

Editorial

Covid-19 controversies and critical research in digital education

Ben Williamson, University of Edinburgh, ben.williamson@ed.ac.uk

Felicitas Macgilchrist, Georg Eckert Institute, Germany, macgilchrist@gei.de

John Potter, UCL Knowledge Lab, Institute of Education, j.potter@ucl.ac.uk

Author accepted manuscript published in *Learning, Media and Technology* 46(2), 117-127.
<https://doi.org/10.1080/17439884.2021.1922437>

If financial markets are taken as the main measure of the impact of the Covid-19 pandemic on education since early 2020, then education technology ('edtech') has finally arrived with disruptive and transformative force in education systems around the world. With reports of over \$16billion USD venture capital investment in edtech in 2020 alone, and spectacular valuation claims of prospective returns to come, financial investors and edtech companies are not just seeking to increase their profit margins, but investing in 'a vision to transform how the world learns' (HolonIQ 2021). These are new speculative 'investments in forms' of unique digital education (Decuyper, Grimaldi and Landri 2021) that produce digital assets promising generous prospective market returns (Komljenovic 2021). For financial specialists, the disruptions of Covid-19 have inspired a 'digital transformation' of education, at all levels, and they are investing further to fully realize this valuable vision of the future of post-pandemic education. In other words, through speculative financial valuations and market-making devices, investors are 'betting upon and hedging against future educational developments ... and even shorting educational futures' in the pursuit of 'wealth extraction' (Facer 2021, 6).

Markets, of course, are neither the only measure of the impact of the pandemic on education systems, outcomes, policies and practices, nor the only means for imagining

and investing in education futures, however speculative and spectacular their valuation claims may be. Local and national governments have tried to build their own, independent, infrastructures for education. Nonprofits have leapt into action, developing and distributing resources. Radio has turned up again. Countless research studies, press reports, assessments by learned societies, education agency reports, consultancy and think tank analyses, and more, have sought to identify both the positive and negative effects of the crisis on learners, educators, and institutions. These range from optimistic outlooks on ‘best practices’ of ‘what works’ and ‘what we have learned’ in terms of digital educational provision, to more sombre analyses of effects such as ‘learning loss’, ‘Covid slide’, ‘unfinished learning’, ‘digital poverty’, widening inequalities, commercialization and privatization, and the challenges of well-being and mental health, as well as many others. Many practitioners working in education have had to develop new ‘lockdown literacies’ to manage the processes of teaching at a physical distance from students, lecture theatres, classrooms, science labs and practice studios (Gourlay et al 2021). For some, this has felt dysfunctional and disorientating, while for others it has enabled experimentation and innovation in the practices, spaces, and relationships through which teaching and learning occur (Watermeyer et al 2020). These effects will have been experienced very differently in diverse contexts, and remain to be fully examined and understood as education systems set out towards post-pandemic recovery.

What is clear already is that education is now the focus of a great deal of both reappraisal and ‘re-imagining’, with digital education technologies at the forefront of much of this work. This time last year, in an editorial for *Learning, Media and Technology* written just as the first UK-wide lockdown came into force, we highlighted how various actors and organizations were approaching the crisis as an opportunity for ‘experimentation’ in digital education, while acknowledging how such efforts were embedded in and emerging from a much longer history of digital technology in education (Williamson, Eynon and Potter 2020). We can now look back on the ‘greatest edtech experiment in history’ and begin, tentatively, reflecting on its effects—although taking full stock of the varied impacts will necessarily require a variety of long-range studies and historical, social, economic and geopolitical contextualization (Williamson 2021). If the last year was an experiment in digital transformation of education, then how did it track from past trends, what effects did it produce, and what does it hold for the future?

There is much to learn from the experience of the pandemic. Many educators have achieved considerable successes with digital technologies; many students have encountered new and exciting digitally-mediated ways of learning and studying; and the crisis has catalyzed some long-overdue debates on such important issues as assessment, curriculum and pedagogy. But it's impossible to ignore the major problems too. Online exam proctoring software and its biases, unequal access to hardware or internet connectivity, politically-motivated algorithmic grade standardization, and the use of online learning platforms for cheating are among the most contentious issues in education over the last year. They have generated not just critical researchers' attention but extensive media coverage, public outrage, and political contests. These are not straightforward problems to analyze or understand, and cannot be reduced to simple questions about whether the technology or the algorithm 'worked' or not; whether digital access or digital poverty produced causal outcomes; or whether the platforms affected students' 'academic integrity'. As such, they demand more nuanced, critical forms of analysis, not least as last year's invocations of short-term opportunities for digital experimentation have evolved into demands for long-term digital transformation.

Even in the reportedly 'positive' cases of adaptation to the pandemic—such as schools and universities successfully 'pivoting online' and 'innovating' in pedagogy and curriculum (Barber et al 2021)—there remain many questions to address: what relations were involved; what arguments and claims were produced, and were they substantiated; what chains of decisions were made (by whom); what new practices were encouraged, coerced or forced into being; what money was spent and where was it acquired; where was power located in these changes; who resisted them and who benefitted (or not); what 'nonhuman' technological and material things were involved; how did these nonhumans function; and what does all this say about the future organization and arrangement of educational institutions, practices and systems?

Our animating concern as editors of *Learning, Media and Technology* is how the intersections of education and technology require social scientific, humanities-oriented or philosophical analyses of political and economic factors, social contexts, technical functioning, policy agendas, company business models, underlying theories of learning, pedagogy, curriculum and assessment, among other elements and relations between them. A critical approach to digital technologies and media in education takes seriously these complexities, relations and the controversies they generate, and

seeks to tease out the details as a way of understanding the current state of education and the emerging implications. The purpose of this editorial, then, is to highlight a limited selection of the array of complex ongoing controversies in education that have emerged from the last year of global disruptions. In digital sociology and science and technology studies, ‘controversies’ are understood as cases of disagreement and contestation in scientific or technological development, including controversies over knowledge claims, ethics and values, and often involving diverse expert communities, political actors, regulators, financial funders, and various publics (Marres 2017). During moments of controversy in science, technology and digital development, different actors mobilize to find a way forward, form into associations with shared objectives and aims, and some find themselves excluded. Different developmental pathways are considered, compromised over, and eventually settled and stabilized. Controversies are thus where power is revealed, as paths to certain futures are sorted out, while other possible futures are closed down.

Drawing attention to controversies in education technology can likewise assist us in understanding how certain futures are being opened up or foreclosed as debates intensify over the post-pandemic future of education. Just as, last year, we cautioned about the short-term framing of edtech experimentation and technological solutions to the crisis, research should also now carefully scrutinize proposals for long-term digital transformation—teasing out their animating imaginaries, their networks of support, the longer histories of thinking they draw on, their funding, the practical actions they catalyse in the present, and their implications for education over the next decade and beyond.

As an editorial group, we are delighted to have been joined this year by Professor Felicitas Macgilchrist of the Georg Eckert Institute, whose own research explores the complex practices of education technology design and use, highlights its embeddedness in social, historical and political context, and opens up important questions about how education futures are imagined and made. With Felicitas Macgilchrist joining us—who is honoured to be on board—we hope to strengthen the reputation of *Learning, Media and Technology* as an international source of leading research that engages critically with digital technologies and media in learning and education. That task is only possible with the support of the growing field of critical researchers and authors dedicated to such important studies, to the peer reviewers who have continued to support the journal and submitting authors over challenging

recent months. We invite future submissions to contribute to the vital work of building the critical research base required to shape the future of digital technology and media in education, and offer here our initial observations on a few selected areas of controversy.

Emergency digital delegation of state responsibility

One key characteristic of the educational response to Covid-19 has been the development of new multi-sector networks, public-private partnerships and outsourcing contracts dedicated to promoting educational technologies. Prior to the pandemic, the education sector was already a highly variegated, multi-sector space, governed and managed as much by policy networks, industry partnership arrangements and outsourcing agreements as by central governmental authorities alone (Lewis 2020). However, the role of such relationships has become especially apparent during the pandemic, with private actors increasingly participating in both the provision of short-term emergency educational services and promoting longer-term policy changes (Williamson and Hogan 2020, 2021). Emergencies produce ‘catalytic opportunities’ for market-oriented privatization policies and reforms in education, as those advocating for pro-private sector policies can take advantage of urgent catastrophic situations to dismantle public education systems, construct and circulate narratives of ‘relief’ and ‘reconstruction’, and amplify and extend temporary emergency measures as a new form of ‘normalcy’ (Verger, Fontdevila & Zaracajo 2016). Technology companies have become especially prominent providers of temporary ‘relief’ measures and more durable models of ‘reconstruction’ during the pandemic (Taylor et al 2020). This is symptomatic of a particular form of ‘digital statecraft’ and policy work that increasingly involves ‘cyberdelegation’ to commercial tech firms and, correspondingly, policy enactment through the digital programs and infrastructures they provide (Fourcade and Gordon 2020).

Commercial education technology companies have expanded across the education sector considerably amidst the pandemic, raising fresh concerns and questions about private control over public education (Teräs et al 2020). One example of the digital delegation of state responsibility for education during the pandemic include the provision of laptops for students studying at home. As part of the Department for Education program for education during Covid-19 in England, the government announced a Get Help with Technology initiative in 2020 to provide students with

laptops in order to be able to study from home. The initiative included an original £96million contract to a major hardware vendor to supply laptops, Google Chromebooks and 4G wifi routers, and later an additional £100million to the same firm. While schools reported delayed delivery of the devices and in some cases receipt of substandard machines featuring malware, it also emerged that the contract had been awarded without an open tender process to Computacenter, a computer hardware provider linked to the Conservative party that was subsequently added to the cross-governmental strategic supplier list in 2020 (Bright 2021; Good Law Project 2021; Trendall 2021). Founded by a Conservative party donor, Computacenter later disclosed the pre-tax profits of its UK arm had risen by 50% to over £200million during 2020, primarily driven by demand for ‘technology sourcing’ in the UK public sector, amounting to a 402% jump in dividends for its shareholders (Carr 2021). Meanwhile, in Scotland, the Scottish National Party made a pre-election policy commitment to invest £350million in the purchase of laptops, Google Chromebooks or tablet computers for every school student (Mcilkeny 2021). On the international stage, Google also announced the launch of a range of new Chromebooks, after sales of the low-cost devices soared during school closures, along with various new features for its online learning services (Tung 2021).

Laptops for students reveal a number of important ways that private technology companies have become increasingly integral parts of education systems during Covid-19. They are the recipients of multimillion pound state contracts, acting as outsourced central technology sourcing contractors, some with political affiliations, generating generous shareholder value and profit margins. Laptops also act as tangible political symbols of policy attempts to address digital divides, partly intended to encourage public goodwill amidst ongoing debates about education funding and support for teaching professionals. Moreover, in the case of Chromebooks, with their pre-bundled Google applications, laptops also bring global technology corporations into direct contact with students, embedding students and teachers alike in the Google ‘Workspace for Education’ ecosystem of apps and platforms such as Google Meet and Classroom. While low-cost Chromebooks experienced heightened demand during the pandemic, the Google Classroom platform alone surpassed 150 million users, with Google repositioning it as a competitive alternative to other learning management system software. Ultimately, through its Classroom and Chromebooks, Google has become a global provider of both the hardware and the software platforms for digitally-mediated and data-extractive education; in other words, Google is building

the private technological infrastructure for a new form of post-pandemic public education (Perrotta et al 2021).

These new forms of networking, partnership and contracting are significant beyond education, signifying how technology companies have sought ‘infrastructural dominance’ across sectors during the Covid-19 pandemic:

Private companies often use their computing and financial power to ... increase their infrastructural power and contribute to the hollowing-out of publicly governed institutions. Private firms’ ability to incrementally build these resilient, infrastructural forms of dominance is visible in the partnerships established during the COVID-19 crisis.... [Public sector] dependence on private services could lead to a scenario in which it is dominated by technologies and actors that the public is unable to truly challenge. (Mollicchi et al 2020, 279, 282)

Reflecting this increasing infrastructural dominance of private firms in the public sector, ministries of education have ‘cyberdelegated’ responsibility for education during the pandemic to international providers of both computer hardware and software, with state funding awarded to companies that have then actively grown market share and shareholder value. These are complex issues illustrating how educational technologies as seemingly mundane as low-cost laptops are a major site of controversy. Such developments demand detailed further critical research to unpack their political, commercial and financial elements as much as their effects--whether beneficial or not--on students and teachers.

Inequality and non-edtech-tech

Alongside these developments in the edtech industry, other technologies are also expanding their infrastructural dominance in educational spaces. In many places ‘non-edtech-tech’ has--sometimes controversially--become the educational technology of choice in schools. In Argentina, for instance, one of the most widely used systems for teaching during the pandemic is WhatsApp. Less than 50% of students have a computer to use at home for school work; less than 50% have a quality internet connection. Since most students have a (prepaid) mobile phone, teachers have oriented their emergency remote teaching to involve audio, video and texting on the phone; students send photos of work they have done on paper (Ferrante 2021). These and other providers become the unofficial outsourcing partners of public education, with educational policymakers relying on their availability to ensure that schooling can

continue. At the same time, there is little official recognition of these systems. In Argentina, to remain with this example, official agreements were made with internet service and mobile phone service providers to ensure that students and teachers could use .edu sites without being charged for data use (Ferrante 2021). This move to ensure educational continuity and equitable access overlooks the intense educational use of non-edtech sites.

Also in the name of ensuring access and participation, radio and television programming shifted to incorporate educational content, with several broadcasters, including those in Lithuania and Germany, going into their archives to find educational shows and documentaries to rerun. Other major broadcasters, like ABC Australia, moved to a community-based guerrilla-style approach to making new content, given the strict social distancing and hygiene measures and the very small teams that could work together (UNESCO 2020). Stories abound of teachers moving their classes onto community radio in, e.g. the Central African Republic, and reaching not only their own class, but keeping thousands of students 'in' schooling (Makazaga 2020). Radio, a medium often pronounced dead in the face of newer, more sophisticated technologies, has again become central, this time through simple mobile digital radio studios which sustain schooling through the pandemic.

What will the long-term impact of these kinds of technologies be when emergency pandemic teaching is over? For the OECD, it is clear that radio and television programming can only be a short-term emergency solution; the medium to long-term should prioritise the expansion of infrastructures for online learning (Reimers & Schleicher 2020). Yet there are hints that some broadcasters plan to retain their new daytime educational programming. Initial scholarly attention to radio education during the pandemic has pointed to 'new academic dynamics that are attractive to the student', linking these both to podcasts in pop-culture and to the history of radio as a revolutionary medium for educational participation (Castillo Villalobos, Monroy Ordóñez & Tíjaro Corredor 2021). This renders radio a potentially fascinating technology for future education, and for future research.

Support as continuity and support as care

A further site of controversy is over the notion of 'support'. Support is a ubiquitous word in reflections and recommendations for education during the pandemic. For the OECD, UNESCO and other major supranational and national actors, support

primarily refers to continuing educational provision, i.e., to supporting learning, curriculum adaptations, teacher autonomy and the implementation of Covid-19 strategies. Although there is recognition of the need to provide emotional support for students and teachers, and to support particularly vulnerable or disadvantaged students, the priority in the proposed edtech strategies, public-private partnerships, public-NGO partnerships and other technology-related strategies is for systemic support for individuals to continue their education.

Other actors prioritise a middle layer between the system and the individual. For them, support is about community support and care. Edtech and the networks and partnerships of edtech should orient to creating and sustaining relations of care among community members. Social media were, for instance, retaken as safe spaces for community-building through sharing ideas, resources and concerns. A report of responses in 31 countries suggests that for many practitioners, collaboration and sharing were among the primary reactions to the first phase of the pandemic (Bozkurt et al 2020, 11). In South Africa, a group of concerned academics suggested ‘social pedagogy’ early in the pandemic as a way to first listen to students’, teachers’, unions’ and communities’ needs and collaboratively map, with them, the current situation, before designing appropriate, socially just, equitable, decolonising and supportive curricula. For this kind of approach, edtech only becomes relevant within a ‘response grounded on values of equity, ubuntu, human dignity, compassion, respect for human life, nature and the environment’ (Public Universities 2020, 3). Similar understandings of support led to calls to terminate the educational year, and use the time to support communities and to learn ‘the new technologies and pedagogies required to best deliver a socially just curriculum’ instead (Black Academic Caucasus 2020, 10).

For Bali (2020), these two different orientations—supporting the continuation of education as seamlessly as possible, and acknowledging the need for more care—have been unfolding in educational institutions in deeply paradoxical ways. There is a great need now for careful analysis of how decisions have been and are still being made, and how edtech materialities, practices and policies are entangled in these decisions. How has support been enacted on the ground, in lived pedagogies, alongside or despite policy priorities? What tensions have arisen and how are knowledge, communication and sociality shaped in these sociotechnical practices?

Covid-19 and children’s rights, digital and otherwise

The emphasis on the seamless continuity of regular education during the pandemic has tended to result in a neglect of children's rights. Earlier in 2021, with the aim of focusing attention on rights-respecting obligations internationally, the United Nations Convention on the Rights of the Child adopted 'General Comment 25', a potential major step forward. It establishes a check on the erosion of children's rights in respect of, for example, data mining, and profiling based on narrow metrics of achievement and dubiously constructed, for-profit, AI technologies. The UN document is promoted by a charity, the 5Rights Foundation, whose demands are that:

Companies must design services that anticipate children and young people by design and default. Policymakers must ensure that their rights are upheld both on and offline. Children and young people must be empowered to navigate the digital world creatively, knowledgeably and fearlessly. (5Rights Foundation, 2021)

'General Comment 25' addresses concerns arising from issues discussed elsewhere in this editorial and is distinguished from many such pronouncements by the involvement of children in its construction. Those children consulted wanted to know, amongst other things, how to manage untrustworthy information online, a situation which is not always addressed in the curriculum, lending weight to the arguments which have been made about lack of media education as an abuse of the rights of the child (see, for example, Cannon, Connolly and Parry, 2020). They also wanted clarity on the collection of data about them, its purpose and destination and how or why it could be shared without their consent. Paragraph 33 places the onus for responding to these concerns onto the business sector...

...including the technology industry, (which) should receive training that includes how the digital environment affects the rights of the child in multiple contexts, the ways in which children exercise their rights in the digital environment and how they access and use technologies. They should also receive training on the application of international human rights standards to the digital environment. (United Nations, 2021)

We can at least hope that worldwide, ed tech is made to take note of this UN comment as part of their approach to ethical implementation of AI in education.

Livingstone (2021) has written positively about the adoption of 'General Comment 25' as follows:

The General Comment will land on the desk of every government in the world. It clarifies what the digital environment means for children's civil rights and freedoms, their rights to

privacy, non-discrimination, protection, education, play and more. It also explains *why* States and other duty bearers must act and, within the limits of 10,700 words, *how* they should act. (Livingstone, 2021)

The emphasis on the rights of the child, particularly in respect of their play, is very welcome in an era in which children's agency is circumscribed by both the conditions of the pandemic and by unwelcome political interference in their education. Suddenly, in the UK for example, extra initiatives are touted as essential to deal with loss of school time, as mentioned elsewhere in this piece. At the local and personal level, the careless and often trite narrative of 'loss' is an unwelcome intervention in relationships between parents, carers, children and schools, even as it provides headlines for politicians, and, of course, commercial opportunities for educational consultants. The negativity in the discourse around children and their education only raises the temperature in a debate which should be more nuanced and research-based, though it serves political and commercial interests to stick to simple messages about 'catching up'.

Here in the UK, behavioural norms are said to be out of alignment with expectations because, firstly, yet again, parents have failed in some way and, secondly, digital media has exerted a pernicious influence on life during lockdown (even though it was touted initially by the same complainants as a lifeline in maintaining social contact). These breaches of discipline are alleged to be widespread, a combination of lack of school routine and poor parenting though, predictably, the statements by the incumbent secretary of state for education in the UK have a massive lacuna in them where evidence should be and have been widely rejected by education experts. Once again, there is a side swipe at mobile phones, the familiar tropes of media-blaming in full swing. Meanwhile, on the ground, in the UK, parents, carers, teaching unions and other experts report mainly positively on the return to school of more children (Adams, 2021).

As a counterbalance to the negativity in public discourse around children and their learning, projects are emerging worldwide which challenge the prevailing narrative of loss, with the aim of collecting evidence about experiences during the pandemic, many of them focused on children's playful creativity and wellbeing as opposed to their performance against the various benchmarks (Corona Showcase, 2020; Pandemic Play Project, 2020; Play Observatory, 2021). These are closer in spirit to the UN comment on Digital Rights of the Child. They value community, relationship-building and

children's need for re-establishing the social as they return to school in those countries which are fortunate enough to be coming out of lockdown. Their emphasis is on children's engagement with documenting their lived experience for present and future generations, including in countries which are still suffering and some way off emergence from the pandemic.

We should hope that research will emerge which respects the digital, and other, rights of the child and reports on a deeper dive into the effects of the pandemic and associated lockdowns on children's wellbeing that goes beyond commercial interest or headline-grabbing populism. In particular, we should look to ways to promote wellbeing and celebrate creativity in difficult times at the local level, and to resist at least some of the negative labelling and commandeering of children's lived experience for commercial and political gain.

Measuring and mitigating 'learning loss'

A final important emerging example of new kinds of controversies in education technology is in the area of 'learning loss' measurement and mitigation. Despite being a highly contested concept, learning loss has become the focus of education research and policy in many countries worldwide. Researchers from multiple fields have begun defining and examining learning loss from various perspectives, for example, in psychological studies of the deleterious effects of school closures on cognition, behaviour and affect; neuroscience research on the neural imprints that inhibit learning; and quantitative social science studies of the effects of the pandemic on students' social mobility.

Most prominently, however, emerging analyses of learning loss are alarming for governments and policy authorities because they calculate the long-term impacts on national economies. Influential international organizations such as the OECD and World Bank, for example, have promoted and published research calculating and simulating the economic impacts of learning loss, as predicted skills deficits caused by school and campus closures result in weaker workforce capacity, reduced income for individuals and overall 'human capital' deficiencies for nations (Azevedo et al 2020; Hanushek and Woessman 2020). As one OECD publication framed it, learning loss represents a kind of 'hysteresis effect' usually studied by labour economists as a measure of the long-term, persistent economic impacts of unemployment or other events in the economy (OECD 2020). As such, framing education in terms of

hysteresis in economics assumes that learning loss is a causal determinant of long-term economic loss, and that mitigating this problem should be a major policy preoccupation for governments seeking to upskill their stock of productive human capital.

Political anxieties over the potential economic hysteresis effects of the Covid-19 crisis in education help to contextualize and explain the rapid production of learning loss measurement studies in the 2020-21 academic period, and the equally rapid marketing of ‘mitigation’ solutions by education technology and testing companies. In the US, for example, states are spending approximately \$6.5 billion addressing learning loss, while a further \$100 million has been allocated to the statistic-gathering arm of the U.S. Department of Education to study learning loss. However, it has also been argued that beyond being a controversial concept, learning loss is also a conceptual product of the global industry of educational testing and measurement:

Learning loss has become more of a marketing catchphrase than a term that captures what students have faced in the last year. The marketing of learning loss, however, has been fairly effective in getting money allocated that will almost certainly end up benefiting the industry that coined the phrase. Ostensibly, learning loss is a term that sprung from educational research that identified and quantified an effect of pandemic-related disruptions on schools and learning. In actuality, it’s the result of campaigns by test publishers and Wall Street consultants. (Bello 2021)

The history of the concept of learning loss may, then, be intimately tied to industry aspirations to capitalize on governmental concerns and investments. In England, for instance, the Department for Education commissioned the Education Policy Institute, an independent think tank, and the commercial assessment company Renaissance Learning to produce a national study of learning loss, using data collected by Renaissance as part of its school testing software (Burrows 2021). Utilizing data from reading and mathematics assessments of over a million pupils who took a Renaissance Star test in autumn 2020, the findings were then published by the Department for Education as an official government document (Gov.uk 2021).

In essence, this example indicates how anxiety to collect data about learning loss resulted in commissioning a commercial education technology testing company with the necessary assessment infrastructure already in place. Moreover, Renaissance is originally a US-based assessment and edtech company focused on ‘learning analytics’ and ‘personalized learning’ (<https://www.renaissance.com/about-us/>), which also

markets and supplies services for ‘learning gap’ mitigation, as explicitly marketed on the UK Star Assessments homepage:

Computer-adaptive Star Assessments for reading and maths are used by over 6,500 schools across the UK and Ireland. Star Assessments provide you with reliable data showing progress made by each student ... and can help instantly identify learning gaps such as those arising from COVID-19 closures and disruption. ... Star Assessments complement Accelerated Reader, Accelerated Maths and myON by Renaissance, and provide a personalised learning plan for each student, helping to inform next teaching steps.

[\(https://www.renlearn.co.uk/star-assessments/\)](https://www.renlearn.co.uk/star-assessments/)

This example, as in the US, indicates how multinational testing and edtech companies themselves have become official outsourcing partners in the production of data as authoritative knowledge for pandemic policy development. These companies are strategically mixing the measurement of learning loss with marketing of learning gap mitigation software, thereby specifying the very policy problems to be addressed and advancing their own products as the solution simultaneously.

Again, these are issues demanding much further examination. The contested history of ‘learning loss’ is now integral to the ways that education systems and practices are being reshaped in the present as a way of addressing concerns about the future. There are major political, scientific and commercial threads to ‘learning loss’ measurement and mitigation that remain to be unpicked and traced to their consequences.

Towards post-pandemic critical research on digital education

The editorial reflections above represent a very small selection of the issues related to education, learning, media and technology arising from the experience of the Covid-19 pandemic. Of course, many of these issues are not historically novel or unique to the contemporary pandemic context but continuous with past trends. The current so-called ‘digital transformation’ of education has been imagined for many years, by organizations across the sectoral spectrum and diverse geopolitical locations, and is certainly not reducible only to commercial opportunism during the pandemic.

Nonetheless, there certainly seems to be a new intensity in debates over the connections between education and technology. This is represented well by the formation of an Education Commission by *The Times* newspaper in the UK—consisting of parliamentarians, entrepreneurs, industry figures, and education

leaders—which intends to produce insights for policy in education over the next decade and has explicitly singled out education technologies and AI in education for attention (Woolcock 2021). The new intensification and acceleration of matters related to education and digital media and technology deserves continued critical attention: these are complex, multifaceted, fast-moving and highly relational developments, many of which may profoundly affect the future of education systems, institutions, students and educators, for better or worse, in the years ahead (Castaneda and Williamson 2021).

Looking forward, we invite future submissions to *Learning, Media and Technology* that take edtech and related forms of digital education as complex, multifaceted phenomena that are infused with social, political, economic, cultural and scientific issues and controversies. We believe such critical research will be as significant as ever, if not more-so, as the future of education is debated, experimented on, envisioned, re-imagined, designed, invested in, and programmed into practice over coming years. Critical research on learning, media and technology should play a significant role in examining the historical and present state of technology in education to participate in shaping those post-pandemic futures. We have emphasized here some new debates about support, care, rights and play as a way of foregrounding alternative ways that educators and other groups are seeking to respond to the pandemic. Highlighting ‘what works’ and ‘what we’ve learned’ about digital technologies and media in education, or, more extremely, allowing markets to imagine, invest in, and make the future, will be insufficient for the challenges to come.

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