Report for EdTechHub (ODI)

What does the research suggest is best practice in pedagogy for remote teaching?

Tony McAleavy and Kristine Gorgen

with input from Ed Gaible

Section 1: Executive Summary

Scope of study

- This report provides a rapid evidence summary of what is known about best practice in teaching when school students are educated by distance learning.
- It considers both theoretical concepts and empirical evidence relating to the effectiveness of teaching methods used in a distance learning context.
- The report includes a consideration of the grey literature about pedagogy produced in response to the current period of global school closures.
- There are limitations in the nature of the evidence base. Much of the research into remote pedagogy comes from a higher education context. Little attention has been devoted to remote pedagogy at primary school level. Research evidence from low-income and middle-income countries is limited.

Key themes

The general principles of effective pedagogy remain valid in the context of remote learning, but there are additional challenges facing the remote teacher.
The highly effective remote teacher must be proficient in the same domains as the face-to-face teacher: planning and teaching well-structured lessons (*structure*), adapting teaching when appropriate to meet individual needs (*adaptation*), and making accurate and productive use of assessment (*assessment*). However, physical distance between the teacher and learner presents considerable challenges and requires changes to planning, teaching and assessment practices. For example, online teaching should not try to mimic the entirely synchronous teacher-student engagement of the conventional school. Ensuring equitable outcomes for disadvantaged students is more difficult for remote teachers and requires greater intentional effort. Moreover, pedagogical performance is circumscribed by the digital capacity of the teacher. The digital capacity of teachers in some high-income countries is poor and is poorer still in most low-income countries. Many teachers therefore need professional development support in the use of technologically enhanced pedagogy.

Research highlights the importance of developing and maintaining 'teaching presence', in order to ensure that learners thrive when studying remotely.
The failure of many MOOCS demonstrates the importance of student persistence and motivation. This, in turn, depends upon substantial teacher-student engagement. There is a well-established theoretical framework for considering the work of teachers in a distance learning context, which emphasises the need for proactive planning to ensure 'teaching presence'. This framework was developed by the Canadian researchers, Anderson and Garrison. According to this model, since the remote teacher starts at a disadvantage in terms of social interaction, they must deliberately strive to remedy this, making remote students aware of their teaching presence through many different forms of dialogue: instructing, guiding, questioning, listening, assessing, advising, admonishing and reassuring

them as appropriate. Student success depends upon having a strong sense of the teacher's virtual presence. A well-designed sequence of remote learning will involve frequent, diverse opportunities for the teacher to demonstrate 'presence' to students, including assessment activities. Teaching presence can be promoted regardless of whether the main form of remote instruction is via centralised radio/TV broadcasting or whether students are engaged in online learning with a local school.

It is a false dichotomy to propose that undesirable 'teacher-centred' rote learning or desirable 'student-directed' enquiry constitute the two main forms of remote pedagogy. The model proposed by Anderson and Garrison is neither 'teacher-centred' nor 'student-directed'. For them, the effective remote teacher is a subject matter expert skilled in different aspects of 'direct instruction', including exposition and explanation. In this model, effective teaching presence involves the provision of a well-structured sequence of intellectually engaging learning activities and frequent diagnostic feedback. At the same time, students are highly engaged in their own learning, and are encouraged to take responsibility for their work and to develop metacognitive strategies.

The USA has substantial experience in educating school students via distance learning, but virtual charter schools achieve poor academic outcomes.
There are currently about 300,000 students enrolled in the virtual K-12 school sector in the USA. Pedagogical quality expectations are set out in national standards, which were revised in 2019. There has been substantial research into the sector, particularly into learning outcomes and provision in virtual charter schools. Some major studies have been negative about the outcomes and provision offered by these schools. One important study highlights the excessive personalisation of provision and the emphasis on self-paced study as contributing factors to student underachievement.

The Chinese government approach to pedagogy during the current period of school closures provides an interesting case study.
The Chinese authorities reviewed the literature and identified key pedagogical risks in moving to remote learning: teachers can be overwhelmed by the curation challenge of organising online resources; teachers need training or support when moving to remote pedagogy; and some learners lack mature skills in self-regulation and independent study. The Chinese authorities sought to mitigate these risks and advocated a blend of asynchronous and synchronous teaching, along with technologically enabled assessment practices.

Governments can assist in the curation of learning resources.
Creating entirely new learning resources can take up a disproportionate amount of a remote teacher's time, thereby reducing available time for interaction with students. Governments can help by providing centralised guidance on suitable learning resources. Open Education Resources (OER) are particularly useful because they allow teachers to modify materials to suit the particular needs of their students.

Remote teaching brings challenges, but technology can be used to enhance the impact of distance learning.

Whether the medium is radio, TV broadcasting or online learning, remote teaching activities can be designed in ways that maximise cognitive engagement and minimise the risk of passivity on the part of the learner. Students should be frequently encouraged to evaluate their own work, to understand 'what good looks like', and to consider how they can take responsibility for improvement.

Section 2: Evidence and Policy

Introduction: Applying the general principles of effective pedagogy to the specific context of remote learning

The characteristic behaviours and areas of expertise of highly effective schoolteachers are well researched. Many countries have occupational standards for teachers, which seek to translate this knowledge into a set of professional expectations. The Teachers' Standards for England are a good example.[1] They provide a comprehensive overview of the essential components of teacher professionalism, including key pedagogical skills. The identified areas of expertise are consistent with the best evidence about what effective teachers do well.[2] According to these standards, best practice pedagogy includes proficiency in three core domains:

1. **Planning and teaching well-structured lessons (*structure*)**
2. **Adapting teaching when appropriate to meet individual needs (*adaptation*)**
3. **Making accurate and productive use of assessment (*assessment*).**

The highly effective remote teacher must be proficient in these domains, but physical distance between the teacher and learner brings additional challenges above and beyond those that confront the teacher in a 'bricks and mortar' school. Teachers working remotely must contend with greater complexity when designing well-structured lessons because the 'lesson' is a more fluid construct in a distance learning context. Remote 'lessons' include real-time (or synchronous) opportunities to engage with students, but also structured, sequential (or asynchronous) learning and teaching sessions, in which students spend time undertaking assignments without the virtual presence of the teacher. Access to fewer visual clues and less real-time information makes agile, adaptive teaching and diagnostic assessment more demanding for the remote teacher.

As a result of these constraints, the highly effective remote teacher needs to be particularly intentional in ensuring that essential components of effective pedagogy – ***structure, adaptation,*** and ***assessment*** – are delivered effectively in a remote learning context.

The remote teacher is also more dependent on technology than the face-to-face teacher, and pedagogical effectiveness will be circumscribed to a greater extent by the level of digital skills l the teacher possesses than would be the case in a conventional setting. In many countries, this represents a considerable challenge. According to the PISA 2018 survey of principals in participating jurisdictions, 35% of secondary school students in comparatively wealthy OECD countries are enrolled in schools where teachers typically lack the necessary technical and

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[1] Department for Education (2013). Teachers' Standards for England. [Online]. Accessed at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/665520/Teachers__Standards.pdf

[2] The Department for Education (DfE) recently reviewed and published a bibliography of the research evidence underpinning the Teachers Standards for England linked to a new Early Career Framework. This evidence review was independently assessed and endorsed by the Education Endowment Foundation. The bibliography relating to the evidence review is provided in DfE (2019) Early Career Framework. Accessed at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/773705/Early-Career_Framework.pdf

pedagogical skills 'to integrate digital devices in instruction'.[3] The figure will be considerably worse for schools in most low-income countries, where the majority of teachers are likely to lack the necessary skills for best practice in remote teaching. In Cameroon, it has recently been calculated that only 20 to 25% of teachers have personal access to the internet and the majority are unable to make effective use of technology.[4]

In the global context of the current crisis, UNESCO-IIEP has emphasised the importance of the equity challenge that arises when disadvantaged students transition to learning remotely.[5] The difficulties which are already present in ensuring equitable outcomes in conventional schooling, especially for disadvantaged students, are likely to be increased by remote teaching and learning. While students in conventional classrooms work in a homogeneous environment, those working from home attempt to learn in a range of situations, including some which are highly problematic. Digital access in all countries is closely connected to household socio-economic advantage: the United Nations calculates that, globally, households are divided almost equally between those who have and do not have access to the internet.[6] In addition, marginalised groups, such as girls and students with disabilities, are less likely to do well when working from home. The effective remote teacher must therefore be highly sensitive to the problems facing disadvantaged learners.

All teachers have, of course, a fundamental responsibility to promote the safety and well-being of their students. Safeguarding is more difficult when students study remotely and greater use of online learning brings its own increased safeguarding risks..

Before the crisis: conceptualising best practice in pedagogy for remote learning

In the last two decades, there has been considerable theorising about how learning takes place in technologically enabled distance learning situations and, by implication, the steps teachers need to take to optimise learning outcomes when teaching remotely.

Since 2000, Canadian academics Terry Anderson and D R Garrison, together with others, have established and refined the concept of 'teaching presence' in the context of remote learning.[7] The work of Anderson, Garrison and their colleagues developed out of innovation and research into university-level distance learning, so the transferability of their ideas to the school sector

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[3] Schleicher, A. (2020), Education disrupted – education rebuilt: Some insights from PISA on the availability and use of digital tools for learning, *OECD Education and Skills Today.* [Online]. Accessed at: https://oecdedutoday.com/coronavirus-education-digital-tools-for-learning/

[4] UNESCO (2020) COVID-19 Webinar: A new world for teachers, education's frontline workers. A*.* [Online]. Accessed at: https://en.unesco.org/news/covid-19-webinar-new-world-teachers-educations-frontline-workers-covid-19-education-webinar-2

[5] IIEP (2020). Three ways to plan for equity during the coronavirus school closures. [Online]. Accessed at: http://www.iiep.unesco.org/en/three-ways-plan-equity-during-coronavirus-school-closures-13365

[6] United Nations (2020). Telecommunication Development Bureau Statistics. [Online]. Accessed at: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

[7] Garrison, D. R., Anderson, T., & Archer, W. (2000) Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2-3), 1-19; Anderson, T., L. Rourke, D.R. Garrison and W. Archer (2001). Assessing teaching presence in a computer conferencing context, *Journal of Asynchronous Learning Networks 5 (2)* Garrison, D. R., & Anderson, T. (2003). E-Learning in the 21st century: A framework for research and practice; Garrison, D. R. (2006). Online collaboration principles. *Journal of Asynchronous Learning Networks,* 10(1) pp. 25-34; Garrison, D. R. (2015). Thinking Collaboratively: Learning in a Community of Inquiry.

must therefore be given careful consideration. With this caveat, much of their thinking does appear relevant to conceptualising remote teaching at school level.

Anderson and Garrison proposed that good remote learning needs to be understood as a social phenomenon and not an exercise in supported self-study. Aspects of social interaction which can be taken for granted in face-to-face teaching situations need to be explicitly built into the design of remote teaching approaches in a highly intentional way for them to be effective. They have promoted the concept of 'teaching presence' – the level of engagement and visibility of the teacher in the academic life of the remote student. The concept of teaching presence proved highly influential in higher education discourse about remote teaching.

Advocates of the importance of teaching presence believe that the remote teacher starts at a disadvantage in terms of social interaction and must therefore strive deliberately to remedy this, making remote students aware of their teaching presence in many different forms of dialogue: instructing, guiding, questioning, listening, assessing, advising, admonishing, and reassuring them as appropriate. To succeed, students must have a strong sense of the teacher's virtual presence. A well-designed sequence of remote learning will involve frequent, diverse opportunities for the teacher to demonstrate that presence to students.

For Anderson and Garrison, the remote teacher is an active instructor and not simply the facilitator of student learning through enquiry. From the beginning, they rejected the notion that the online teacher was 'the guide on the side'. They reaffirmed the important. traditional role of the remote teacher as a subject matter expert who explains content to novice learners in an engaging way, exploring student understanding through questions and using assessment information to correct student misconceptions.[8] Anderson and Garrison called this aspect of pedagogy 'direct instruction'.[9] They described the teacher as 'a subject matter expert who knows a great deal more than most learners and is thus in a position to 'scaffold' learning experiences by providing direct instruction'.[10] They used this term as shorthand for structured, engaging, teacher-led pedagogy and not as a reference to the 'Direct Instruction' approach to teaching associated with the work of Siegfried Engelmann. Anderson and colleagues presented a framework that sought to identify the indicators of direct instruction that should be present in the work of the online teacher.

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[8] Anderson et al., (2001) p. 9

[9] The complex meaning and history of the term 'direct instruction' is traced by Rosenshine, B., (2008) Five meanings of Direct Instruction, Center for Innovation and Improvement. [Online]. Accessed at: http://www.centerii.org/search/Resources/FiveDirectInstruct.pdf

[10] Anderson et al., (2001)., p. 2

> **Indicators of direct instruction**
>
> • Present content/questions
> • Focus the discussion on specific issues
> • Summarize the discussion
> • Confirm understanding through assessment and explanatory feedback
> • Diagnose misconceptions
> • Inject knowledge from diverse sources
>
> Anderson et. al (2001)

Many other researchers have endorsed the importance of the concept of teacher presence and sought to further explore its nature in remote teaching. Pearson provides a useful overview of the development of 'presence theory', in which some of the literature relates to teaching presence.[11]

One of the most important opportunities for the remote teacher to demonstrate presence is through assessment. Researchers have highlighted the need for teachers to be clear about the different purposes of assessment and to provide a range of assessment activities in a remote learning context.[12] Regular online assessment should be used to provide information that can inform the dialogue between teacher and student and address any misconceptions. Summative assessment activities should be used to determine when the students are ready for new content. For each individual student, the teacher should use assessment data to 'calculate student's risk of failure'.[13]

At an early stage of their work on presence, Anderson and Garrison identified the need for the remote teacher to create a so-called '**cCommunity of iInquiry'**, comprising the students on a course and led by the remote teacher. An effective community of inquiry, they suggested, depends upon teaching presence, but also on 'social presence' and 'cognitive presence'. **Social presence** is the extent to which the learner has a developed sense of belonging to a collective group or community with fellow students on the same course. In the context of a transition from face-to-face to remote learning, the challenge is, of course, maintaining rather than establishing the sense of community. The effective remote teacher must intentionally promote this sense of community. **Cognitive presence** relates to the extent to which students are personally engaged with their learning, undertaking a well-designed sequence of learning that enables them to acquire new knowledge and understanding while working remotely. Teachers should design activities for maximum cognitive engagement, ensuring that there is a careful sequence during a block of work from initial 'triggering events' to the 'resolution' by the students of the problem that they have been studying.[14]

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[11] Pearson (2016). Teaching Presence. Higher Education Services. White Paper. [Online]. Available at: https://www.pearson.com/content/dam/one-dot-com/one-dot-com/us/en/pearson-ed/downloads/Teaching-Presence.pdf

[12] Means et al. (2010). Online Learning: A Meta-Analysis and Review of Online Learning Studies. [Online]. Accessible at: https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

[13] Means et al. (2014) Learning *Online*: What Research Tells Us About Whether, When and How, p*. 10*

[14] Hosler, K, & Arend, B. (2013) "Strategies and Principles to Develop Cognitive Presence in Online Discussions." In Z. Akyol & D. R. Garrison (Eds.), Educational Communities of Inquiry: Theoretical Framework, Research and Practice. (Information Science Reference: Hersey, PA), 148--167.

Confirmation of the importance of online teaching presence comes from the disappointing story of remote learning via Massive Open Online Courses (MOOCs) since 2012. MOOCs have failed to fulfil the promise and excitement that they first generated, largely because students often lack the persistence and high levels of self-regulation needed to complete this form of learning. Harvard University and the Massachusetts Institute of Technology (MIT) were pioneering providers of MOOCs. Reich and Ruipérez-Valiente analysed data relating to 5.63 million MOOC students enrolled on MIT and Harvard courses from 2012 to 2018.[15] They established that the completion rates were pitifully low from the beginning and had worsened over time. Fewer than 5% of MOOC students completed their courses. One obvious difference between MOOCs and many other forms of distance learning is the typically much lower level of teaching presence within MOOCs and much higher demands in terms of student motivation and self-regulation. If volunteer adult learners need teaching presence to persist in their learning, then it seems beyond doubt that school students learning from home require high teaching presence.

The presence theory of Anderson and Garrison has been utilised in some countries by experts providing guidance on remote pedagogy to schools during the current period of school closures. This idea was explicitly highlighted in the recent advice provided to schools by the State of California in the context of Covid-19-related school closures. In the guidance on remote pedagogy, the first message to teachers in California is: '*Be present as an instructor*'. Teachers are given straightforward examples of how such presence can be achieved. These examples do not all require ambitious synchronous teaching and learning. The first recommendation is that teachers should record a weekly three-minute video reviewing the highlights of the previous week and explaining the focus for the forthcoming week to their students. Formative assessment is also recommended as a means both of establishing presence and ensuring that core pedagogical engagement takes place.[16]

In China, the team that designed the learning approach used during the period of school closures also used the concepts developed by Anderson and Garrison. They identified the need for 'interactivity, social presence, and cognitive presence'. Unless engaging, interactive remote learning was provided, the result would be 'unmotivating learning experiences'.[17]

In the context of school closures, the case for teaching presence was also implicitly made in recent OECD advice to policymakers. The OECD highlighted the findings from the PISA 2018 assessment that even among 15-year-old students, just one in nine students was able to distinguish between fact and opinion. Students need engagement with a teacher so that they can safely navigate the dangerous waters of internet resources. Researchers found that:

> *Without considerable guidance and support from teachers, it is unlikely that students will be able navigate the world of online learning on their own.*[18]

[15] Reich, J. and Ruipérez-Valiente, J. A. (2019). The MOOC Pivot. *Science* 363(6423), pages 130-131.

[16] California Department of Education (2020) Lessons from the Field: Remote Learning Guidance. [Online]. Accessed at: https://www.cde.ca.gov/ls/he/hn/appendix2.asp

[17] Huang et al. (2020). Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese Experience in Maintaining Undisrupted Learning in COVID-19 Outbreak. Beijing: Smart Learning Institute of Beijing Normal University.

[18] Reimers, F. & Schleicher, A. (2020). A framework to guide an education response to the COVID-19 Pandemic of 2020 [Online]. Available at:
https://www.hm.ee/sites/default/files/framework_guide_v1_002_harward.pdf

The work of Anderson and Garrison supports the idea of the highly visible and proactive remote teacher. In much of the discourse regarding pedagogical quality, especially in low-income countries, a very different idea is proposed: the need to move away from a harmful 'teacher-centred' pedagogy. The juxtaposition of 'bad' teacher-centred pedagogy, based on rote learning methods, and 'good' student-centred pedagogy, characterised by student-led enquiry, is still extremely prevalent in the global literature relating to school quality. A typical example can be found in Serin, who, like many other commentators, assumes that there is an urgent need to move away from the concept of teaching as the transmission of knowledge from the expert teacher to the passive student. [19] Researchers such as Serin propose that the role of the teacher should be to facilitate student-directed learning. Commentators who make the binary distinction between undesirable teaching-centred and desirable student-centred learning tend to emphasise the importance of reducing teacher classroom talk and allowing students to take more control of their learning.

Ideas about the desirability of student-led enquiry, with minimal teacher supervision, are also not uncommon in high-income countries. In April 2020, the UK Times Educational Supplement published an article discussing different potential teaching responses to school closures, including the ideas of Sugata Mitra, who advocates 'minimally invasive' teaching support for enquiries led by students. It explained:

> In the current situation in many schools, a teacher would set a task via a platform such as Google Classroom, then children would go off and complete that task either on their own or collaboratively, using something like Microsoft Teams…the teacher may pop into this learning journey as a partner, but never as a dictator of what comes next.[20]

Some advocates of student-centred pedagogy might consider that the promotion of *teaching presence* and *direct instruction* were manifestations of poor teacher-centred pedagogy and a recipe for student passivity and disengagement. This would be to misunderstand what Anderson and Garrison mean. Students in a community of inquiry are highly engaged. The teacher adopts a dialogic approach that encourages active learning, with a strong emphasis on formative assessment. Teaching presence is manifested not through one-way transmission of knowledge but through frequent dialogue in which students are encouraged to take responsibility for their work and to develop metacognitive strategies. Cognitive presence can only be achieved through the provision of a well-structured sequence of intellectually engaging learning activities.

Before the crisis: pedagogy within the context of virtual schooling in the USA

The provision of primary or secondary school education entirely by remote learning, as opposed to blended learning (which combines face-to-face instruction and online study), is relatively uncommon in many countries. However, one exception is the USA, where, since 2000, there has been a dramatic increase in the provision of online K-12 schooling through both state or district provision and charter schools. In the academic year 2017-18, there were over 500 full-time

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[19] Serin, H. (2018). A Comparison of Teacher-Centered and Student-Centered Approaches in Educational Settings. *International Journal of Social Sciences & Educational Studies,* 5(1), pp.164–167.
[20] Worth, D. (2020) Coronavirus: How to maximise distance learning, TES Magazine, April 2020. [Online]. Accessed at: https://www.tes.com/magazine/article/coronavirus-how-maximise-distance-learning

virtual schools serving 300,000 students.[21] Many of these are virtual charter schools, free from the control of the local school district.

Attempts to promote and benchmark quality across the virtual K-12 school sector have led to the development of National Standards for Quality Online Learning, which relate to the quality of provision in full-time online education. There are three sets of standards: for online teaching, online programmes, and online courses. They were last revised in 2019 and are available online.[22] The standards were produced through an iterative process that involved a literature review of relevant research and a consultation process with stakeholders and users. The website hosting the standards states an expectation that school districts will use them as a key reference point during the period of school closures, explaining: 'These are essential frameworks for K-12 districts developing quality online learning plans to deal with long-term school closure possibilities'.[23]

The US National Standards for Quality Online Teaching are organised into domains covering:

- Professional Responsibilities
- Digital Pedagogy
- Community Building
- Learner Engagement
- Digital Citizenship
- Diverse Instruction
- Assessment and Measurement
- Instructional Design.[24]

The standards emphasise the importance of online safety. The term 'netiquette' is used to describe the strict rules required to ensure that students operate within safe and mutually respectful boundaries. The online teacher is expected to be active in monitoring, for example, student-to-student online interaction so that the rules are enforced. The standards remind teachers of the need to be vigilant regarding intellectual property issues. This is particularly important because the standards assume that a significant role for the online teacher is the curation of online resources for student use.

Influenced by the research of Anderson, Garrison and others, the standards repeatedly use the term 'presence' to describe teacher-student and student-student visibility and interaction online. There are frequent references to peer interaction and the community of learners. At the same time, there is a marked emphasis on the importance of the personalisation of learning and the need for the teacher to provide each student with an individualised learning plan. The introduction to the standards makes it clear that teachers are expected to differentiate their planning at the level of the individual student, stating: 'The National Standards for Quality Online Teaching and indicators focus on online instruction that creates a highly individualized learning environment'.

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[21] Molnar et al., (2019). Virtual Schools in the U.S. 2019. Boulder, CO: National Education Policy Center.
[22] National Standards for Quality Online Learning (2019). [Online]. Available at: https://www.nsqol.org/
[23] Ibid
[24] National Standards for Quality Online Teaching (2019). [Online]. Available at: https://www.nsqol.org/wp-content/uploads/2019/02/National-Standards-for-Quality-Online-Teaching.pdf

The virtual school sector has attracted substantial interest from researchers. There have been many small-scale, typically qualitative studies of the work of teachers in these schools. There have also been several larger quantitative studies with a focus on the academic outcomes of the virtual schools, particularly virtual charter schools. These studies are negative about the learning outcomes achieved in the sector, although they do recognise that many of these schools serve a challenging constituency of students who have often found it difficult to thrive in a conventional school environment.

These studies of virtual charter schools suggest a possible link between the disappointing performance of the schools and the pedagogy used by their teachers. The National Education Policy Center issued a highly critical report on the virtual school sector in 2019.[25] This study questioned the extent to which the sector had developed teaching approaches suitable for an online environment. The National Education Policy Center drew upon a major study of virtual charter schools that was published in 2015 by the research organisation Mathematica.[26] This study made some insightful comments on the possible connections between pedagogy and poor outcomes. For instance, students typically followed courses that were self-directed and personalised.[27]

The authors of the Mathematica study commented critically on 'the ubiquity of independent study' in these schools, implying that this was one cause of students' disengagement. In addition to a dull and lonely diet of self-paced study, students were suffering from the absence of face-to-face interaction or sufficient equivalent synchronous online engagement with a teacher and other students. The study explained that: *The difference is dramatic: students in the typical online charter school have less synchronous instructional time in a week than students in a brick and mortar school have in a day.*[28]

At the same time as students were deprived of real-time engagement with peers, the schools were failing to exploit the potential they had for frequent and powerful one-to-one coaching online. This combination was likely to lead to alienation and frustration.

> *The small amount of synchronous instructional time provided by most online charter schools is not coupled with a large amount of one-on-one interaction with teachers. This suggests that most online charter schools expect that the bulk of learning will occur during a student's individual engagement with the course material, perhaps with the help of a parent.*[29]

Pedagogy and the international response to the Covid-19 crisis

Widespread school closures in 2020 have led to considerable discussion about the need to ensure continuity in teaching and learning. Advice about remote pedagogy has varied from place to place. A key point of difference is the extent to which online learning has been promoted. Some ministries of education have endorsed the role of online e-learning. In Egypt, for example,

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[25] Molnar et al. (2019).

[26] Gill, B., Walsh, L., Wulsin, C.S., Matulewicz, H., Severn, V., Grau, E., Lee, A., & Kerwin, T. (2015). *Inside on- line charter schools.* Cambridge, MA: Mathematica Policy Research.

[27] Ibid, p. xiii

[28] Ibid, p. xiv

[29] Ibid, p. xv

the government has contracted the education technology company Edmodo to provide a learning platform for all students and teachers in the country.[30] Other governments have taken a different approach, emphasising older technologies such as teaching via radio or TV, rather than online learning.

Some commentators have suggested that high-tech pedagogy is both unrealistic and likely to increase the educational equity gap. The UNESCO International Task Force on Teachers for Education 2030 has stated that e-learning solutions are likely to be divisive and ineffective:

> *Technological solutions to ensure continuity of learning often exacerbate inequalities. Distance and e-learning are only effective for teachers, students and families with adequate electricity, Internet connectivity, computers and tablets, and physical spaces to work. More traditional media-based learning, via print, television, phone and radio, often offers more viable ways of helping teachers to continue to provide lessons, especially in the poorest countries.* [31]

Policymakers in some countries appear to be torn between commitment to the use of technology and recognition of the scale of the digital divide among both their students and teachers. At a recent global webinar, the Director-General for Teacher Development in Peru, explained that the government had recently released three MOOCs to train teachers to shift to online teaching. In the same discussion, he stated that only 35% of teachers have access to a computer with internet connectivity.[32]

The OECD, in partnership with Harvard University, has developed an educational framework for policymakers as they seek to respond to the crisis. The framework is intended to be inclusive, so that it will be a helpful guide to action regardless of the digital capacity of the country. The OECD framework urges governments to set clear expectations about what teachers and schools should do locally to support continuity of learning. At a minimum, it is suggested, there should be a system of communication with students, and a form of checking-in daily with each student. [33]

Remote pedagogy in China during the period of school closures

In partnership with UNESCO, Beijing Normal University has published a study documenting the way school closures have been managed in China.[34] The Chinese Ministry of Education managed remote learning through a programme called 'Disrupted Classes, Undisrupted Learning', which was intended to provide flexible online learning to hundreds of millions of students working from home. One of six dimensions of the strategy concerned 'teaching and learning methods'.

[30] Zawya (2020) *Egypt's Education Minister launches virtual classes platform.* [Online]. Accessed at:https://www.zawya.com/mena/en/business/story/Egypts_Education_Minister_launches_virtual_classes_platform-SNG_172279183/

[31] International Task Force on Teachers for Education 2030 (2020). Response to the COVID-19 Outbreak - Call for Action on Teachers. [Online]. Accessed at: http://www.teachersforefa.unesco.org/v2/index.php/en/ressources/file/470-response-to-the-covid-19-outbreak-call-for-action-on-teachers

[32] UNESCO (2020).

[33] Reimers, F. & Schleicher, A. (2020), p. 21

[34] Huang et al. (2020).

The project team for 'Disrupted Classes, Undisrupted Learning' reviewed the international literature relating to skilful remote teaching, identifying some of the characteristic challenges that needed to be addressed. The Chinese project team advocated schools designing a blend of synchronous and asynchronous teaching and identified four essential technologically enabled pedagogical techniques that should be used in combination:

- Live-streaming teaching (lecture format)
- Online real-time interactive teaching
- Online self-regulated learning with real-time interactive Q&A
- Online cooperative learning guided by teachers

For each method, associated benefits and risks were identified – such as the fact that live-streamed lessons were technologically challenging and that the real-time class discussion in a synchronous 'lesson' could be of a poor quality.

Time	Types of organization	Technical means	Learning resources	Learning content	Requirements for teachers and students	Expected outcome	Potential risks
Synchronous instruction	Live streaming teaching	Live streaming platforms	Existing teaching courseware/ lecture notes	Face to face teaching contents	Teachers should be capable to use live streaming tools for online teaching. Students should be focused for a long time in front of the screen.	Focused teaching in classroom	Require good network bandwidth, Poor real-time online discussion and communication, poor student experience
	Online real-time interactive teaching	Classroom interaction software	Learning materials and guidance questions should be provided before class	Key and difficult points in teaching	Teachers should be capable of guiding and organizing online interaction. Students should actively communicate with teachers online.	Face-to-face discussion and communication	
Asynchronous instruction	Online self-regulated learning with real-time interactive Q&A	Online learning platform and real-time interactive tools	MOOCs of others or oneself, or self-made courses	Rich learning resources and complete learning activities	Teachers should be capable of producing course resources, such as making videos and designing online learning activities. Students should have strong self-regulated learning abilities.	Improvement of students' self-regulated learning abilities	Students lack the sense of collective belonging, and students with lower self-regulated learning ability are easy to fall behind.
	Online cooperative learning guided by teachers	Online learning space, online collaborative learning platforms and learning analysis tools	Featured websites, databases and learning tools	Individual activities and group activities; individual task and group task	Teachers should be capable of diagnosing problems based on data analysis results and giving guidance in time. Students should collaborate with others and conduct self-regulated learning.	Improvement of students' cooperative learning abilities	There is a huge difference in learning outcomes between different groups, and a few students do not actively participate in it.

Figure. 1. Recommended online teaching techniques within the Chinese project[35]

The Chinese project team formed a view, based on their reading of the research literature, of the challenges of student engagement in a remote context. To recreate the learning atmosphere of a face-to-face classroom, three pedagogical priorities were promoted:

1. Building a sense of belonging to a community
2. Providing timely feedback to learners
3. Encouraging learners to relax and not be preoccupied with competitive achievement.

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[35] Ibid,

Chinese teachers were encouraged to use a variety of assessment techniques based on fitness-for-purpose criteria, including online adaptive testing and paper-based assessment activities. The project recommended that students should create e-portfolios of their significant work. Social media tools were recommended as a means of providing one-to-one diagnostic feedback. Figure 2 gives an example of a real-time assessment dialogue using a chatting tool.
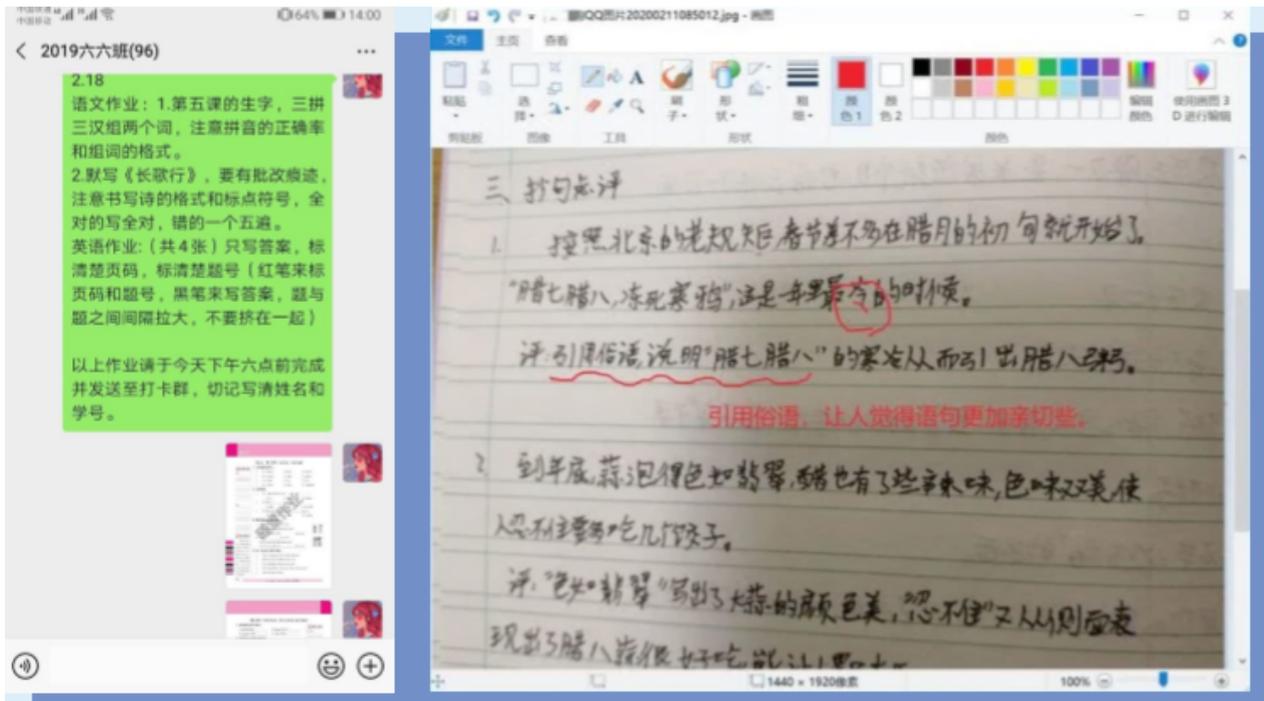

Figure. 2. Assessment practice from No.1 Primary School, Puyang, Henan province.[36]

In Figure 2, the student sent a digital photograph of written work to the teacher. Using real-time chat tools, the teacher provided feedback, marking the work in electronic red ink with more detailed comments in the chat itself.

Creating, curating or adapting resources

Teachers in many countries complain about the burdensome nature of lesson preparation. Creating entirely new learning resources can take up a disproportionate amount of the time of a remote teacher, thereby reducing time for interaction with students. Policymakers can help by providing centralised guidance on suitable learning resources. In the context of the current crisis, the OECD framework recommends that governments curate catalogues of high-quality education resources aligned to the local curriculum.[37] In response to school closures, the Commonwealth of Learning (CoL) has published a quality-assured guide to online learning resources.[38] Ministries in many countries have done the same. In China, teachers were provided with access to centrally curated open resources, with schools invited to customise resources to suit their own students and integrate the external resources within a coherent sequence of

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[36] Ibid.

[37] Reimers, F. & Schleicher, A. (2020).

[38] Commonwealth of Learning (2020a) Keeping the doors of learning open. [Online]. Accessible at: https://www.col.org/programmes/open-schooling/oer-open-schooling-oer4os

learning at the school level. 24,000 free and open online courses were curated at the national level.[39]

The central curation of resources has, in some countries, been undertaken alongside the publication of guidance about safeguarding and the need for particular care for student wellbeing in the context of online learning. The Department for Education in England has both curated a collection of freely available resources and provided guidance on online safeguarding.[40] London Connected Learning Centre has provided guidance to teachers on different aspects of remote pedagogy, including parental engagement, safeguarding and the use of YouTube.[41]

Many – but not all – resources recommended by governments are Open Education Resources (OER). To qualify as OER, the resources must be publicly available, free-of-charge and able to be used and adapted by teachers without permission under the terms of a suitable intellectual property licence. Although initially pioneered in higher education, OER have clear relevance and potential in the school sector. OER can come in many forms, including electronic textbooks, videos and software. They have the potential to enhance the work of schoolteachers by providing quality, no-cost resources that can be tailored to meet the specific needs of students at a local level. The CoL has pioneered the use of OER at school level. Most of the materials that have been promoted during the school closure crisis are OER. In addition, they have published high school textbooks for most subjects in OER format, which have been used extensively in Africa.[42]

To date, there has been relatively little research into the benefits of OER at school level.[43] Research into use in higher education is highly promising, suggesting that students can achieve outcomes that are at least comparable with those achieved using conventional, expensive textbooks.[44] An Open University investigation of how schoolteachers from the USA, UK and South Africa use OER indicates that teachers typically welcome OER because of their ability to modify the materials to suit their own students.[45]

Being realistic about the immediate use of online teaching and learning in the context of immediate school closure

Virtual courses have been offered by universities for decades and these institutions have had time to refine pedagogical approaches. The UK Open University, which pioneered remote pedagogy, was established in 1969 and has had fifty years to develop its offer to students.

[39] Huang et al. (2020).

[40] DfE (2020b). Covid-19 safeguarding in schools, colleges and other providers. [Online]. Accessed at: https://www.gov.uk/government/publications/covid-19-safeguarding-in-schools-colleges-and-other-providers

[41] London CLC (2020). Remote Learning. [Online]. Accessed at: https://londonclc.org.uk/remote-learning/

[42] Commonwealth of Learning (2020).

[43] Hassler, B., Hennessy, S., Knight, S., & Connolly, T. (2014). Developing an open resource bank for interactive teaching of STEM: Perspectives of school teachers and teacher educators. Journal of Interactive Media in Education, (1)

[44] Hilton, J. (2019). Open educational resources, student efficacy, and user perceptions: A synthesis of research published between 2015 and 2018. Educational Technology Research and Development,1-24.

[45] de los Arcos et al. (2016). Adapting the Curriculum: How K-12 Teachers Perceive the Role of Open Educational Resources. Journal of Online Learning Research, 2(1) pp. 23–40

Virtual high schools have existed in the USA for many years. Conventional schools, even if they have good connectivity with students, cannot possibly be expected to transition to a fully developed remote learning offer overnight.

In the context of school closures, there is a need for caution in designing the mix of synchronous and asynchronous learning. FutureLearn is a London-based organisation that provides online learning in partnership with many UK and international universities. In the context of the current crisis, FutureLearn has developed a free online course intended to help those teachers involved in both compulsory and post-compulsory education who are relatively unfamiliar with remote learning, highlighting some of the practicalities relevant to ensuring learning. The FutureLearn course advocates that the novice remote teacher should take great care when establishing the right mix of synchronous and asynchronous course components, recommending a substantial weighting (in time allocation) towards asynchronous learning. Although working largely asynchronously, students have an opportunity to raise problems and concerns synchronously with the teacher via consultations held during 'virtual office hours'. These are fixed and advertised times when the teacher is available to provide one-to-one tutorial support.

How can technology enhance pedagogy?

Where a good online infrastructure exists, school closure provides an opportunity for reflection about ways in which technology can be used to enrich teaching and learning. The concept of the 'flipped classroom' has considerable potential. The 'flipped classroom' developed as a form of blended learning but can be adapted to an entirely online environment. Researchers at the University of Hong Kong, (Lo and Hew 2017) provide a useful review of the development of 'flipped' pedagogy and some of the issues involved in applying the methods at school level.[46] The classic flipped model, as it emerged in higher education, involves students watching instructional videos online and undertaking assignments related to the knowledge and skills online. The teacher reviews the work before holding a formal class where student problems and misconceptions are identified, and skills practised under the supervision of the teacher.

There has been considerable recent discussion on the relationship between pedagogy and technology at school level. The Education Endowment Foundation in the UK has recently undertaken a review of the evidence base relating to the use of digital technology to improve learning. Based on this review, EEF has developed guidance for teachers, identifying ways in which digital technology can be used to enhance three specific facets of teaching and learning:

- The quality of teacher explanations and modelling
- Pupil practice of new skills
- Effective assessment and feedback. [47]

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[46] Chung Kwan Lo and Khe Foon Hew (2017) A critical review of flipped classroom challenges in K-12 education: possible solutions and recommendations for future research, *Research and Practice in Technology Enhanced Learning*

[47] E. Stringer, C. Lewin and R. Coleman (2019) Using digital technology to improve learning: guidance report. Education Endowment Foundation. [Online]. Accessed at: https://educationendowmentfoundation.org.uk/public/files/Publications/digitalTech/EEF_Digital_Technology_Guidance_Report.pdf

The Chartered College of Teaching in England has promoted and developed similar ideas about specific ways in which technology can strengthen pedagogy. The College has recently published an extensive collection of case studies based on practitioner-led enquiries into the relationship between creative use of technology and improved pedagogy.[48]

Conclusion: A time for learning

The priority for policymakers worldwide at a time of school closure is to maintain continuity of learning as much as is possible. In all countries, governments should seek to ensure that disadvantaged and marginalised students remain engaged with learning and are given personal pastoral support.

School closure is also a time for the education community to learn. There will be lessons for policymakers in every country about the extent to which the education system proved resilient and adapted successfully to the Covid-19 crisis. In every country, there should be a retrospective consideration of level of its pre-crisis readiness, in terms of the infrastructure for online learning, the availability of devices in disadvantaged households, and the skills teachers need for effective online teaching. The current emphasis on distance learning further provides a positive opportunity for learning about pedagogical effectiveness and the potential of technology to help teachers and school students. This learning will be of great value beyond the immediate crisis.

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[48] Chartered College of Teaching, (2019) Understanding the role of digital technologies in supporting effective teaching and learning *Impact: Special Edition* [Online] Accessed at: https://impact.chartered.college/issue/special-issue-january-2019-education-technology/

Section 3: Recommendations for policymakers

1. **Promote safeguarding**

Remote learning creates new health and safety risks for children. Online engagement by minors can lead to different forms of abuse. Some children and young people unable to attend school will be at a greater risk of harm at home. Governments have a fundamental responsibility to mitigate these risks and promote the importance of different forms of safeguarding.

2. **Make teaching engagement with vulnerable and disadvantaged students the top priority**

The evidence relating to distance learning identifies student motivation, engagement and self-regulation as the single biggest challenge facing the remote teacher. This challenge is exacerbated in several ways by disadvantage. Insights from this evidence review are consistent with the global consensus that policymakers must make learning continuity for disadvantaged and vulnerable students the top priority during the period of school closure. At a local level, teachers should use all available means to keep in touch with high-risk students and their families, providing pastoral support and guidance for learning.

3. **Look for all available opportunities to promote teaching presence**

Students will benefit from the highest possible level of interaction with teachers. Achieving teacher visibility will be particularly challenging in those countries where the primary means of remote instruction is through a centralised radio or TV channel. Those responsible for the design of the programmes should ensure that there is continuity in the face or voice of the central teacher. The broadcast teacher should demonstrate a caring persona, communicating warmth and an interest in student welfare and academic progress. Opportunities should be identified to create a sense of community. Conventional radio routinely promotes the idea of 'the community of listeners' by inviting individuals within the audience to submit questions via SMS. This humanises mass media broadcasting.

In the context of centralised remote teaching through radio or TV, there may be scope for supplementary engagement by local teachers using SMS messaging or social media to establish 'presence' with students. If possible, teachers should contact their own students, checking that they are engaged with the broadcast resources. In the context of very large classes and high student-teacher ratios, teachers should always give priority to contacting the most vulnerable learners. Local teachers should also attempt to establish SMS or social media contact with parents, encouraging them to ensure that children engage with the broadcast material and providing regular tips on the focus of the children's learning.

Policymakers should manage centralised broadcasting adaptively, gathering data from localities about levels of use and engagement, and looking for practical ways to modify provision in order to increase engagement.

Where online learning is possible at school level, teachers should promote 'presence' through the design of both synchronous and asynchronous activities. Teachers should look for every possible opportunity to humanise and personalise pedagogical messaging. Synchronous teaching may be technically difficult but provides a potentially important context for teacher-

student engagement. Formative assessment dialogue is both essential for learning and a way of transmitting the message that the teacher cares about the wellbeing and progress of the individual student. Video, used either synchronously or asynchronously, gives the teacher a powerful means of promoting their presence. A 'virtual office hours' approach should ideally be used so that individual students can proactively ask for guidance and feel that their personal academic or pastoral problems matter to the remote teacher.

4. Design broadcast and online teaching activities that encourage cognitive engagement and learning

Whether the medium is radio or TV broadcasting or online learning, teaching activities should be intended to maximise cognitive engagement and minimise the risk of passivity on the part of the learner. The remote teacher should provide frequent examples of 'modelling', personally demonstrating the skill that is being taught and inviting the student to understand the components of good work. The teacher should make the thought processes and decisions made when producing the modelled work visible to the students. There should be frequent low-stakes assessment activities which encourage students to retrieve and apply their knowledge related to the topic. The remote teacher should promote metacognitive strategies. Students should be frequently encouraged to evaluate their own work and to understand 'what good looks like' and how they can take responsibility for improving their own work.

5. Understand the challenges and limitations of self-paced and student-directed learning

It is, of course, important that students develop the ability to work independently. However, too much emphasis on self-paced learning can lead to disengagement. In a distance learning context, great care is needed when considering the required levels of self-regulation. The lesson from the world of MOOCs is that even adults find self-paced learning with limited teacher interaction problematic. Student project work requires particularly careful design. Students need opportunities to research and answer enquiry questions, but they also benefit from careful structure and regular access to input and guidance from an expert teacher.

6. Support teachers through the curation of learning resources

Remote teachers should be given as much help as possible in accessing existing, quality-assured curriculum materials. Teachers are likely to find OER particularly helpful because they have the potential to provide both high-quality resources and scope for modification to meet specific local circumstances.

7. Plan for school re-opening and beyond

Despite best efforts, it is inevitable that some students' learning will be harmed by the current phase of school closure. Policymakers should be planning now for 'catch-up' programmes when schools re-open. While the world awaits a vaccine for Covid-19, it is possible that schools will be forced to close repeatedly and there is a need to plan for a more resilient remote teaching infrastructure that enables better maintained learning continuity during any future school closures. The current crisis also provides an opportunity for learning about the strengths and weaknesses of technology which can be used beyond the period of Covid-19.

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