

Lessons to Be Learnt? Education, Techno- solutionism, and Sustainable Development

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6.1 INTRODUCTION

At first glance, education might seem an obvious area where digital technology can be a major enabler of sustainable development. Indeed, many people presume *any* aspect of education to inherently support sustainable development – as Kioupi and Voulvoulis (2019, p. 13) reason, “the road to sustainability is paved by education, and unless we invest on it, we might never get there”. This chapter therefore addresses the widely held belief that digital technologies are an integral part of establishing high-quality educational conditions for all. With digital technologies now entwined with the generation and sharing of knowledge throughout contemporary society, growing numbers of policymakers, industrialists, and education professionals continue to promote the imminent “digital transformation of education” (OECD, 2021, p. 5) as a key element of sustainable development in the 2020s and beyond. This is especially evident through the UN Sustainable Development Goals (SDGs) –

as UNESCO's framing Incheon Declaration put it: "information and communication technologies must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision" (UNESCO, 2015, p. iv).

In contrast, this chapter argues that we need to radically reconsider the relationship between education, sustainable development, and emerging digital technologies. Belying the prevailing hype, there is little justification to expect the digitally driven reversal of long-standing inequalities in education. Indeed, the continued reform of education around excessive digital technology consumption might well exacerbate social inequalities, political divisions, *and* environmental degradation. In short, this chapter argues that discussions around sustainable development need to move away from default assumptions that the continued digitization of education is an inherently "good thing". This is not to say that digital technologies have no place *at all* in desirable future forms of education – rather this is a call to re-imagine education technology in scaled-back and slowed-down forms that might be deemed appropriate for an era of continuing social upheaval and climate collapse.

6.2 A BRIEF HISTORY OF THE DIGITAL (NON) TRANSFORMATION OF EDUCATION

Notwithstanding the ongoing hype around digital education, the past 40 years provide scant evidence that the implementation of digital technologies straight-forwardly "enhances" or "transforms" education systems in widespread and/or lasting ways (see Selwyn, 2021a). Of course, education systems in the Global North have invested heavily during this period in the adoption of computers, the internet, platforms, and most recently a range of Artificial Intelligence systems and tools. Yet, while these waves of "innovation" have all prompted notable surface-level changes to the nature and form of what takes place in classrooms and other education settings, any sense of progress is tempered with a general acknowledgment that long-standing structural inequalities and inefficiencies of education persist (Rafalow & Puckett, 2022). In this sense, it could be argued that we now have education systems that might well appear to be increasingly technologically dependent, but are still *not* technologically empowered.

Any discussions of education technology and sustainable development therefore need to pay close attention to the long-standing complexities and intricacies of digital technology and educational change. Take, on one hand, the ways in which current digitally driven forms of school and university education in high-income countries continue to be structured by entrenched educational logics. For example, it seems that digital technology has done little to disrupt resilient hierarchies of time, space and place, as well as curricularized assumptions of knowledge, the primacy of individual assessment, and other established institutional forms of schooling. On the other hand, the dominant forms of digitization that *have* taken hold in education seem primarily to reinforce and amplify "corporate reforms" of schools and universities – supporting the creeping standardization of practice, a reliance on metrics and data-driven accountability, and increased emphasis on market-led efficiencies. In all these ways, then, the impacts of digital "innovations" and "disruptions" in most

Global North education systems remain firmly in lockstep with vested institutional interests and the maintenance of administrative power.

At the same time is a long-standing – but largely unrealized – faith in the capacity of education technology initiatives to redress social, economic, and cultural disparities in low-income and middle-income regions. In policy terms, the UN 2030 Agenda for Sustainable Development is framed around the notion that “the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress” (UN, 2015, para 10). In practical terms, the past 20 years or so of work in the field of “information and communications technologies for development” (ICT4D) is littered with high-profile instances of such tech-driven hubris. Toward the end of the 1990s, for example, the much-celebrated “Hole In The Wall” initiative saw the placement of unattended computer kiosks in some of the poorest communities around India – ultimately rewarded by a \$1 million TED prize to further develop the idea of technology-driven “self-organized learning”. As was subsequently claimed by the initiative’s founder (then chief scientist at the global “IT learning solutions” corporation NIIT): “what children achieve routinely in hundreds of ‘Holes-in-the-Walls’ in some of the remotest places on earth is nothing short of miraculous – a celebration of learning and the power of self-motivation” (Mitra & Dangwal, 2010, p. 680). In contrast, the impact of these interventions was acknowledged widely by disinterested observers to have fallen well short of any such claims. As Mark Warschauer (2003, p. 45) reflected: “in short, communit[ies] came to realize that minimally invasive education was, in practice, minimally effective education”.

Another salient illustration of these unfulfilled ambitions was MIT’s much-celebrated “One Laptop Per Child” initiative, which worked throughout the 2000s to saturate educationally impoverished communities across sub-Saharan Africa and South America with rugged “\$100 laptop” devices deemed capable of supporting self-directed learning. In contrast to its grand ambitions of “empowering the world’s poorest children”, OLPC ceased operations after a few years and was soon judged to have comprehensively failed (Keating, 2009), with independent observers noting “how little the project’s vision [was] taken up in practice” (Ames, 2016, p. 95).

Other high-profile digitally driven social renewals of education have similarly failed to materialize. During the 2010s, for example, the emergence of Massive Open Online Courses (MOOCs) prompted much enthusiasm – touted as a means of providing free university-grade tuition for masses of online learners around the world regardless of their local circumstances or prior educational experience. Yet, belying promises of radically democratized tuition, most MOOCs proved to merely advantage those who were *already* well-resourced and educationally successful (Rohs & Ganz, 2015). As Tressie McMillan Cottom (2012, n.p) reasoned at the time:

The people who would benefit most from online learning are not necessarily where these programs are moving. That means really ambitious autodidacts – the kind who have long benefited most from innovative education models – will take advantage of MOOCs to become, well, more autodidact-ish. Already privileged

elite students with broadband, iPads, Macbooks, and time (the greatest luxury of all) will simply have more spaces in which to be privileged and elite.

Such high-profile failures illustrate the stubborn trend across the past 40 years for even the most well-resourced and innovatively designed digital education “solutions” to flounder in terms of lack of fit with local contexts and needs, a lack of interest in the long-term sustainability of such ventures, and what Kemp Edmunds (cited in Madda, 2022, n.p) describes as “an unadulterated hubris that [technology actors] can solve complicated layered problems in extremely complex industries with many challenging stakeholders, [and] financial, bureaucratic and time constraints”. Above all, these unrealized attempts at technological transformation warn against the folly of assuming that structural, societal, and deep-rooted issues surrounding education are easily “fixable” via technology. As Megan Erickson (2015, n.p.) puts it, “education is not a design problem with a technical solution”.

6.3 CURRENT FRAMINGS OF ED-TECH AND SUSTAINABILITY INTO THE 2020S

Set against this background – and drawing on the key concepts underpinning this book (see Chapter 2) – why should we presume that further applications of digital education during the 2020s under the banner of “sustainable development” will be any different? In practical terms, one of the major reasons why people continue to anticipate the digitally driven improvement of education is the UN “Sustainable Development Goals” (SDGs) – in particular, SDG 4: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. Digital technology is clearly aligned with at least six of the ten targets in SDG 4, which confidently foreground digital technology as a key area of skill development, as well as a means of equitable delivery, and system-wide planning and monitoring. As such, tech firm Huawei (2018) reckoned SDG 4 to have some of the highest levels of correspondence with digital technology across *all* 17 SDG goals, concluding that “even slight technological improvements could result in better performance” in terms of progress toward SDG 4 criteria. All told, SDG 4 continues to boost the idea of digital technology as a potentially powerful enabler of sustainable education during the 2020s. As Tyagi et al. (2019, p. 441) contend in a report titled “ICT Goals for SDG 4”:

rolling out ICT solutions will not only transform education and deliver social and economic benefits to people but also provide substantial benefits for the education sector globally.

In more specific terms, the ten SDG 4 targets and associated indicators boldly frame digital technology use in education as potentially supporting economic, social, *and* environmental sustainability. These include various expected economic benefits in terms of increasing economic growth and workforce capacity. For example, bolstering the long-standing justifications around supporting young people to develop work-related computer skills is the continued promotion of specific forms of “digital literacy”, “learning to code”, and similar forms of technology-centered “up-skilling” within most levels of education (see also

Chapter 8). More recently, schools have been positioned as key sites in the development of “on-demand” technological competencies required by young people entering the “gig economy” and other forms of precarious labor. We have also seen digital education initiatives in middle-income and low-income regions seeking to develop “digital entrepreneurship” among young people – that is, programs designed to encourage technology-driven entrepreneurial skills, “digital livelihoods” and provide digital skills development opportunities with a focus on using digital technologies to start businesses, secure employment, and access financial products and services (UNESCO, 2018).

Alongside these presumed economic benefits are strong claims over social sustainability outcomes. In particular is the idea of digital technologies enhancing the accessibility (and therefore inclusivity) of education provision. This is seen to be the case, for example, for learners with neurodevelopmental conditions, and other mental and physical disabilities (see Chapter 7). As Megan Crawford (2017) reasons in terms of the SDG 4 goals:

With connectivity, students can access learning resources and opportunities even in remote or low-income areas. Teachers can prepare for classes anytime or anywhere. ICT opens up access to education to underserved populations for whom improved educational opportunities lead to improved economic opportunities.

Specific social benefits include diversifying pathways into computer science and “STEM” careers for groups traditionally underrepresented in these employment sectors, as well as establishing schools, libraries, and other educational institutions as centers for shared community access to computers, internet, and other digital resources. All told, enthusiasm abounds for the capacity of most new forms of digital technology to enhance equality of educational opportunities and educational outcomes. As Ward (2020, n.p.) puts it, “rich nations can contribute immensely to SDG 4 by using the next generation of educational technology to democratize access to advanced learning on a global scale”.

Finally are burgeoning claims that the continued digitization of education can contribute to environmental sustainability. For example, it is suggested that digital technologies are a ready means of developing environmental education, and fostering global communities of students centered around climate change awareness and action (Gismondi & Osteen, 2017). Alongside these benefits is the alignment of digital education with “green tech” principles – where increased use of digital technologies in education contributes to the pursuit of forms of eco-growth. In particular is the presumption that online education can support the reduction of carbon emissions associated with campus-based travel and education – not least by lowering emissions of students and teachers otherwise commuting to-and-from classes (Versteijlen et al., 2017) alongside the reduction of on-campus power consumption (Caird et al., 2015). If education technology is considered at all in terms of its environmental impact, this has tended to be in wholly positive claims of “protect[ing] global environmental resources” (Caird & Roy, 2019, p. 107). As Becker and Otto (2019, p. 8) conclude:

Digital learning . . . saves resources and CO₂ emissions, thus contributing to the protection of the climate and to the goal of responsible consumption and production. . . .

it helps to connect people from different cultures by allowing for intercultural exchange among students without additional travelling . . . it facilitates a self-regulated learner-centered style of learning that is well-suited to empower learners to become agents of a sustainable development.

6.4 EDUCATION AND SUSTAINABILITY AS A FOCUS OF ONGOING TECHNO-SOLUTIONISM

All told, the received wisdom is that the continued digitization of education across the 2020s remains will play a pivotal role in advancing communities, countries, and regions toward a range of sustainability outcomes. Indeed, in reviewing the likely impact of digital technology across the 17 SDGs, Neves (2020, p. 266) takes time to highlight a particularly “strong linkage between education and digital solutions”. Looking beyond such speculative expectations, however, the push for continued digitized education during the 2020s is clearly extending (if not amplifying) the spirit of techno-solutionism that underpinned previous decades of education technology. Indeed, if anything, expectations of an educational “technical fix” appear to be further exaggerated with each successive wave of emerging technology. Take, for example, recent expert assertions that all ten SDG 4 indicators can be positively influenced by emerging innovations around mobile internet, Big Data, and cloud computing (Gupta et al., 2020). Similarly, so-called 4IR (Fourth Industrial Revolution) technologies such as AI, biotech, mixed reality, quantum computing, and robotics are now inspiring heightened rhetoric such as “wealthy nations developing transformational 4IR Ed-Tech have a moral imperative to use it to achieve SDG 4” (Ward, 2020, n.p.). At this point, the only concerns being raised seem to relate to the speed and scale of the technology rollout. For example, when considering the potential of e-books and digital libraries, Evans (2016) reflects,

Whilst they have their merits and arguably are having a deep and transformative impact on particular communities, the reality is that these solutions cannot scale quickly enough to reach the 250 million children who are not learning basic literacy. Time is not on our side if we are to achieve the SDGs by 2030.

Of course, as acknowledged throughout this book, such hype and hubris are not unique to education. Indeed, technological solutionism is integral to mainstream thinking around most aspects of sustainability and pervades discussions around most of the SDGs (see Chapter 2). Indeed, current discussions around sustainable development have been described as imbued with an “ambient prometheanism” which foregrounds the problem-solving capabilities of human innovation, and “advances technological solutions developed by capital and energy-intensive projects” (Dillet & Hatzisavvidou, 2022, p. 1). Nevertheless, the persistence of this solutionist mentality within sustainability discussions appears particularly pronounced in terms of education and SDG 4. In many ways, the appeal of this enduring magical thinking around technology and education is understandable. Morgan Ames’s (2019) notion of “charismatic technology” describes the ways in which new technologies gain traction within education discussions through the promised association of

impressive technical progress with equally far-reaching social progress. Seen in this light, techno-solutionism offers a high-profile and expedient means for governments, education authorities, and other stakeholders to appear responsive to complex sustainable development imperatives in a forthright and innovative manner. There are obvious self-interested reasons for actors concerned with matters of sustainable development and education to be acting in this manner. The main question that remains far *less* obvious, however, is whether they are justified in doing so.

6.5 PROBLEMATIZING ONGOING TECHNO-SOLUTIONISM AROUND EDUCATION AND SUSTAINABILITY

At this point, then, we need to consider the prospect of education technology simply continuing over the next few decades as a case of “business-as-usual”, perhaps overlaid with a veneer of green growth. The ongoing efforts around SDG 4 certainly seem to presume the continued mass implementation of digital technologies in the service of sustainable development outcomes. If so, we need to also take seriously the likely adverse outcomes and limits of continuing to pursue this line of solutionist thinking in contrast to the likely lack of impactful change. As Katy Jordan (2020) notes, the presumed beneficial impacts of digital technology on SDG 4 remain woefully under-scrutinized, with academic researchers showing little appetite for investigating actual links between digital technologies and SDG 4. Yet, in light of previous iterations of digital (non)transformation of education, it is doubtful that the promise of future digital education solutions under the aegis of SDG 4 will ever be *fully* realized. As such, it is important to acknowledge that few of these inventions and initiatives are likely to address the complex societal and planetary factors underpinning sustainability problems in the ways that are being currently promised.

A few interrelated issues therefore need to be brought to bear on the current optimism that persists throughout mainstream discussions around digital technologies and SDG 4. First, it is worth stressing that this is *not* an argument that digital technologies are of no benefit *at all*. As with previous waves of education technology initiatives and interventions during the 2000s and 2010s, it is likely there will be plenty of specific localized instances of digital technology innovation that might be seen as cases of “best practice” in terms of supporting particular social, economic, and/or environmental sustainability. Digital technologies are likely to continue to “work” for some people – for example, advantaging already privileged students and teachers, and/or resulting in outcomes that “work” in support of institutional agendas. Yet, it is important to consider the scale and scope of any ostensibly positive applications of technology – especially in terms of the inevitably limited capacity to address inequalities and disparities between historically marginalized and disadvantaged groups and regions. As Sætra (2022) points out, we should not let micro-level impacts on individuals and small groups distract attention from (i) the differential impact of any digital technology use at a meso-level of classes, nations, and regions, as well as (ii) the long-term macro-level impacts of digital technologies “on our economies and societies in the broadest sense”.

In addition, it is also important to consider the interlinked nature of any sustainable development outcomes – with any application of digital technology in education likely to

have corresponding (and often conflicting) social, economic, political, and environmental impacts. Indeed, one of the limitations of the current techno-solutionist framings of digital education is how they over-simplify sustainability issues in ways that fit the technological solutions being proposed – therefore doing little more than give a surface appearance of addressing the problems that they purport to address (Nachtwey & Seidl, 2020). Moreover, as reasoned in Chapter 2, dominant narratives of technological change tend to frame perceptions of what is possible solely in terms of the technology to hand. This chimes with Christo Sims' (2017) account of how technology actors often frame (and underestimate) education “problems” through a technical mindset, resulting in what Sims describes as a “tunnel vision” where attention is paid only to aspects of education that fit with the tools that are being developed.

The implications of this “tunnel vision” in terms of the capacity of current forms of digital technology to meaningfully address sustainability goals need to be taken seriously. For example, Sims (2017) argues that this narrowness of perspective tends to marginalize concerns for wider social contexts that shape educational institutions and the communities that they serve, while often glossing over issues of wider structural inequalities altogether. This “tunnel vision” therefore leads to tautological conclusions where the implementation of a new digital technology is offered as a plausible response to problems that have been set in train by the use of a preceding digital technology. In addition is a worrying tendency for digital technology to fundamentally alter how issues of sustainability in education are perceived – not least, the “economisation and depoliticization of planetary environmental issues” (Dillet & Hatzisavvidou, 2022, n.p.; see also Chapter 17).

In this sense, it is well worth reconsidering the likely adverse outcomes of continuing to pursue reductionist forms of solutionist thinking in relation to sustainable development and SDG 4. In particular, this raises the need to consider the possibility that digital education developments are unlikely to address the complex social nature of sustainability problems in the ways that are promised. Instead, if anything, it might be expected that the current wave of techno-solutionism is most likely to perpetuate (and perhaps intensify) sustainability harms. Take, for instance, the ways in which virtual schooling was implemented across the COVID-19 pandemic shutdowns of school and university systems – demonstrating consistently how technology-based education remains predicated on elite consumption and uneven benefits (Sosa Díaz, 2021). As Susan Flynn (2021), writing from the perspective of an educator in a high-income country, reflects on the “online pivot” during the COVID-19 pandemic:

The digital realm proffers ease of access, connectivity, easy dissemination of knowledge and information but it also produces and sustains inequalities and perpetrates assumptions. Our students may not be the digital natives we assume, nor is their access to technology necessarily equitable.

Alongside these disparities in educational outcomes are the ways in which digitally focused forms of skills education have also proven to exacerbate social inequalities in employment outcomes – at best facilitating access to low-status, low-paid, routine and precarious jobs

within the new economy, or trapping young people into a subsistence self-employment along decidedly vulnerable and marginalized forms of digitally driven “entrepreneurialism”. As Angela Dy (2019, pp. 11–12) contends:

Despite the transformative potential of the Internet, the landscape of digital entrepreneurship is still shaped by social patterns of privilege and disadvantage . . . the current trend of encouraging digital entrepreneurship as a means to social mobility and economic independence for marginalized and disadvantaged people may in fact be encouraging greater economic vulnerability.

Perhaps most noteworthy (yet glossed over in most discussions of education and technology) are the ways in which a continued emphasis on digital education is likely to exacerbate growing ecological and environmental harms associated with the production, consumption, and disposal of digital technology. For example, picking up on Brevini’s arguments in Chapter 3, any enthusiasms for the increased use of AI in education surely have to reckon with the materiality of this technology and its deleterious consequences for the planet. Striving to refashion education around AI, augmented reality, and other emerging digital technologies feeds directly into the problems that Brevini highlights regarding the depletion of scarce resources in manufacturing, usage and disposal processes, alongside the excessive amounts of energy used to support data processing and storage, *and* the exacerbation of waste and pollution issues. The continued excessive application of digital technology in any context – education included – makes little sense in terms of environmental sustainability.

All told, we need to take seriously the prospect that digital education is unlikely to be a key enabler of sustainable development and might well result in regressive and ultimately harmful outcomes for many people and regions. This corresponds with broader emerging concerns among environmental activists – what Jonathan Crary sees as the “obvious but unsayable reality” that digital technology is not likely to be an instrumental of radical change – instead, that “if there is to be a livable and shared future on our planet, it will be a future offline” (Crary, 2022, p. 1). Set against this bleak perspective, therefore, it seems increasingly important that we need to *think otherwise* when it comes to the forms of “digital education” that should be encouraged under the aegis of sustainable development.

6.6 THINKING OTHERWISE – TOWARD RE-IMAGINING MORE SUSTAINABLE FUTURE FORMS OF DIGITAL EDUCATION

In this spirit of thinking otherwise, we now need to reflect on the challenge of looking forward to what could (or should) be done differently when it comes to digital technology, education, and sustainable development. First is the need to reframe popular, professional, and policy discussions about education and digital technology along more socially, economically, and environmentally realistic lines. The arguments advanced in this chapter (and across most chapters in this book) follow what can be broadly understood as a “socio-technical” perspective – that is, considering the application of digital technologies “in context, and not as some isolated and neutral tool” (Sætra, 2022). As has been evident throughout all of this chapter’s discussions, the application of digital technology in

education needs to be seen as a coming together of technical *and* social issues – of devices, institutions, economic and political systems, scientific laws, *and* social relations.

Seen in this light it makes little sense to expect sustainable development outcomes to arise unproblematically from the application of digital technology in education. Instead, education technology needs to be reframed as a political issue – that is, guided by values that some actors wish to see realized, while clashing with the values of others. At present, the dominant values informing the implementation of digital education under the aegis of SDG 4 and “sustainable development” make sense only in terms of what has been described elsewhere in this book as the “shallow” ecological thinking that typifies the utilitarian pragmatism of Western governments, businesses, and industry (see Chapter 18). The subtext of many of this chapter’s criticisms is that any such “business-as-usual” approach is likely not good enough. Instead, we need to re-imagine digital education along more radical lines. In short, we need to find more refined forms of sustainable digital education that do not perpetuate harms to marginalized people and are not yoked to presumptions of continued economic growth and/or the excessive harmful waste of planetary resources.

One such radical alternative might be reframing our ambitions for digital technology and education around an explicit eco-justice agenda (e.g., Ale, 2021). This might start with a collective “withdrawal” or “releasement” from unsustainable and harmful forms of education technology (Heikkurinen, 2018) – that is, not feeling compelled to be led by “gigantic” developments in corporate software development, but instead feeling confident to follow other lines of digital use. In this spirit, we might choose to re-imagine education technology along more “sustainable” lines, where the allocations of digital resources are apportioned fairly and do not excessively disadvantage the already disadvantaged. In its own small way, then, these are alternate values and principles that educators, policymakers, and other stakeholders would do well to take on board as they face up to the challenge of deciding what “sustainable” technology use in education might look like in times that are increasingly shaped by climate crisis, social upheaval, and political instability. From this perspective, rethinking sustainable forms of digital technology use in education requires us to focus on questions of ethics alongside questions of ecology.

In the immediate term, this reframing of education technology first compels us to consider current forms of digital technology that might be considered “sustainable” in nature, and therefore deserving of retention. These technologies and practices might fulfill a number of briefs. First is the encouragement of “low-impact” technology use sustained by re-use, repair, and recycling of digital resources within education settings and local communities (thereby bringing education technology into correspondence with the efforts around SDG 12 – “responsible consumption and production”). Second is a general emphasis on basic forms of digital technologies that can be easily produced, maintained, augmented, and repurposed on a local basis. This relates to the degrowth ethos of “voluntary simplicity” (Liegey & Nelson, 2020, p. 12) and the prioritization of technology that is “slower by design” (Kallis et al., 2020, p. ix). Echoes of these approaches are certainly evident throughout the recent history of educational computing – especially in terms of the renewed interest throughout the 2010s for mini-computers such as the Raspberry Pi and MicroBit, as well as the adoption of “Maker technology” and other forms of “tinkering”.

Much of this alternate spirit of what might be termed “Ed-Tech within limits” (Selwyn, 2021b) is also evident within communities and contexts whose engagements with digital technologies are *already* substantially constrained by climate, hostile environments, and limited resources and infrastructure. In this sense, high-income countries might also learn from looking toward the forms of technology-based education innovation that have developed (and sometimes flourished) in low-income countries, regions, and contexts. Indeed, the history of locally driven education technology development in low-income contexts over the past 20 years or so can provide strong pointers to the forms of digital technology infrastructure and use that might be considered “appropriate” for increasingly resource-constrained and environmentally hostile circumstances elsewhere. These include “low-tech” technology such as radio, telecentres, SMS, and pre-loaded dumbphones. Indeed, the worldwide shutdowns of schooling during the successive waves of the COVID-19 pandemic saw local educators in many low-income and middle-income countries turn to analog technologies (such as radio, television, dumbphones, and paper-based resources) to redress the inequalities of online schooling (see Meinck et al., 2022). As such, all these examples point to a number of principles that might be taken forward into re-imagining education technology for an era of climate crisis.

Regardless of specific form and design, the different ideas just outlined all point to ways in which we might begin to rethink education technology in terms of distributive justice – fostering sustainable and socially appropriate forms of technology use for disadvantaged groups who stand to benefit most from the use of education technology (and, conversely, lose most from the enforced absence of education technology). This also suggests establishing norms of what constitutes “fair” forms of education technology access and use, as well as foregrounding principles of collective decision-making and communal ways of managing how technologies are developed and deployed in education (O’Sullivan et al., 2021). All told, these examples highlight that reframing forms of education technology that are appropriate for an age of climate crisis, increasing social instability, and other concerns that relate to “sustainable development” does not simply equate with making *less* use of technology in education. Instead, it requires engaging with the complex problem of how to make *less use* of technology for *more just* education outcomes. These are clear shifts and changes that will not arise from continuing to approach education and sustainable development along techno-solutionist lens.

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