Digital Pedagogies for Future School Education: Promoting Inclusion

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This article develops four school education scenarios to help educators consider the role of digital technologies in future teaching and to provoke discussion of how education might be done differently. The context for these scenarios is a world shaped by the COVID19 pandemic. The development of education scenarios is a useful device for thinking about the future and is often used as a methodology to stimulate discussion about possible variations in education. We use our empirical data from a recent study of Australian schools illustrating exemplary remote-teaching, to generate four alternative scenarios for future school education, with a particular focus on learning agency, and the level of educational technology use. We show how different contexts and different student needs are supported by each of the four scenarios. This set of scenarios challenges the common perception that remote learning is only effective through high end use of online technologies, and suggests there is a role for both student-led and teacher-led approaches, depending on the particular contexts. The article discusses the place of innovation in disadvantaged and technology-restricted contexts. It concludes with an analysis of the ways in which school education might respond to future challenges and opportunities.

Keywords: digital futures, digital pedagogy, agency, inclusion, innovation

Introduction

The pandemic has provided opportunities for educators to review current ways of teaching and learning, and to investigate how digital pedagogies can enhance or disrupt student learning. This article builds on empirical research conducted during COVID19 and identifies current drivers of practice operating in remote emergency learning during pandemic stay-at-home periods. Using futures methods, the extremes of the drivers are located, and the

authors then develop four possible scenarios for digital education futures located at these extremes. The scenarios are grounded in current practice, but provide suggestions of possible futures that invoke discussion of inclusion and innovation and stimulate debate.

The article provides a justification for using futures methods, and outlines the relevant literature pertaining to the use of digital pedagogies for emergency remote teaching. We then discuss the empirical case data that ground this study, and explain how futures methods were used to explore possible futures emanating out of these cases. Descriptions of the scenarios that evolved are provided and these are used as a provocation for the discussion to outline what effective digital pedagogical designs might offer in future education. The research question that we explore in this article is: *How do we design future digital education in ways that promote inclusion in school education?*

The next section explores the literature and context regarding digital pedagogies against the backdrop of emergency remote teaching.

Background

There is a range of emerging studies concerning school education during the recent pandemic-related teaching periods. These studies distinguish this context from more deliberately planned practices of distance education, online learning, mobile learning and home schooling. They emphasise the importance of better understanding the experiences of teachers and students and other stakeholders during this time of crisis, in order to inform strategies that address future challenges of schooling in unpredictable times.

Bozkurt et al (2020) conducted a large-scale, global study to better understand the shift from face-to-face education to emergency remote education in both the K-12 and higher educational landscape. They used a collective case studies approach to examine lessons learned, and suggested solutions from 31 countries across the world. Themes of wellbeing,

social injustice, inequity and the digital divide emerged. For example, parents were overburdened by their everyday duties and their emerging educational roles, and most stakeholders experienced increased anxiety which required strategic solutions. The study highlighted pedagogical issues, such as the need for alternative assessment strategies, as well as data privacy and ethical concerns linked to intensive use of online practices.

The following studies were conducted in Australasia, using survey methods to investigate students' views of the emergency remote teaching period. They highlighted common challenges with student engagement, peer interaction and wellbeing. Yates, Starkey, Egerton and Flueggen (2021) examined senior secondary school students' (n=1975) experiences of technology-supported learning at home during the school lockdown period. The New Zealand student participants reported increased agency and flexibility over their use of time, but others lacked the skills to manage these benefits productively. Students reported on supportive digital approaches that enabled motivation and collaboration, and enhanced wellbeing. A similar study was conducted by Longmuir, Windsor and Henning Loeb (2021), who surveyed 241 senior secondary students in Australia. Emerging factors that supported the students' learning experiences included engaging content, access to motivational events and activities, and strong and supportive relationships with teachers and peers.

A large survey of 1200 Australian school teachers was conducted by Ziebell, Acquaro, Pearn and Seah (2020) to provide a snapshot of their experiences of the emergency remote teaching period. Many teachers significantly improved their digital proficiency and enjoyed enhanced collaboration with other teachers at their schools. Healthy home-school partnerships were a key factor in managing remote teaching and student engagement. Teacher wellbeing was evidently a concern, with 66% of teachers reporting that they worked more hours than usual. Concerns were also expressed by 75% of teachers about student wellbeing, particularly for those students living in challenging circumstances. Similar concerns were

raised by Brown, Te Riele, Shelley and Woodroffe (2020), who used an online survey (n=70) and interviews (n=51) with key Australian stakeholders to investigate the effects on vulnerable young Australians in this period. They found that almost 50% of Australian school students were at risk of having their learning and wellbeing significantly affected. These students were vulnerable due to their young age, social disadvantage, specific needs or family employment context. They made a number of recommendations, for example, the provision of additional support for parents and families, and more personalised strategies for at-risk and disengaged students.

In another Australian study, Ewing and Cooper (2021) investigated technology-enabled learning during the 2020 remote learning period, by investigating the perspectives of teachers, students and parents through 40 interviews. Although teachers prioritised engagement strategies, students felt that they were less engaged with teachers and peers, and perceived a lack of social interaction. They also found that online learning was less personalized.

Beyond Australia, Trust and Whalen (2021) used a survey method to explore K-12 (mainly US) teachers' (n=3354) experiences with technology in the emergency remote teaching period. They found that teachers' digital practices typically supported traditional information delivery pedagogies and management practices. They identified several challenges, including problems evaluating suitable digital resources, a lack of communication with students and families, and a lack of student engagement. They concluded that teachers would benefit from more experience with blended approaches to teaching and learning, including use of the K–12 Blended Teaching Readiness instrument (Graham, Borup, Pulham, & Larsen, 2019). In a study of Spanish teachers, Beardsley, Albó, Aragón and Hernández-Leo (2021) investigated changes of teachers' digital practices in this period. Two surveys and interviews were conducted with teachers, and researchers also analysed the advice that

teachers sought on Twitter. Teachers believed their proficiency and confidence in using digital technologies for teaching had improved. They sought advice on Twitter on their instructional needs, as well as on the creation of their own digital content for teaching.

Finally, Darling-Hammond and Hyler (2020), in the USA, articulated directions for policymakers and educators to advance teaching and learning during the pandemic and beyond. In a climate of acute teacher shortages and low teacher morale, they pointed to complex challenges ahead, including the need to address school students' academic and social emotional needs, as well as managing increased inequities. They discuss a need for future professional learning that helps teachers to prepare for new teacher roles in "unpredictable combinations of distance learning, blended learning, and in-classroom learning." (p 457).

This article builds on this literature base by generating and discussing four future digital scenarios that are grounded in baseline data from our own recent case studies of exemplary schools during the emergency lockdown period.

Research Design

There are two sections to the research design. The first section discusses how we collected empirical data from four Australian schools, which we used as a stimulus for the second section. The second section involves the use of scenario building to provoke discussion on future designs for digital learning.

Case Study Methodology

In collaboration with the sponsor of this research, four case studies were developed. The sponsors of the research comprised a professional Australian state-based association of schools, and personnel in the association selected a set of exemplary schools for case studies.

Their focus for the research was the emergency remote learning period caused by the COVID19 pandemic in the state of New South Wales (NSW), Australia in 2020. The criteria for schools' selection in the project involved a reputation for exemplary support of student and teacher wellbeing, and high satisfaction with remote learning outcomes within the school. The aim of the project was to investigate practices that supported students' remote learning, inclusion and wellbeing.

Participants

Each of the four case study schools had unique characteristics. The first was Brightwater (pseudonyms used for all schools) School for Girls, a large nonselective school in Sydney from Pre-Kindergarten to Year 12. The second school, Manlala School, is a selective, coeducational school in Sydney for students from Kindergarten to Year 12. Students at Manlala are drawn primarily from a particular religious and cultural group. The third case school, Fairmeadows Primary School, is a small primary school in a regional city in NSW, with enrolments currently from Kindergarten to Year 5. Finally, two cases came from one overarching case school, St Theresa's School, which spans six regional schools in NSW that cater for students from Pre-Kindergarten to tertiary level. This case study concerned two of those schools. St Theresa's Alternative Learning, for students with disabilities in Years 3 – 12, is a special needs school. St Theresa's Young Parents School is an accredited special assistance school for young parents, providing flexible learning environments for young teenage parents.

Methods and Analysis

The case studies were conducted through semi-structured interviews lasting 30 minutes with 21 volunteer teachers and eight school leaders across four schools. Eight focus groups were also conducted, each with five to ten school students from participating teachers' classes, and

each lasting 30 minutes. Artefacts in the form of student work samples and teacher-constructed videos and programs were also analysed. All ethics procedures were followed, and appropriate consents obtained. Teachers taught a variety of subject areas in secondary schools, and primary school teachers were also included.

All data were collectively examined by two UTS researchers, who developed a framework of themes in response to the research questions. The selected themes were ones that were relevant to the foci of the study: student wellbeing, inclusion, and remote learning experiences and outcomes. These themes were selected because they were prevalent in the data across the four cases. We list them in the next sub-section. Two additional researchers who were not directly involved in the data collection searched independently for prevalent themes and cross-checked with the original themes to gain intra-researcher reliability. They also checked the case study for veracity and accuracy, referring to the original data in case of disparities in understandings. A final set of themes was produced, which reflected consensus among all four researchers. A narrative was then constructed for each case school using these themes.

The final step was to build a multi-case narrative in which the the individual case studies were collected together by the researchers, and collectively examined for trends and differences amongst the case schools. The different approaches were contrasted and discussed amongst the research team. These findings are discussed in Kearney, Schuck, Fergusson and Perry (2021), and a subsequent paper, currently under development.

Scenario Building

Scenario building is frequently used as a futures method. Scenarios often provide possible futures to provoke discussion on the desirability of such futures or to identify ways that we can either move to achieve those futures or prevent them (Schuck, Aubusson, Burden &

Brindley, 2018). In a recent example, Leahy, Holland and Ward (2019) used this approach to explore how school teaching and learning might be shaped by use of new educational technologies.

The drivers that are used to predict the future in scenario construction are often obtained from the literature or from expert panels. In this study, we considered themes arising from the empirical case study data, including student collaboration, student wellbeing, inclusion, teaching approaches, educational technology use, student agency, parental support and inclusion, and teacher collegiality and agility. We selected two of the themes to use as drivers for scenario building. Drivers need to be ones that are likely to be critical and impactful in the future. They also need to have strongly divergent possibilities that may change as time passes (Schuck et al., 2018). The two themes that appeared in every case study and showed variability and divergent extremes were: *educational technology use* and student *learning agency*. Therefore, these were selected as the drivers for our scenarios development. The technology use continuum ranged from *low educational technology use* to *high educational technology use*. The student agency continuum ranged from *teacher-led learning* to *student-led learning*. It is stressed that each axis is a continuum and that data from the case schools were located at different points on each continuum.

There are a number of ways to develop scenarios. In this article, we use two-dimensional models as suggested by Linde (2003), Snoek (2003) and Schuck et al. (2018). In this model, two sets of axes are set up to form a two-dimensional plane. The extremities of each axis represent the two extremities of a particular driver. Each of the four emergent quadrants represents a different scenario defined by the axes bounded by that quadrant, as shown in Figure 1.

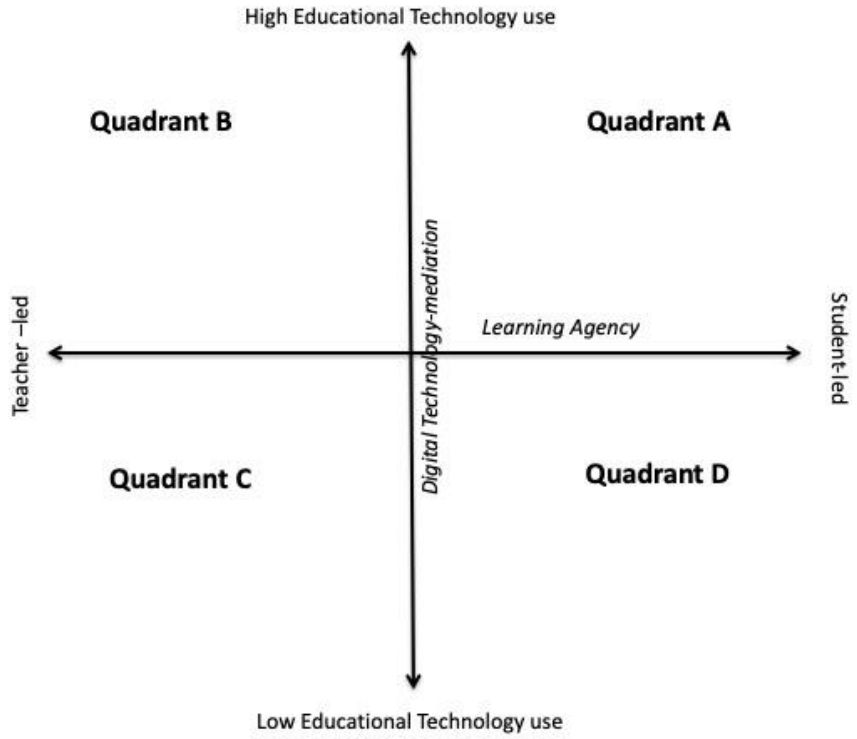

Figure 1. Two dimensional model showing selected drivers

Once this model was set up with the drivers allocated to each axis, as shown in Figure 1, we used the case school data as a springboard to build future scenarios.

When building scenarios it is suggested (Snoek, 2003) that the scenarios should be located at the extremes of the continua. The original cases in our study are not located at the extremes and for us to consider possible futures to provoke discussion it is important to move beyond what is experienced now, to what may possibly be experienced in the future. The data from each of the four case studies are predominantly located in unique quadrants, thus covering all four possibilities. This coverage ensured that each scenario, while extreme, is developed from a realistic basis.

Each scenario represents the two extremes of the axes defining the quadrant in which it is located. Furthermore the scenarios need to be constructed and presented as positively as possible. This step ensures that the researchers' biases are minimised and that each scenario is true to its drivers. The scenarios need to have internal consistency to make them as realistic as possible. They need to be plausible and yet challenging to provoke discussion. We used these guidelines to construct four scenarios, and these are presented after the case descriptions.

Case Descriptions

In this section, we focus on findings from our case study pertaining to our selected drivers, educational technology use and student learning agency. Findings from the four cases can be located across the two-dimensional model shown in Figure 1, showing the utility of these two drivers. The four cases covered diverse school contexts, covering rural and urban locations and differing levels of access to the internet and devices. Other case study findings are reported elsewhere (Kearney et al., 2021).

Driver One: Educational Technology Use

Driver 1 in this model (see Figure 1) involves the use of educational technology. The continuum represents the frequency of use, with intensive use at one end and strategically targeted but infrequent use at the other end.

The 2020 emergency remote teaching period occurred with little time for planning or preparation. Teachers and students in the case studies often had little experience of online learning and many schools had not implemented learning management systems at scale. In all four case study schools, although they were at very different stages of digital learning, the emergency remote teaching period was a catalyst for expedited technology integration. New

technologies were minimised and were carefully chosen based on their user-friendliness. This was to avoid minimal disruption to staff and students as they pivoted to remote teaching.

There was a range in emphasis on technology for supporting learning across the schools. For instance, Fairmeadows Primary School emphasized an outdoor education philosophy. Teachers at this school used a minimal number of online classes each week as a segue to off-computer activities that encouraged students' use of low-tech resources from their home learning packs. In contrast, Manlala School made heavy use of Microsoft Teams to deliver online lessons scheduled throughout the day, and to archive and share resources, such as lessons and exams. This open sharing allowed consistency between classes across cohorts.

Teachers were conscious that they had less time for explicit teaching in a remote teaching environment. Many teachers created carefully tailored instructional videos that succinctly communicated key ideas and explanations to students. Teachers found this process confronting and even intimidating at first, but developed new skills to create their own digital resources and enact digital approaches. Teachers also invested time in preparing non-digital resources for students' take-home learning packs and kits.

Schools adopted a variety of strategies to assist students who were disadvantaged due to limited access to the internet or to devices. Schools collected digital resources, such as teacher-made videos or downloaded copies of textbooks, to share with students on portable storage media.

A fundamental commitment to students' wellbeing underpinned all decisions relating to schools' adopted digital practices during the remote teaching period. This care was often extended to students' families. There were frequent check-ins built into daily routines using a range of technology-based approaches, and where needed, such as at St Theresa's specialist school for young parents, check-ins occurred during home delivery of learning packs.

Teachers were conscious of the benefits of peer collaboration, not just to support quality learning but also to optimise social interactions for students' wellbeing. Hence, teachers adopted digital practices to leverage learning conversations and group work, for example, using video-conference facilities and cloud-based software. In this way, they helped students to combat isolation and to feel connected with their peers and school staff.

Driver Two: Learning Agency

Driver 2 in this model (see Figure 1) involves the extent of agency that students experience in learning. Students experiencing a high level of agency enjoy autonomy, choice and ownership of learning. We have labelled this extreme of the continuum as student-led learning. At the other end of the continuum, students are heavily guided by teachers, and do not experience much choice or autonomy. We have labelled this extreme as teacher-led learning.

Most schools in the case studies decided to avoid mimicking the structure of face-to-face teaching environments, adopting a blend of synchronous and asynchronous strategies. They mixed their use of teacher-controlled digital approaches, such as online zoom sessions and teacher-made instructional videos, with more student-controlled, self-paced learning tasks. In this way, schools' digital practices constituted a blend of instructional, online approaches, with independent learning tasks aiming to enhance student agency.

Student-controlled tasks promoted student independence, as in the off-computer activities at Fairmeadows Primary School that utilised resources in their learning packs, often in learner-generated contexts outside of their house. Students interacted with these resources at their own pace before or after 'live' video-conferenced classes. This type of approach was a key to strengthening the student-led components of blended learning approaches in the case schools. Brightwater school students often engaged in more autonomous, student-generated

media projects before sharing their final products with their peers and teachers in whole-class online classes. And senior social sciences students from Manlala School engaged enthusiastically in self-regulated, peer online discussions about contemporary, self-selected issues, before further whole-class discussion in their formal Teams classes.

The Scenarios

In this section, we use data from the case schools as a starting point for generating four future-oriented scenarios to provoke discussion about how digital pedagogies may evolve to support future schooling. In alignment with futures methods, these descriptions are positively phrased and guided by the extremes of our two selected drivers, educational technology use and learning agency.

Scenario A

In this scenario, extrapolating from Brightwater School data, students have access to state-of-the art digital technology. Each student has their own laptop or high end tablet, and the school has provided a range of educational programs and apps that are loaded on to the device. Students have access to school Internet and also have access to the Internet at home. Devices are lightweight and portable to allow ease of mobility between school and the external environment.

Students customise their devices by loading software, apps and music onto the device, according to their individual interests and tastes. Teachers support different learning needs of students by providing differentiated support to students in the form of suitable levels of activities. Students select appropriate levels of tasks in negotiation with teachers. Students set learning goals for themselves at the beginning of each academic year in discussion with the teaching staff.

Students are encouraged to become experts in areas of interest to them and to consult with world experts online as well as other stakeholders such as family members. Teachers encourage students to design their own projects in areas of interest and to clearly show what new learning has been achieved in the project. They generate their own media and use it in sophisticated ways to communicate ideas and express their thinking. In this way, students are the main media producers in this scenario.

A strong emphasis lies in self-assessment and students are encouraged to identify areas of weakness that they wish to improve and seek apps that are helpful. Students are encouraged to self-regulate in their use of digital technologies and are encouraged by teachers and family members to engage with and follow online digital health guidelines. Staff are available to advise on suitable apps, technologies and ways of optimising use of technologies.

Once students graduate from school, they are experts in different areas, have a strong understanding of how to use technologies for work and study purposes and are strongly connected to people with similar interests around the world. Their achievements at school lead to a confidence and belief in their abilities and to a development of leadership skills.

Scenario B

This scenario, derived from Manlala School data, involves students' learning through technology-intensive instruction. Students use a specified set of technology resources, selected and sequenced by the teacher, to scaffold and direct them through learning modules. Most resources are accessed through the institution's learning management system (LMS) and through corporate-sponsored technologies such as Google Drive.

Devices are owned by the institution to give teachers access to a wide range of data, to avoid software viruses and for efficient software updates. The institution's IT personnel

can monitor students' use of software and websites on these devices to prevent online misdemeanours.

Students mostly learn individually in the classroom in the presence of a teacher, and ideally bring headphones so they won't disturb others when accessing apps, websites and multimedia materials. They can also learn 'off-campus', remotely accessing teacher podcasts or externally made videos such as Khan Academy materials. 'Virtual assistants' help students navigate through online exercises and attempt to respond to student queries. Students receive automatic feedback as they progress through online modules, and individual data is collected by the LMS for the teacher, such as a student's rate of progress, number of clicks, and number of quiz attempts. Students are assessed through quizzes after completing modules of work, and progression to the next module relies on a mastery rate of 80% or above in these tests. Differentiation occurs automatically using the system's in-built learning analytics that guide aspects of each module for a student, such as the content presented and challenge level. Students who complete their modules efficiently, or attain high rates of mastery, are rewarded through provision of enjoyable competitive games where they can compete with other students around the world.

Teachers are experts in designing multimedia learning resources for students' campus-base or remote learning. Teachers design and use digital presentations underpinned by the robust principles of multimedia instruction (Mayer, 2009) and their investment in preparing or selecting highly polished materials is often rewarded with high student feedback scores. In this way, teachers are the main media producers in this scenario. Teachers are also experts in whole class instruction, including the facilitation of whole-class discussions, both classroom-based and online using video-conference facilities. Teachers aim to engage students in these face-to-face and 'live' online sessions by following a traditional I-R-E type of interaction (Mehan, 1979), that is they initiate (I) a question to the class, students respond

(R) and then teachers evaluate the response (E). All classes are recorded so absent students can access them later.

Student learning is efficient, mastery of content is optimised, and students are well-prepared for external tests. Upon graduation from school, students are well-prepared for the workforce. They are familiar with following instructions and working in technology-rich environments to complete assigned tasks. They are competent online learners and familiar with the modularised, behaviourist approach that typically informs the design of professional learning materials in the workplace. They are acutely aware of health and safety issues related to technology use, and cognisant of the potential influence of big corporations on their digital behaviour. They have confronted these challenges as teens through their technology immersion, and developed skills to manage them.

Scenario C

In this scenario, derived from data collected at St Theresa's Church School, all students enjoy similar opportunities, both at school and at home. Students are not disadvantaged by their lack of access to digital technologies in their homes. They are supported in class with school owned devices, which are kept at school and not allowed out of the class in which the teacher introduces them. These devices are used sparingly to ensure that students remain focused on the lessons devised by the teacher.

Direct instruction supports students to understand topics and saves time by having strict schedules in which the required material can be covered. Students are provided with clear directions and are confident that they know what is required of them. The additional time gained in class by not having to learn how to use new technologies is used by teachers to provide extra support for students' learning in areas in which they might be struggling.

The lack of need for devices at home both saves families money and provides a safe environment free from cyberbullying and damaging effects of social media. It also means that parents are able to support their children in their learning as they recognise the tasks from their own schooling. The technology restricted home environment gives students the time to pursue other activities such as reading recommended books and conducting outdoor activities with friends, and participating in organised sport. As a result, students' wellbeing is high, and eye strain and posture problems are rare. Mentally students are strong and physically they become fit from outdoor activity.

In their senior years, students have been well prepared for external exams. Standardised assessment makes ranking of students' skills straightforward as like are being compared to like. When students leave school, they will have strong social skills, developed from the face to face contact they have enjoyed with their peers. They will be well balanced and well suited to positions requiring personal interactions, such as hospitality, counselling and fitness training. In a highly automated world, these skills will be in demand.

Scenario D

This scenario, derived from Fairmeadows Primary School data, involves the judicious and sparing use of technology to enhance students' learning in a targeted way, or for administrative purposes such as accessing lesson resources. Most activities involve the use of carefully selected non-digital resources that are assembled by students in negotiation with their teachers. Differentiation is facilitated by the teachers in liaison with parents and students. Students learn in a range of formal and non-formal settings, with an emphasis on learner-selected contexts such as outdoor environments.

Students enjoy autonomy over their learning. They choose authentic problems to explore in open inquiry mode tasks, guided by the curriculum and their own interests.

Students participate in international projects through technology-mediated connections to support their inter-cultural literacy development. However, there is a predominant 'think local' mindset, emphasising face-to-face connections with local peers and experts, such as family members, and a focus on problems relevant to their immediate context. Students carefully select and use suitable resources in a way that best meets their carefully negotiated learning goals. They choose between a variety of modes to express their views and new understandings and they create artefacts to share with peers and the local community.

Teachers focus more on their role as designers of learning rather than on the transmission of knowledge. They use authentic assessments, such as reflective portfolios and journals, and focus on formative feedback to improve students' critical thinking, teamwork and self-regulation skills. They encourage students to make their own decisions, for example, by offering them a choice of inquiry problems, learning resources and modes of expression. They guide students to use technology astutely and selectively, for example, to support their independent learning and to mediate cooperative, open-ended inquiry processes.

This 'low tech use' makes it easier for students, teachers and parents to manage and prevent unwanted health issues caused by excessive computer use, such as eye strain, digital addiction and mental health problems. Indeed, the intergenerational nature of learning in this scenario helps to mitigate risks. Distraction, undesirable encounters with strangers, and other problems such as cyber-bullying and gambling, are less likely as students spend more time offline.

Students are encouraged to focus on developing relevant skills for the future workforce, such as teamwork and interpersonal skills, rather than transient digital competencies that may quickly become obsolete.

Discussion

This article has utilised a future scenarios methodology to explore how digitally mediated tasks might be designed in the future to enhance learning and promote greater inclusion in schools. Using two drivers derived from recent case study data - educational technology use and learning agency - the scenarios have generated a multiplicity of illustrations that suggest teaching and learning can, under certain circumstances, be inclusive both with intensive and infrequent use of educational technologies. To set this discussion in context, it is important to return to the main conclusions drawn from the case study. In each of the case schools, teachers reacted to the restrictions imposed by the school lockdowns by minimising the volume of live synchronous online teaching. This was partly motivated by concerns about unequal access to technology and partly about excessive screen time exposure associated with online teaching. Instead, schools looked to develop a balanced approach to the use of technology and placed increased emphasis on supporting students to control their own learning with more self-paced activities. Students enjoyed greater degrees of freedom and were able to exercise more agency and free-choice than had previously been the case. This was evident in both the technology intensive and low technology case study settings. Also, in all of the case studies, teachers expressed greater concern and awareness of emotional and social challenges associated with remote learning and isolation experienced by many young people. They were acutely conscious of the need to support students' general wellbeing and explored various strategies to achieve this, again through low and high tech solutions, such as the increased emphasis on peer-to-peer support and collaboration opportunities.

The ramifications and implications of these findings have been incorporated in the four scenarios presented above. We now return to the original research question to reflect on how educators might design digital education in the future in ways that promote greater inclusion.

Promoting Inclusion

It is widely accepted that the so-called digital divide is more than simply an access to technology issue (Hohlfeld, Ritzhaupt, Dawson & Wilson, 2017) and other factors such as an individual's ability and capacity to exploit the technology are at least as important, if not more so. However, the scenarios posited in this paper reveal how the inequities and problems linked to access and use of technology can also be minimised in a low intensity technology setting, such as scenario C, where the strategic but minimalist use of educational technology creates a more level playing field in which fewer individuals are disadvantaged by issues linked to ownership (or lack of it) of technology tools. By reducing the frequency of technology use for school learning, and ensuring learning activities and tasks outside of school are not dependent on online technologies, including use of social media, scenario C demonstrates how education futures could be designed to promote greater social inclusion whilst also minimising some of the current issues around cyber-bullying and spread of disinformation. Nonetheless, critics would argue that such an approach is a Luddite charter, and whilst the problems associated with the iniquitous and unfair distribution and use of educational technologies in our schools are important to address, the solution will not be achieved in a race to the bottom which ignores the clear and tangible ways in which the appropriate use of technology can provide access to beneficial learning experiences that would otherwise be impossible.

An alternative approach to promoting greater inclusion in our educational establishments is evident through scenarios A and D that focus on greater learning autonomy and independence. In their different ways, distinguished by widely differing approaches to the use of educational technologies, both of these scenarios point to ways in which students can be encouraged to take greater responsibility for their own learning and the life choices

that stem from this. This includes both the cultural tools and capital to make well informed decisions and choices. During the periods of enforced remote learning regimes brought about during the pandemic, students were forced to take more responsibility for their own learning but the question that arises now is should this be reversed as schools and educational establishments edge back to 'normality' or could there be lessons to be learned for the future? In both the technology rich and technology restricted scenarios (A and D) students enjoy greater levels of autonomy and choice than they might have experienced prior to the pandemic, and both scenarios promote a more inclusive approach to learning by reducing the learner's dependency on external agents such as the teacher. Neither scenario posits an ultra-radical position such as a 'teacher-less' school but both note how the imposition of remote learning revealed the ability for students to self-regulate and assume more responsibility for their own learning than is traditionally the case.

The pandemic has raised many concerns and challenges associated with wellbeing, both mental and physical, but it has also challenged many of the prevailing mindsets and assumptions around education and learning and, to varying degrees, all of the scenarios presented here indicate how thinking about wellbeing has changed during this period. In particular the low-technology scenarios (C and D) emphasise a more holistic and inclusive approach to learning that considers both the cognitive and social dimensions of learning to be equally important. The key here may be raising awareness of the potential pitfalls and dangers associated with excessive technology use and exposure (especially to the more odious aspects of the internet) but also, strategies that enable students to better mediate and self-assess the risks in order to make better informed decisions about when to use technology, which links again to the importance attached to learning agency and independence referred to previously.

Finally in terms of greater inclusion, the future scenarios presented above highlight the tension between individuality and collaboration and the benefits to be had in both models. In scenario A students are encouraged to be more collaborative in their outlook and modes of learning, engaging with outside stakeholders and experts when they need help or assistance. They are therefore well prepared and enculturated to participate and be integrated as global citizens when they leave school. But in a perverse sense, the students who inhabit scenario B are also well prepared for the world - albeit a very different one - by a more individual and teacher directed approach that places greater emphasis on individual achievement and success. The two approaches are not necessarily incompatible and point to how both may be necessary in the future in both technology rich and low contexts.

Exploring Innovation

The second aspect of this paper concerns digital pedagogical innovation which is a theme we have explored previously in the context of mobile and agile learning (Burden, Kearney, Schuck & Hall, 2019). In these publications we have identified criteria and rubrics to clarify the nature of pedagogical innovation and how it might be evaluated in technology-enriched contexts. These criteria include the relationship between the learner and the teacher; the context of the learning and the extent to which it is bounded in traditional spaces such as the classroom; and the agency and autonomy exercised by the learner (Burden et al., 2019). Many of these criteria are evident in the current study which suggests that the pandemic may have accelerated and amplified some of the trends and developments which were evident prior to the pandemic. However, in two of the scenarios the adoption and use of technology is minimised and these exemplars provide opportunities to explore alternative interpretations and approaches to innovation that are not so greatly predicated on the digital pedagogy innovation criteria we have previously adopted.

Another factor is the role of the teacher/educator and in particular, the relationship that exists between the teacher and the learner. Aligned to this is the relationship between learner and community, including parents and grandparents. In scenario B, the role and function of the teacher is clearly demarcated or bounded, even more so than pre-pandemic, and the case study evidence that contributed to this scenario indicates this may be a necessary and efficient mode to operate in during times of crisis such as a global pandemic. It may also suggest this more didactic, traditionalist approach has benefits for future educational practices, especially when mediated by technology, as in this scenario. However, our other scenarios suggest the relationship between teacher and learner may be less static in the future with the definition of each becoming more fluid and interchangeable, and intergenerational learning may also play a role (Burden et al., 2019). For example, in scenario B where the role of the teacher might appear fairly traditional and didactic in nature, it is likely the teachers will have gained greater insights and understanding of how students tackle tasks associated with digital media tools because they were required to produce high quality digital learning resources themselves for their students. By necessity remote learning has required teachers to cede some of their responsibilities and roles in leading learning over to students whilst also adopting new roles themselves as learners and co-constructors of knowledge with their students. This realignment of roles and responsibilities between teachers and students would appear to represent a significant and lasting effect brought about by the pandemic and also a design principle for how education might be reconstructed going forwards.

Closely aligned with the changing role of teachers and students in the future is the recognition that students will often welcome and embrace greater agency and choice, regardless of whether this is in technology rich or technology low contexts. Again, by necessity remote learning forced students to adopt more responsibility for their own learning when they were not under the same face to face scrutiny and control associated with physical

classroom environments. Arguments for and against greater student autonomy and agency considerably pre-date the pandemic but the temporary, albeit protracted shift to remote learning, has enabled researchers and practitioners alike to study these claims in laboratory like conditions and at scales that would only recently be inconceivable. The outcomes highlight how positively most students react to greater freedoms and choice and how in turn, this enables teachers to develop more mutually supportive relationships with their students, sometimes - as in scenario D - leading to a complete reappraisal of their own role as teachers.

Finally, in terms of innovation and change, the scenarios along with their underpinning case study data focus renewed attention on the contexts of learning, encouraging the reconceptualisation of space and their respective boundaries. With the exception of scenario C, the others promote new configurations of the learning space and challenge traditional boundaries. They challenge binary definitions such as formal/informal and on campus/off campus. This process of reconceptualising learning spaces was independent of technology usage. In scenario A, for example, where technology use was deemed to be high, students used their mobile devices to extend the boundaries of the classroom by accessing expertise external to the school to undertake a project. Similarly in scenario D, students are set to work across both formal and informal boundaries but in this case without the intensive mediation of technology. The pandemic has highlighted both the need to organise learning differently in the face of a global crisis and also the viability and feasibility of doing so both currently and in the future. Context is particularly important in this respect and the major take-away from the pandemic appears to be the hybrid nature of learning which transcends simplistic binaries such as learning in and out of school. Regardless of the frequency of technology use, schools developed multiple spatial modes of operation during the pandemic which suggests these have value in the future.

Conclusion

The recent remote teaching periods have contributed to new ways of viewing the use of educational technologies for school education, with renewed emphasis on inclusion and wellbeing. The future scenarios generated and discussed in this paper have offered an opportunity to examine different ways of enacting technology-enabled approaches. Intensive technology use may not necessarily be the panacea to effective digital education in the future, and both teacher-imposed and learner controlled practices can lead to inclusive education.

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