Year 9. The teachers teach their lessons every day from three studios in Alice Springs via the video conferencing tool. The students visit their class websites to find out what they are learning each day and upload their work to their Google Drive folders. Feedback is delivered via Google documents, emails and/or over the phone.' (ACARA, n.d)

Distance education schools, such as the School of Isolated and Distance Education (SIDE) in Western Australia, offer a full curriculum from Kindergarten to Year 12. The SIDE uses online delivery with synchronous delivery via a web-conferencing platform, or asynchronous delivery, with 24/7 access through a web-based portal to deliver curriculum materials and facilitate student and staff collaboration online.

Queensland has seven schools of distance education, whose primary purpose is to service rural and remote students and students of isolated parents, as well as catering for students requiring alternative school settings, students enrolling for medical reasons and those accessing subjects not available locally. Several years prior to the pandemic, the Department of Education in Queensland implemented a virtual collaboration tool called iSee, which has been used to offer enrichment programs at a state level, including those targeted to Aboriginal and Torres Strait Islander students.

Victoria, Tasmania and South Australia also have their own distance or virtual schools. Students can undertake all their primary or secondary schooling through these schools, or they may elect to undertake one specific curriculum unit or subject that may not be offered at their 'home' school. In this case, space may be provided in the timetable for the student to undertake the discrete subject(s) during their school day. Some of these schools, including the Virtual School Victoria, moved delivery onto a more integrated online platform pre-pandemic, using a Learning Management System (LMS) (Bartley et al., 2018).

Prior to COVID-19, the NSW system was notable for the diversity of remote and online delivery through its public system (Roberts & Downes, 2020). NSW has many specific schools providing distance education but in addition to these, senior secondary students within clusters of isolated schools across the state undertake shared curriculum units using virtual technologies. There is also Aurora College that was initially designed to offer selective education to secondary students via virtual learning technologies, but it has now expanded to include non-selective Year 11 and 12 curriculum units and Years 5 and 6 selective classes. Students in Stages 4 and 5 enrolled in Aurora College participate in certain subjects at their regular 'residential' school, but they participate in selective online classes in English, mathematics and Science (NSW Department of Education, n.d.). The Australian Capital Territory does not have its own distance or virtual school, but students who wish to undertake a distance education program are able to access distance education programs in NSW.

Appendix E. Duration of remote and online learning during COVID-19 in Australia

While the spread of COVID-19 and the subsequent shift to remote and online schooling was, and continues to be, different in every state and territory, lockdowns and social distancing measures occurred from March 2020 across many Australian communities. In response, schools in most jurisdictions ceased face-to-face learning by the end of Term 1 in 2020, in an attempt to slow and stop the spread of COVID-19.

Each jurisdiction's experience of lockdowns and school closures continued to vary through 2020 and 2021. In general, schools located in metropolitan areas where the virus spread more rapidly delivered remote and online learning for longer periods compared to schools in regional and remote areas. Metropolitan Melbourne underwent six lockdowns from 2020 to 2021, with the city experiencing 36 weeks of remote schooling, the longest of any jurisdiction. Conversely, Katherine in the NT experienced three weeks of remote education in 2021, and none in 2020. Although each jurisdiction faced unique challenges in terms of diverse student populations and the spread of COVID-19, face-to-face learning was made available for children of essential workers and vulnerable students during remote learning periods.

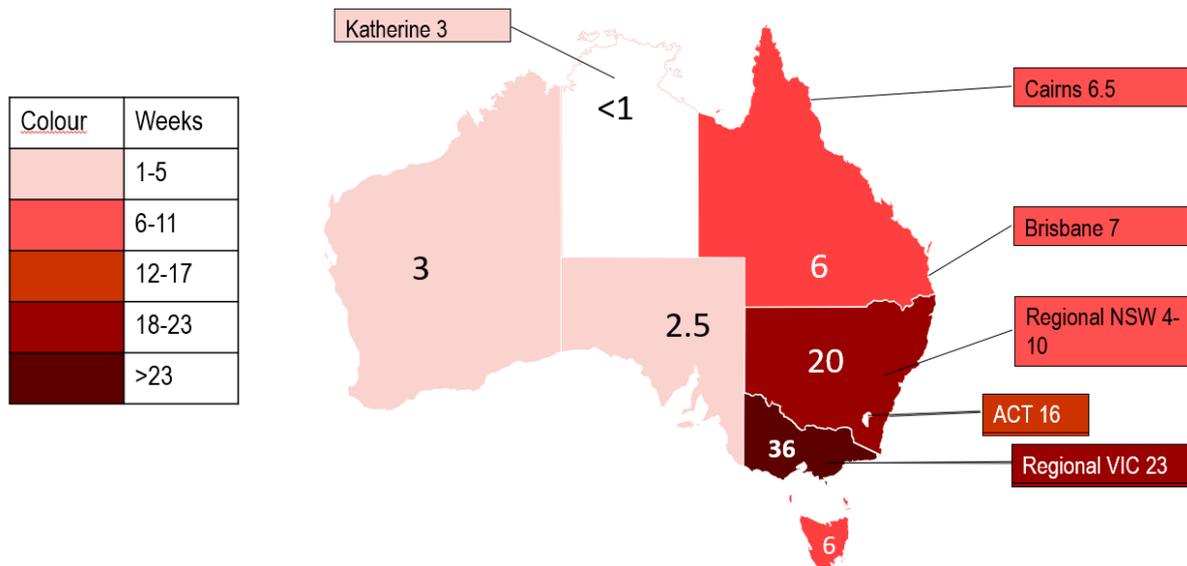
Table E-1 summarises the number of weeks of school closures across states and territories in 2020 and 2021. The number of weeks represent the time where the majority of students were learning remotely; weeks where there was reduced attendance are not included in the count. Year-level nuances, such as where early years and senior secondary students were able to return to on-site learning earlier than other students are excluded. Periods of time where school attendance was 'optional' are also not included in the count of weeks. The total number of weeks of remote and online learning is presented visually in Figure E-1, with the shading intensity matching relative duration of closures.

Table E-1 Duration of remote learning across states and territories 2020–2021

State / territory	2020				2021				Total
	T1	T2	T3	T4	T1	T2	T3	T4	
New South Wales (Greater Sydney, Central Coast and Illawarra)	3	4					10	3	20
New South Wales (Regional*)							3-7	1-3	4-10
Victoria (Metro Melbourne and Mitchell Shire)	1	8	9	3	2	2	11		36
Victoria (Regional)			9	1	1	1	11		23
Queensland (Brisbane and South East)	1	5			<1		1		7.5
Queensland (Cairns)	1	5					<1		6.5
Queensland (Remainder)	1	5							6
Western Australia		3							3
South Australia	1			<1				1	2.5
Tasmania		6							6
Australian Capital Territory	3	5					5	3	16
Northern Territory (Darwin)							<1		<1
Northern Territory (Katherine)							1	2	3

Source: ACARA, 2020b. *Regional New South Wales lockdown periods ranged varied across local government areas.

Figure E-1 Number of weeks of remote schooling across Australia in 2020-2021



Appendix F. System approaches for remote and online learning: examples

Supplementary examples of the system approaches for supporting remote and online learning from different jurisdictions as outlined in Section 2 in this report are given in Table F-1 below. These are drawn from the stakeholder consultations and documents supplied to the Review. The table lists a snapshot of approaches applied across states and territories and is not an exhaustive list.

Table F-1 Examples of system approaches for supporting remote and online learning

Aspect	Example
<i>System approach: facilitating increased collaboration</i>	
System collaborations	<ul style="list-style-type: none"> • Ongoing communication between Catholic school sector peak bodies in Melbourne and Sydney supported their respective system responses to lockdown policy changes. • South Australian school principals were able to learn from Victoria's extensive experience with remote learning through a panel featuring central and regional departmental directors and principals from primary, secondary and specialist government schools in late 2021. • Representatives from the NT reported on the ease of jurisdictional collaboration, as they were provided with resources from other states such as NSW, Queensland and Victoria.
School collaborations	<ul style="list-style-type: none"> • The National Catholic Education Commission (NCEC) used its existing Catholic teaching and learning network to identify successful practices at the local level which were shared between schools and Catholic systems.
<i>System approach: ensuring provision of technology</i>	
Partnerships	<ul style="list-style-type: none"> • In Victoria, the state with the longest periods of remote and online learning, Telstra provided dongles to students located in disadvantaged communities, across school sectors.
Provision of devices	<ul style="list-style-type: none"> • In 2021, the Victorian government announced as part of their Bridging the Digital Divide policy that students were able to permanently keep any computers that had been provided by schools for ongoing use.
Standard system-wide technology	<ul style="list-style-type: none"> • Within the ACT, all students in Years 5 to 12 had been previously allocated a Chromebook for home use. During the first lockdown, this was extended to students in Years 3 to 4. • All secondary students within the Melbourne Catholic Archdiocese had access to a device prior to COVID-19, although different platforms were used across schools. Since 2021, the Archdiocese is managing access to one platform across schools.

Aspect	Example
Standardisation of technology following remote learning	<ul style="list-style-type: none"> • The Queensland Department of Education is rolling out a new system-wide enterprise level LMS, QLearn, from 2023. While already in development, the pandemic underscored the importance of its timely implementation.
Supply of bandwidth	<ul style="list-style-type: none"> • The NT conducted a study into the limitations of bandwidth in remote schools in anticipation of the implementation of system-wide remote and online learning. • Queensland has new agreements with suppliers to boost bandwidth from 2023 and further in 2026, in acknowledgement of the importance of providing schools and students with internet access regardless of location.
<i>System approach: enabling teacher professional learning and development</i>	
Initial up-skilling in remote teaching	<ul style="list-style-type: none"> • Prior to the pandemic the ACT Education Directorate had devised a three-year program of professional learning for teachers to upskill technological pedagogical practice. This three-year program was converted into one week program as lockdown commenced, with engagement from the full teacher workforce. • The NSW Department of Education offered short on-demand professional learning sessions created to support teacher skill development and their digital uptake, with thousands of teachers taking part.
<i>System approach: developing teaching and learning materials aligning with the curriculum</i>	
Digital resources	<ul style="list-style-type: none"> • The ACT Education Directorate created teaching and learning resources for Pre-school to Year 10, including daily lessons in English, mathematics and one other curriculum area for Prep to Year 2 classes in Term 2, 2020 and Term 4, 2021. On demand bespoke resources were also available to ACT high schools forced to close due to isolation and deep cleaning when on-site schooling returned. • One offering prepared by the NSW Department of Education included guided packages for teachers including recorded lessons across most key learning areas with a strong literacy and numeracy focus, using a teaching stimulus. Resources created in 2022 included more explicit teaching content. Teachers were able to cut and paste different sections and send it via the LMS to students to differentiate teaching and learning within a single class. • In Western Australia, resources and programs previously prepared by the School of Isolated and Distance Education (SIDE) were downloaded and moved into local LMS by primary teachers where they also could be printed as hard copy packs. For secondary schooling, materials from SIDE were available online which could then be adapted for school context, but not stand-alone units of work.

Aspect	Example
<i>System approach: ensuring provision of wellbeing supports to students</i>	
Planning and identification tools	<ul style="list-style-type: none"> In Victoria, the Department of Education and Training developed an online planning tool to help identify students at risk of disengagement, to ensure schools could identify any student who was vulnerable and maintain their engagement and connection with schools.
Information resources	<ul style="list-style-type: none"> In Victoria, the Department of Education and Training provided online information through a Mental Health Toolkit webpage with links and resources made available to students, staff and parents. The Department also provided further information for parents via podcasts with the Raising Learners network.
Expert advisors	<ul style="list-style-type: none"> The Victorian Department of Education and Training appointed new area-based Health and Wellbeing Key Contacts – experts assigned to each government school focusing on students with mental health concerns and at high risk of disengagement.
Digital wellbeing checks	<ul style="list-style-type: none"> Catholic Education SA developed a six-item student survey that was deployed weekly and used to track student wellbeing.
<i>System approach: providing additional supports for different student cohorts</i>	
Provision of information for teachers regarding supports for students with additional needs	<ul style="list-style-type: none"> In Victoria, the Department of Education and Training updated resources, guidance and advice to schools during remote learning periods. Physical disability specialist staff were provided with webinars on infection prevention and control. The department also undertook weekly meetings with disability sector organisations.
Adjustments for students with hearing and vision impairments	<ul style="list-style-type: none"> Learning@home TV operated by the Queensland Department of Education included AUSLAN signers alongside presented programs. In Queensland, online education for vision impaired secondary school students included literacy using braille for virtual English classes.
Changes to Individual Learning Plans	<ul style="list-style-type: none"> The ACT Education Directorate provided support for teachers to adjust individual learning plans for students, encompassing any changes required to facilitate students working independently.
Supports for CALD students and families	<ul style="list-style-type: none"> In Victoria, the Department of Education and Training provided additional supports for CALD students and families, including translated resources, expanding telephone interpreting and text translation services to schools, additional telephone services to English Language schools and centres, new EAL/D resource packages for teachers, and daily contact with students and families.

Aspect	Example
	<ul style="list-style-type: none"> • In Queensland, the Department of Education provided scripted audio lessons that sat alongside digital learning packages.
Supports for Indigenous students	<ul style="list-style-type: none"> • In Western Australia, experts were brought in to plan for possible lockdowns in remote Indigenous communities, and were also identified as information and support contacts for Indigenous schools. • In the ACT, the Education Directorate implemented a program to help Indigenous students reengage with learning when school returned, using Indigenous Assistants onsite at school.
Incorporating inclusive practice into ongoing remote teaching	<ul style="list-style-type: none"> • During 2022, the Department of Education in Tasmania has been further developing their Virtual Learning Centre to explicitly ensure that it incorporates inclusive practice, drawing on lessons from remote and online learning periods during COVID-19 in their own and other jurisdictions. Teaching and learning materials have been organised in year level groupings, with further adjustments for EAL/D students and students with diagnosed disabilities, articulated through individual learning plans. Differentiated learning can be achieved for students working below or above the expected level as they can access the lessons, but with adjustments. Aside from the standard learning sequence, teachers can draw on the appropriate adjustments and a referral process for students working at home. Students can be referred to the support and inclusion team to have follow up contacts with the family and extra supports and further monitoring from the team. Ongoing contact with the student’s school is maintained throughout.

Appendix G. Reliability of evidence on approaches for remote and online delivery

Ensuring that students are equipped with appropriate digital devices and able to access learning technologies at home are the first steps to remote and online learning, but there are many other factors that influence student engagement and learning within an online setting, particularly pedagogical practices (Berghdahl, Nouri, Fors & Knutsson 2020; Bol, 2020; Cavanaugh, 2013). However, the wide-ranging research evidence that is broadly supportive of remote and online learning is often unclear about specific teaching practices (Education Endowment Foundation, 2020; Higgins, Xiao, Katsipataki, 2012). Studies typically focus on the usability of discrete technological interventions and their potential for innovation, but they often do not specifically address how teachers and pedagogies can support the delivery of remote and online learning (Ames, Harris, Dargusch & Bloomfield, 2020).

The identified approaches to remote and online learning are outlined in Table G-1 alongside an indication of reliability. Applying AERO's Standards of Evidence, the evidence and research collected for the Review sits on the continuum between low (Level 1) to medium confidence (Level 2) (AERO, 2021). Level 1 hypothesises why an approach should have positive effects, whereas Level 2 evidence comprises research that associates an approach with positive effects.

Table G-1 School-level and classroom-level approaches for remote and online learning

Evidence-informed approach	Reliability ^a
<i>School-level approaches</i>	
Changing the structure of the school day to suit online provision	●
Using high-quality technological tools that support student learning	●
Integrating digital technologies within school communities	●
Providing opportunities for teachers to collaborate and support one another during online and remote delivery	●
Developing various communication channels with families through periods of online and remote delivery	●
<i>Classroom-level approaches</i>	
Providing opportunities for students to interact with their peers in the online classroom	●
Facilitating teacher-student communication through digital technologies	●
Adopting learning plans designed for remote and online delivery	●
Varying teaching pedagogies to promote student engagement in remote and online delivery	●
Supporting students to work independently at home	●
Providing appropriate assessment and feedback in the online classroom	●
Adapting practical subject areas to the online learning environment	●

Notes: ^a Reliability determined by AERO framework (2021). The rating is a summative estimate of the overall identified literature and determined by at least one document meeting the requirements of the higher evidence threshold.

Evidence reliability key: ● = low confidence ● = medium confidence.

To illustrate the tensions and limitations in the research evidence currently available, one recent international study sought to link approaches to remote and online provision during the pandemic and the academic attainment of Year 2 to Year 6 students, with a particular focus on gaps between advantaged and disadvantaged students in England (Weidmann, Allen, Bibby, Coe, James, Plaister & Thomson, 2021). The approaches documented included phoning students, timetabling change, live or recorded lessons, frequency of work submission, and use of technological platforms. The study used standardised longitudinal individual-level data for their analysis of student outcomes. However, the study was unable to link the teacher approaches to individual students and thus had to undertake analysis at the school-level, introducing significant measurement error. Therefore, the study was unable to find any clear associations between the approaches that schools undertook in early 2020 to relative changes in mathematics and reading attainment from 2019 to September 2020 (Weidmann et al., 2021). The methodological issues encountered in this contemporary study underscore the challenges involved in identifying what occurred in schools and classrooms during remote and online delivery (both prior to and through COVID-19) and whether adopted approaches had any effect on student outcomes over time.

There is limited research meeting the minimum evidentiary requirements for approaches to remote and online learning in primary or secondary schooling for different cohorts, including

students with a disability, Indigenous students, or students from a language background other than English. There are some examples differentiating between primary/secondary, early/upper primary and secondary students. There is also limited research looking at teaching approaches for specific curriculum areas.

Appendix H. International research

Since the closure of schools due to COVID-19 restrictions, researchers internationally have concentrated on exploring the impacts of remote and online learning on student academic outcomes, both generally and on particular disadvantaged groups of students, such as at-risk students, students with disability, and EAL/D students. The largest concentration of research is from the United States, England, the Netherlands, and Germany. Schools delivered remote and online learning for around 8 weeks in these international contexts, which is shorter than the periods of remote and online learning in some Australian states, such as Victoria and NSW. Most of the research outlined in this section explores student academic outcomes in the 2020 school year compared to previous years. Other research exploring the effects of remote and online learning in 2021 in certain jurisdictions is expected to be progressively released. The most common learning domains featured in research of student outcomes were mathematics, reading, spelling and to a lesser extent, languages.

Research undertaken overseas indicates that the delivery of remote and online learning during the COVID-19 pandemic resulted in mixed outcomes, although some early literature reviews (Donnelly & Patrinos, 2021; Hammerstein, König, Dreisörner & Frey, 2021) and one meta-analysis (Konig & Frey, 2022) report more learning losses than gains. The following sections explore the research undertaken in contexts most comparable to Australia, namely the United States, the UK, the Netherlands, and Germany, focussing on the key trends in student cohorts where available.

In general, these studies use one of two main approaches in exploring the academic impacts on student learning outcomes. The first involves comparing standardised test data of students who experienced remote and online learning during lockdowns to a matched cohort of students pre-COVID-19. Students are matched for example, by SES background and prior achievement (e.g., Engzell, Frey & Verhagen, 2021). Some studies compared the 2020 cohort to a matched sample of schools in 2019 (e.g., Gore, Fray, Miller, Harris & Taggart, 2021), while others compared outcomes across multiple years. For example, Lewis and Kuhfield (2021) analysed data from 2019-2021. The second and less common approach involved obtaining data from the same sample of students at two time points, prior to and during lockdowns for example, and comparing their academic progress across certain key learning areas (e.g., Weidmann et al., 2021).

Researchers use a range of terminology to report differences between pre-COVID-19 student outcomes and those attributable to remote and online learning. This includes 'learning change', 'learning loss' or 'learning lag' (Renaissance Learning & Education Policy Institute, 2021). Pier, Christian, Tymeson & Meyer (2021) refer to the latter to emphasise that during the pandemic, students continued to progress and gain new knowledge and skills, but that their progress may be less than previous years when schooling was delivered predominantly on-site. Based on the terminology used by researchers on this topic during the COVID-19 pandemic, 'learning loss' is the term used in this appendix to denote less relative growth or progress in learning. Researchers report such learning changes as percentile points, standard

deviations, and many convert these measures into months representing the time taken to catch up with pre-COVID-19 outcomes (see for example, Pier et al., 2021).

Limitations associated with pandemic research on student outcomes include instances whereby tests were cancelled during the cessation of face-to-face learning. Attrition from subsequent tests after the initial baseline data has been collected can be an issue, particularly for low SES groups as observed by Zviedrite, Hodis, Jahan, Gao and Uzicanin, (2021) in the United States. Johnson and Kuhfeld (2020) also noted that data samples of students taking tests during remote and online learning comprised larger proportions of students from higher SES backgrounds and fewer EAL/D students. This situation limits the ability to undertake analysis of different cohorts. Due to these reasons, all studies discussed in this appendix state their aim as outlining some key trends as they relate to student outcomes associated with remote and online learning, but saliently, none of the research attributes causality to the differences in learning outcomes.

United States

Like Australia, individual states within the United States experienced varying lengths of school closures. Schools in the United States shifted to remote and online learning from March, 2020 and many government schools remained closed for the remainder of the school year (Education Week, 2020).

The largest study in the United States was conducted in November, 2020 (Kuhfield, Tarasawa, Johnson, Ruzek & Lewis, 2020). The researchers drew on Measures of Academic Progress (MAP) Growth data (large scale standardised tests administered face-to-face and online during the pandemic) to explore changes in student achievement in reading and mathematics in the initial few months of the pandemic.⁷ Based on a sample of 4.4 million students in Years 3 to 8, the researchers explored two aspects of student academic outcomes. Firstly, they aimed to investigate how the 2019-2020 cohort of students performed relative to a matched sample of students from the previous academic year. Secondly, the researchers explored how academic growth changed at the student level from fall 2019, to winter 2020 and fall 2020.

With a few exceptions related to learning areas, the findings highlighted no significant changes in learning. The cohort of students had similar achievement in reading, but lower in mathematics. Looking at within-student learning changes, except Grades 5 and 6, most students made some learning gains in both reading and mathematics, with less gains in the latter. The researchers concluded that the gaps in achievement did not appear to be markedly different from previous years.

In the 2020-2021 school year, restrictions on face-to-face learning varied across states, but continued to impact schools in the United States (August, Carlson, Cieslak & Nieser, 2021). Drawing on the same MAP Growth data, Lewis and Kuhfield (2021) continued to track students into the 2021-2022 school year. They reported that reading gains in the 2019-2020 and 2020-2021 school years were similar to pre-pandemic growth rates; however, mathematics gains were well below average. The report also highlighted that Hispanic students, African American

⁷ <https://www.nwea.org/map-growth/>

students, students attending high-poverty schools, and low achievers had lower academic growth than their relative counterparts.

The extent of learning changes or losses can vary depending on the student outcomes data used by researchers for analysis. For example, MAP Growth and two other sources of additional student achievement data Renaissance Learning Star⁸, and Curriculum Associates i-Ready⁹ were compared by Pier et al. (2021) to investigate students' learning achievement in a cohort of 100,000 Californian students in 2020-2021. Both Renaissance Learning Star and Curriculum Associates i-Ready tests comprise a set of adaptive test items taken in roughly 20 minutes (Curriculum Associates, 2021; Renaissance Star Assessment, 2021). The performance of students in English language and mathematics from Years 4 to 8 were analysed from the three sets of test data.

All three tests showed similar patterns in learning loss, but there were differences in the degrees of learning changes between the tests. For example, all tests showed that Grade 5 and 6 students made the least learning gains in English, four months, and that Grades 4 to 7 had three month learning loss in mathematics, but the MAP tests showed more severe learning losses compared to the other two tests. The results also indicated that English learners, students with disabilities, students of different racial/ethnic backgrounds, low performing students, and students experiencing homelessness all had learning gains less than their counterparts on average. The researchers highlighted that different types of tests may produce different outcomes related to extent of learning losses or changes in students.

United Kingdom

Schools in the UK experienced relatively long lockdown periods, comparable to some Australian states such as Victoria and NSW. Schools across the UK first closed in March, 2020 for 8 weeks. They re-opened in June 2020 and students returned to face-to-face learning. A wave of cases from the Omicron variant in December 2020 saw schools close until February, 2021 (Parliament United Kingdom, 2022).

The Department of Education in England conducted research based on assessment data from Renaissance Learning's Star Reading and Star Mathematics (Renaissance Learning Education & Education Policy Institute, 2021).¹⁰ The assessment data from these sources were matched to data held in the National Pupil Database to account for student demographic information, such as disadvantage (eligibility for free school meals, which can be based on parental income, employment status and immigration status), English speaking background and cultural background.¹¹ The Department of Education predicted students' progress term by term throughout the 2020-2021 school year. Reading levels dropped to two months learning losses initially, but students caught up throughout the school year resulting in an average

8 <https://www.renaissance.com.au/products/assessment/star-reading/>

9 <https://www.curriculumassociates.com/>

10 Star Assessments are "computer-adaptive in nature, [enabling] the identification [of] gaps in learning from the entirety of the curriculum independent of their current year group. Star assessments also include a standardised measure which takes account of the pupil's age in years and months" (Renaissance Learning, 2022, p. 4).

11 See <https://www.gov.uk/apply-free-school-meals> for full list of eligibility criteria

learning loss of 0.9 months by the end of the 2021 school year. Learning losses in mathematics for primary aged pupils followed a similar pattern, with a large dip in learning of 3.4 months in the first term. Learning loss by the summer term (August to October) was 2.2 months, on average. Significant differences between student cohorts arose in the analysis for pupils from disadvantaged backgrounds. 'Disadvantage' was defined as pupils eligible for free school meals at any point in the last six years. By the end of the first half of the autumn term, pupils from disadvantaged backgrounds reported learning losses, on average, of approximately 1.9 months in reading amongst both primary and secondary aged pupils, and around 4.5 months in mathematics for primary aged pupils. No significant differences were reported for culturally and linguistically diverse groups or EAL/D students.

These findings have been corroborated by research conducted by organisations in the UK (Blainey & Hannay, 2021; Juniper Education, 2021). The Education Endowment Foundation for example, have produced a series of reports in order to understand how the pandemic has impacted student learning outcomes and how it has affected the learning gaps between disadvantaged and non-disadvantaged students (Rose et al., 2021; Weidmann, 2021).

Rose et al. (2021) compared a sample of 6,000 Grade 2 students from England, referred to as key stage 1, who undertook standardised tests in reading and mathematics in 2020 compared to a standardised sample of students in 2017. The 2020 cohort of students made around two months less progress in both reading and mathematics, compared to the 2017 cohort. Disadvantaged students, however, made seven months less progress in mathematics and reading compared to advantaged students in the 2020 cohort.

Weidmann et al. (2021) examined whether the gap between disadvantaged pupils and their more advantaged peers widened in 2021, as remote and online learning continued. The researchers utilised student-level data collected longitudinally. Students sat standardised, in-person tests at three time-points:

- November/December 2019 (pre-COVID-19)
- September 2020 (when students returned on-site)
- December 2020 (when students had been back at school for a full term).

The research found that attainment gaps between disadvantaged pupils and their peers for primary level students in mathematics had widened since 2019. Years 2 and 3 was where the largest gaps in mathematics achievement arose in student outcomes. On average, for Years 2 to 6, the mathematics gap between disadvantaged pupils and their peers widened by an estimated 10 percentile points compared to the pre-COVID-19 attainment gap. No significant differences were reported for reading.

Netherlands and Germany

Large scale studies of student academic outcomes have been conducted in the Netherlands and Germany. These two countries have federalised school systems like Australia, however the structure and processes of secondary schooling, differ from Australia, with students streamed into different schools or 'tracks' based on their academic performance. The Netherlands and Germany experienced 8 weeks of remote and online learning in 2020.

Research in these contexts has typically focussed on students' mathematics and reading in upper primary and early secondary school, or the middle years of schooling. Engzell et al. (2021) drew on standardised test data from a nationally representative sample of 350,000 Dutch students in Years 4 to 7 (students aged 7 to 11). The researchers matched students from the 2020 cohort to a sample of students in 2019 on parental education, sex, prior performance, and at a school-level using socioeconomic disadvantage, proportion immigrant background, and school denomination. The analysis highlighted learning losses across all year levels in mathematics, reading and spelling. Disadvantaged students (those without at least one parent with a degree), were worse off than their advantaged peers. These findings are corroborated by those of Schult, Mahler, Fauth & Lindner's (2022) study of German students in the same grade levels, excluding Year 4 students.

While previous research in the English-speaking contexts of the United States and UK highlighted that EAL/D students were more negatively impacted by online learning (e.g., Pier et al., 2021), this was not the case for non-dominant language speakers in northern European contexts. In the Netherlands, Maldonado and De Witte (2021) find no significant learning losses in students who do not speak Dutch as a first language for example.

Table H-1 below summarises the key international research on student outcomes.

Table H-1 Summary of key international research on student academic outcomes during the shift to remote and online learning

Authors	Context	Lockdown period (weeks)	Sample size and cohorts analysed	Key learning areas	Data and approach	Findings	Reliability
Kuhfeld et al. (2020)	United States (all states)	8	4.4 million students in Year 3 to 8	Reading and mathematics	MAP Growth assessments in fall 2020 compared to fall 2019.	Reading: no change Mathematics: ↓ 5 to 10 percentile points	●
Pier et al. (2021)	United States (California)	10	100,000 Year 4 to 8 students	Mathematics and English	Interim assessments compared for students between 2019 and 2020 school years	English: ↓ 2.6 months Mathematics: ↓ 2.5 months English learners, students with disabilities, Latinx students, low achievers and those experiencing homelessness reported larger than average learning lags.	●
Engzell et al. (2020)	The Netherlands	8	350,000 students in Years 4, 5, 6 and 7 (aged 7 to 11)	Mathematics, spelling and reading	Standardised test data from January 2020 (pre-school closures) compared to May 2020 (post school closures)	Mathematics, spelling and reading: ↓ Learning loss more pronounced in low SES students	●

Authors	Context	Lockdown period (weeks)	Sample size and cohorts analysed	Key learning areas	Data and approach	Findings	Reliability
Van der Velde et al. (2021)	The Netherlands	8	133,000 secondary school students in 3 academic tracks: general, vocational and pre-university	English and French	Analysed students' test results from online language program before and during lockdown in 2020	English: no change French: ↑ during lockdowns, especially for the pre-university track.	●
Schult et al. (2022)	Germany	8	80,000 Year 5 students	Mathematics and reading	Standardised test (Lernstand 5) compared to a cohort of students in 2020 to previous 3 years	Mathematics: ↓ Reading: ↓	●
Spitzer et al. (2021)	Germany	8	2,500 K – 12 students	Mathematics	Analysed student performance on online learning software before and during lockdown in 2020	Mathematics: Low achieving students made more learning gains than high performing students	●
Tomasik, Helbling & Moser (2021)	Switzerland	8	28,685 K – 12 students	Mathematics, reading and grammar	Analysed students' standardised test results (MINDSTEPS) before and during lockdown in 2020	Mathematics, reading and grammar: no significant changes	●

Authors	Context	Lockdown period (weeks)	Sample size and cohorts analysed	Key learning areas	Data and approach	Findings	Reliability
Maldonado & De Witte (2021)	Belgium (Flanders region)	7	Over 5,000 Year 6 -12 students	Mathematics, Dutch, social sciences, science and French	Standardised tests from 2015 to 2020; 2019 and 2020 were compared, as were 2017 to 2020 and 2015 to 2020.	Mathematics: ↓ Dutch: ↓ French: ↓ Social sciences and science: No significant changes	●

AERO evidence reliability key: ● = low confidence ○ = medium confidence.



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