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29. Digital education imaginaries

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Introduction

This entry focuses on digital education, in particular the sociotechnical imaginaries which have shaped its histories, philosophies and theoretical framings. These are important because digital, often commercial, imperatives are frequently assumed to be driving our social, political and environmental futures – imperatives which become normalised and enacted through the power of compelling, imagined worlds-to-come. Which stakeholders develop, distribute, build on and profit from these imaginaries – and which become most powerful in social and political terms – is critical to the future of education and the societies within which it operates. To unpack their changing nature, and to map their evolution through academic, policy and corporate discourses, is important for an understanding of where education is headed.

This entry will chart a path through some of the imaginaries currently shaping digital education, from the solutionisms, behaviorisms and humanisms of its history, to the technoliberationist and posthumanist tendencies of its recent past, and finally to the technocapitalist tendencies – and resistances – of its imagined futures.

All visions relating to the purpose of education are driven by articulations of its possible future, and all are likely to be contentious in one way or another, to one set of actors or another. Yet the imaginaries shaping *digital* education are particularly troubled, given their inextricability from the complex and problematic infrastructures of our extractive, technological age. The concept of the sociotechnical imaginary, which will be used as a way of organising this chapter, is already established in the scholarship of digital education, its most accepted definition coming from the science and technology studies scholar, Sheila Jasanoff.

For Jasanoff, sociotechnical imaginaries are ‘collectively held, institutionally stabilized, and publicly performed visions of desirable futures’ (Jasanoff, 2015, p. 4). In other words, while

individual and collective visions for the future are multiple and diverse, not *every* imagined future counts as a sociotechnical imaginary – these require 'resonance among collectives, the allocation of resources, and the adoption into practices of making, governing, and doing to become institutionalized' (Mager & Katzenbach, 2021, p. 226).

Education, as Rahm (2023) has pointed out, has a tendency to be overlooked as a constitutive element of sociotechnical imaginaries, despite its central role within them. Educational imaginaries are themselves increasingly driven by the visions of the large technology companies which, as Mager and Katzenbach point out, 'not only take over the imaginative power of shaping future society, but also partly absorb public institutions' ability to govern these very futures with their rhetoric, technologies, and business models' (Mager & Katzenbach, 2021, p. 223). It is only by understanding the power of these – arguably now dominant – imaginaries that educators and educational institutions can push back on them, and work to articulate alternatives.

Historical imaginaries: from teaching machines to machine behaviourism

As Audrey Watters compellingly argues in her (2023) book *Teaching Machines: the history of personalized learning*, some of the imaginaries currently shaping digital education – and their basis in the meta-imaginary of technological progress – have been around since the 1920s. Focusing on the persistent search among influential educational technologists and psychologists for 'individualised' or 'personalised' learning, Watters tells the story of the development and marketing of Skinner's 'teaching machine' (Skinner, 1954) and its connection to the imaginary of the personalised, automated tutor, its embeddedness within the behaviourist theory of the 1950s and its complicity with the industrialisation of education through the growth of edtech.

Behaviourism and solutionism

The teaching machine was a mechanical device, not a digital one – a wooden box holding cards containing mathematical problems and a knob or lever enabling the student to provide a numeric solution to which the machine would provide an immediate right/wrong answer. It was a mechanism designed to address the failures Skinner perceived in the contemporary US

education system, which he saw as being unable to provide the sufficiently personalised and timely feedback required to support effective learning:

> The simple fact is that, as a mere reinforcing mechanism, the teacher is out of date. This would be true even if a single teacher devoted all her time to a single child, but her inadequacy is multiplied many-fold when she must serve as a reinforcing device to many children at once. If the teacher is to take advantage of recent advances in the study of learning, she must have the help of mechanical devices. (Skinner, 1954).

The teaching machine was designed according to Skinner's behaviourist theory, building on the earlier work of Ivan Pavlov and Sidney Pressey. It functioned according to the underpinning principle of behavioural modification through reinforcement: each student would receive immediate feedback from the machine enabling rapid, personalised, adjustment and modification. It was Skinner's hope that the machine – as a form of teacher automation – could function both as an engine of reform within an 'inadequate' education system and as a route to commercialisation through its large-scale manufacture and roll-out in schools.

As Watters reveals, we can see in the teaching machine the origin of some of the most pervasive sociotechnical imaginaries still shaping digital education seventy years on. Most notable among these, for Watters, is the influence this work had over 'the push for both personalized technologies and behavioral engineering' and the 'technocratic culture' that they brought to educational thinking and practice (Watters 2023, p255). I would add to these the still very current 'solutionist' imaginary that education systems are 'broken' and that only technology can 'fix' them. Alongside this often sits the tacit assumption that the primary source of this inadequacy is the teacher (rather than, for example, lack of investment in public education). As in the quote from Skinner above, this assumption of teacher deficit is still often implicitly gendered.

The instrumentalist-utilitarian imaginary which hails the 'fixing' and reform of education systems and practices through technology has dominated corporate and policy discourses for decades, from the UK government's failed *learndirect* platform of the 1990s (Bayne, 2023;

Gorard et al., 2003) to the – also failed – US one-laptop-per-child programme, widely criticised for its technocentric, western-centric vision (for example, Warschauer & Ames, Morgan, 2010), to the Massive Open Online Courses (MOOC) 'revolution' and the failure of its promise to universalise access to higher education (Knox, 2016).

Marketisation

Hand-in-hand with this solutionist tendency is the commercialisation tendency now normalised in the digital educational technology field. While Skinner attempted to commercialise his teaching machine (a key part of Watter's narrative), he ultimately failed in this objective. However, since the digital 'revolution' of the late 20th and early 21st centuries, the marketisation of the education sector has accelerated rapidly via its dependencies on the for-profit educational technology (edtech) industry. Boosted by multiple technology hype cycles and the COVID-19 pandemic, and now with further expansion anticipated as artificial intelligence becomes embedded across the many platforms and services used by schools and universities, edtech continues to be a growth market. Venture capital investment in the sector reached $22bn in 2021, according to the market data platform HolonIQ (2022). As Williamson and Komljenovic (2023) point out, this market confidence is located within a strong, future-oriented sociotechnical imaginary of what education might be: 'financial calculations are accompanied by transformative "visions" of how education could or should be. Investors focus on allocating funds to companies with products that are expected to produce that imagined future while generating shareholder value' (p.235).

Such technocapitalist imaginaries extend Skinner's language of teacher 'inadequacy' into a set of imperatives for entire education systems. For example, again from HolonIQ: 'Education is grossly under digitized, with less than 4% of global expenditure on tech. As a sector, education is a digital laggard…presenting a serious challenge given the scale of what's to come.' (HolonIQ, n.d.)

Personalisation, constructivism and nudging

At the time of writing (October 2024) we are amid a global frenzy around artificial intelligence prompted by the release of OpenAI's generative AI application, ChatGPT, in 2023. Generative AI is widely seen by academics (e.g. Grover, 2024), industry groups (e.g. WeAreTechWomen, 2024) and policymakers (e.g. UK Department for Education, 2024) as

having the potential to underpin new forms of adaptive 'personalised learning', due to its ability to provide immediate responses based on the prompts of individual learners. While generative AI is fairly new, the imaginaries shaping its potential for personalised learning can be traced back to much earlier visions and promises. In the 1960s, for example, Patrick Suppes famously claimed that 'millions of children' would soon have access to 'the personal services of a tutor as well-informed and responsive as Aristotle' through developments in educational computing (Suppes, 1966, p.207).

While the imaginary of the 'teaching machine' – and its behaviourist underpinning – are undergoing a vigorous re-emergence via contemporary AI in education (see below), behaviourism as a theory became less influential among educators later in the 20th century as cognitive and constructivist theory shifted focus away from behavioural modification through teaching toward the ideal of 'student-centred' learning. Theories of learning now emphasised the need for education to support the active building of understanding based on individuals' experience of the world, within a humanist assumption of individual student autonomy and ability to self-direct. This was a shift later critiqued by Biesta and others for its alignment with the 'learnification' of education and the imaginary of the autonomous 'learner-consumer' within a marketised education system (e.g. Biesta, 2005). From the perspective of the present, therefore, there is a resonance between the critiques of both behaviourism and constructivism in the work of contemporary critical scholars in digital education, who see behaviourism as having been re-birthed through the highly marketised, 'personalised' sociotechnical imaginaries of Silicon Valley (Friesen, 2018). These are imaginaries that are organised around extractive data analytic practices, as Watters (2023) reminds us, 'with the enhanced data extraction and analytical capabilities of modern computing, today's new teaching machines now claim to know more about each student, claim to be able to respond more rapidly, more intelligently, more efficiently than a human teacher could.' (p.254-5)

For Knox et al (2020) emergent forms of digital education carrying the promise of 'personalisation' – including those which now incorporate AI – constitute a form of 'machine behaviourism' which combines 'radical behaviourist theories and machine learning systems' in ways that 'appear to work against notions of student autonomy and participation… shaping learner behaviour towards predefined aims' (31). Such approaches are tightly connected with the behavioural economics of platform media (Zuboff, 2019) and its use of extractive data

practices and psychological nudging techniques to modify and engineer online behaviour, maximising 'clicks' to boost platform dominance and thus advertising revenue.

So, while constructivism appeared to constitute a rejection of behaviourism we can see how both, mobilised within highly technologised societies and market-based economies, have been re-purposed to shape currently dominant technocapitalist imaginaries in education. These appear to centre individual autonomy through 'personalisation', while also undermining it through extractive data practices and machinic 'nudging'. They downplay the labour of human teachers while enmeshing learners and education systems within a new, under-regulated and under-critiqued technosocial order.

Recent histories: from 'frictionless' learning to platformisation

'Liberation' of mind from body

The imaginary of 'personalised learning' enabled by digital technology is surprisingly resilient and far-reaching. Edgar Faure, in the important and, for the most part, deeply humanistic UNESCO report on the future of education *Learning to be* (1972), was already hailing the concept of 'cybernetic pedagogy' in terms similar to those used by Skinner and other behaviourist thinkers in the earlier part of the century, suggesting that 'self-regulating individual micro-systems such as adaptable teaching machines' are capable of accounting for 'an infinite variety of individual differences among pupils.' (Faure et al., 1972, p.115)

From the perspective of the present, this claim sits oddly in a report which for the most part emphasises the humanistic promise of social justice, universal rights and a better world to be achieved through education. Jumping forward to the late 1990s and the early 2000s, we do however see new kinds of rationalist-humanist imaginaries emerging through the growing ubiquity of digital technologies, devices and cultures in education and the wider society. The dualistic imaginary of the 'liberation' of human mind from body made possible by digital communications was one instance of this. As John Perry Barlow's libertarian tract, 'A declaration of the independence of cyberspace', addressed to the 'governments of the industrial world', stated:

> I come from Cyberspace, the new home of Mind. … Our identities have no bodies, so, unlike you, we cannot obtain order by physical coercion. … We will create a civilization of the Mind in Cyberspace. May it be more humane and fair than the world your governments have made before. (Barlow, 1996)

Reading the 'declaration' from the perspective of 2024, the resonances with the troublesome, right-wing libertarian calls for the de-regulation of 'big tech' are clear. At the time, however, the vision of mind 'freed' from the 'constraints' of body was extremely influential in education, weaving itself through the powerful sociotechnical imaginary of 'any time, any place learning' which was foundational in the development of online, distance education in the early 2000s (for example Fletcher et al., 2007; Lassner & McNaught, 2003; Pea & Maldonado, 2005). To this day it continues to shape the field, amplifying the kinds of so-called 'student-centred' approaches which, while taking education online, also often work to reduce it to the interaction of individuals with 'content', re-frame the act of teaching as 'facilitation', and in the process create new kinds of techno-determinist imperatives for schools and universities.

Technoromanticism and frictionless learning

For Coyne, the amplification of mind-body dualism through digital technology seen in the likes of the 'declaration' was a form of what he called 'technoromanticism', having 'taken to heart the Neoplatonic concept of *ecstasis* – release of the soul from the body – though here the soul is replaced with the mind, the means of ecstasis is immersion in an electronic data stream, and the realm of the unity is cyberspace.' (Coyne, 1999, p10)

These technoromantic imaginaries shaped the way in which some educators of the early 2000s approached the 'challenges' of space, time and embodiment, emphasising both the changing parameters of these, and the potential of digital technologies to ease the transmission of knowledge across and between them. For example Otto Peters (2000) saw 'space and time' as having become 'negligible paramaters for data transmission', claiming that 'those who have always interpreted all learning and teaching as an exchange of information, will understand the changes that have taken place and will tend to accept them' (p16). While it seems unlikely that, at the turn of the century, there were that many educators who saw 'all learning and teaching as an exchange of information', the broad

imaginary of frictionless knowledge sharing – and the discourse of inevitability – still persists in digital education.

It is an imaginary that champions digital technology as a means for 'unshackling' those who wish to learn from the constraints not only of time and space, but also of institutions, credit frameworks, fees, classrooms, structured curricula, professional teachers, timetables and other students – all the human and non-human material paraphernalia which frames and supports education systems. Individuals are no longer 'students', but pure, disembodied 'learners' – free to immerse themselves in the new 'realm of unity' constituted by freely-available 'content'. Again, it is the prospect and imaginary of infinite personalisation that often sits at the heart of this promise, for example as Benjamin (1994) claimed, 'Every learner can, at his or her own choice of time and place, access a world of multimedia material… immediately the learner is unlocked from the shackles of fixed and rigid schedules, from physical limitations…and is released into an information world which reacts to his or her own pace of learning.' (p.49)

There was significant work during the second decade of the 21st century – often, again, building on Biesta's critique of 'learnification' (Biesta, 2005) – to push back on this individualised, frictionless imaginary, and to articulate alternative, more critical interrogations of digital education which emphasised the centrality of the teacher and the importance of institutions, education systems and communities of scholarship. Examples of these include the two 'Manifestos for Teaching Online' from the University of Edinburgh (Bayne et al., 2020), work clustering around the largely European Networked Learning series of conferences and books (Networked Learning Editorial Collective, 2021), the work of the Hybrid Pedagogy community in the US (e.g. Morris & Stommel, 2018) and the clusters of Digital Humanities Networks globally which all did work focusing on a deeper and more research-led understanding of how digital culture was impacting on education.

From universal access to platformisation

However the most high profile educational innovation in this period – the Massive Open Online Course (MOOC) movement – was very much driven by the frictionless, any time, any place imaginary, only this time with an emphasis on the radical scaling-up of classes made possible by digital technology. Early experiments in large, online course provision, such as

the 2008 MOOC *Connectivism and Connective Knowledge*, emerged from the Open Education Resources movement, and were designed to test the principles of 'connectivism', a framework developed by its creators, George Siemens (2005) and Stephen Downes (2008). These courses emphasised open knowledge-sharing among distributed groups, with a strong focus on participant connections and content aggregation. However, they still worked within the 'any time, any place' imaginary in which the primary emphasis was on individual learner autonomy and an aspirational '"power-free" domain of participation and sharing' (Bayne & Ross, 2015, p28).

By 2012, this early MOOC movement had been eclipsed by the online courses emerging out of Stanford University, including the 2011 *Introduction to AI* course led by Sebastian Thrun and Peter Norvig which famously enrolled over 100,000 students in a single instance. On the back of the success of these, the MOOC platforms emerged – Udacity, Coursera and later EdX, Udemy, Futurelearn and others. These platform MOOCs were highly conventional, being content and syllabus-driven, incorporating automated feedback nudges and, at least in the first instance, generally focused on computing science and related disciplines. The platforms hosting them gained credibility in the early days by partnering with the world's 'elite' universities to develop and deliver courses. By 2021, almost 20,000 of these had been launched and over 200 million learners had signed up to them (Shah, 2021).

The sociotechnical imaginary at work here brought together that of 'frictionless', 'any time, any place learning' with that of 'universal access to education through technology'. It is true that many people for whom access to higher education institutions was impossible benefited – and continue to benefit – from the online short courses that emerged from the so-called 'MOOC revolution' and the 'Year of the MOOC' (Pappano, 2012). However, the theory and philosophy underpinning MOOCs was primarily techno-solutionist and dependent on the same kind of rationalistic humanism discussed earlier. As Knox pointed out, 'uncritical and problematic forms of humanism tend to be assumed in the promotion and delivery of these courses: the expectation of rational and self-directing individuals, with a universal desire for education' (Knox, 2016, p305). This is a universalism which 'flattened out' regional, cultural and individual complexity in favour of an Anglo-American model of higher education, combined with a pedagogic approach very much indebted to 1960s behaviourism and Silicon Valley norms. Over time, many of these free-to-access courses also started to be monetised.

Some – for example EdX – started out as a not-for-profit but were eventually bought out by for-profit edtech companies. Most began to charge fees for certification, and the movement as a whole began to form the basis for a wider architecture of micro-credentialing and unbundling which continues to played out in institutions of higher education today.

The rise in the sub-discipline of 'learning analytics' (Lang et al., 2017) which grew out of the promise of massive amounts of behavioural data generated within MOOCs was indicative of the extractive turn toward 'big data' in education, which continues into current discussions about both artificial intelligence and platformisation in education. While platforms such as learning management systems and virtual learning environments existed before MOOCs, it was around this period that 'platformisation' itself became an issue for educational institutions. For Komljenovic and Williamson *platformisation* 'refers to the process of universities running their operations on platforms and reorganising their practices to fit these' (Komljenovic & Williamson, 2024, pIII). Currently, the infrastructures of contemporary institutions of higher education are more or less dependent on a cluster of dominant platforms that continuously collect user data, feeding this into further platform development and locking institutions into commercial platform dependencies, homogenised pedagogies, and rising subscription charges. As Komljenovic and Williamson frame it, 'an economic logic that treats educational materials and data as digital assets with potential financial value is in tension with core values of academic ownership and freedom, and open access to educational resources.' (p1)

While alternative imaginaries for educational platforms are sparse, there are some inter-institutional collaborations – such as the Canadian OpenETC – which do vital work to open up new ways of thinking about what a 'platform' might be, 'pooling expertise and resources to support shared infrastructure' and providing community-owned, open-source alternatives (OpenETC, nd, np).

The MOOC 'revolution' amplified another troubling trajectory within education: the techno-determinist imperative for institutional and system reform, and the push to align them to a highly marketised, individualised imaginary for the future of education. The MOOC frenzy led to many government and corporate think tanks and management consultancies concluding that 'traditional' universities, for example, were no longer relevant. They argued that massive

reform was required to align current systems to a future for education imagined very much within the Silicon Valley model. In the UK, the Institute for Public Policy Research produced a report – much read at the time – entitled 'An avalanche is coming' (Barber et al., 2013) which attempted to set a new agenda for higher education based on the premises that 'universities are becoming unbundled', that university leaders need to 'take control of their own destiny and seize the opportunities open to them through technology – Massive Open Online Courses (MOOCs) for example', and that if they do not 'an avalanche of change will sweep the system away' (p5). These kinds of catastrophising imaginaries still persist over a decade later, currently mainly focused on the challenges claimed to be presented by artificial intelligence.

Universities and education systems as a whole tend to be fairly resilient – the MOOC 'revolution' frenzy died out and universities continue, some with a portfolio of excellent online short courses, most with increasingly 'unbundled' operational models, platform dependencies and programmes of 'digital transformation'. The effects of this period persist in a broader sense however, in that criticism and distrust of education institutions – schools, colleges, universities – has become quite deeply embedded as an imaginary within the public sphere. The broader sociotechnical imaginary of institutions as reluctant to embrace technological change, out-of-date, elitist, ineffective and untrustworthy feeds into a range of 'negative societal outcomes' (van Prooijen et al., 2022, p65) including culture wars, populist movements and a decrease in the quality of social relations within a broader 'ecosystem of distrust' (Verstraete & Bambauer, 2017, p129).

Imaginaries for the future: emergence and resistance

The articulation of human and machine

The previous section of this chapter touched on the 'technoromanticism' (Coyne, 1999) of the early years of digital education. It emphasised the tendency to work with the idea of 'mind' liberated from 'body' by digital technologies, in order to open up the possibility of frictionless, universal and 'any time, any place' learning. The crude dualism of this sociotechnical imaginary was at the time already being nuanced by scholars working in the

still emergent field of digital cultural studies, who examined and articulated ways of understanding not the erasure of bodies online, but their reconfiguration. Allucquère Rosanne Stone, for example, in her highly influential essay 'Will the real body please stand up?' commented that in 'cyberspace' communities 'agents meet face to face, though…under a redefinition of both "meet" and "face"' (Stone, 1991, p83), while Haraway asked, simply, 'Why should our bodies end at the skin?' (Haraway, 1991, p178).

In her 1999 book *How we became posthuman*, Katherine N. Hayles connected this reconfiguration to the anti-Cartesian assumption that mind is dependent on body, in that it is only through embodied interaction with its environments that 'the cogitating mind can arrive at "certainties"' (Hayles, 1999, p203). For Hayles, the posthuman subject is formed in an altered, and intimate, relation with technology, yet this is a shift which *re-centres* the body in our considerations of what it means to be human – it is 'an opportunity to put back into the picture the flesh that continues to be erased in contemporary discussions about cybernetic subjects' (5). While working with the belief that 'human being is first of all embodied being' (283), we can embrace the figure of the posthuman as a means of 'rethinking the articulation of humans with intelligent machines' (287) (see chapter 26).

Technology in the view of Haraway, Stone and others writing in this period, held the potential to liberate us from patriarchal humanism and its assumptions of human exceptionalism, supporting us to challenge the dualisms we draw on to define what it means to be human. The figure of the cyborg – the empowered machine-human assemblage – still persists as a sociotechnical imaginary in the wider culture and within digital education, though the cyborg as a locus of radical empowerment has dropped away. Cyborg imaginaries now are less oriented to critical posthumanism, having been absorbed within a highly conservative, marketised 'enhancement' discourse. Examples of this include the pervasiveness of the humanoid robot or 'enhanced', robot-ised human form in popular representations of the 'future of education', the rise of research and investment in educational neurotechnologies (Privitera & Du, 2022) and educational genomics (Williamson, 2018), and other big-tech and big-pharma trajectories toward human augmentation and cognitive enhancement (Bayne & Ross, 2024).

Entanglement

This discussion of course must include current debate about the impacts of artificial intelligence on the nature of what it means to learn and know as embodied humans (Kirschenbaum & Raley, 2024). In 1991, Haraway's statement that 'the machine is not an *it* to be animated, worshipped, and dominated' but rather *is* us 'our processes, an aspect of our embodiment' felt liberating (Haraway, 1991, p180). Many might feel differently about this in 2024 when AI appears unstoppable and ownership of 'the machine' sits firmly with the big tech oligarchs of advanced capitalism. If the machine *is* us in 2024, we are at least part-owned by Altman, Musk, Zuckerberg and their like (see chapter 28).

The sense of potential, even joy, in the subversion of boundaries between human, machine and world did however carry through into the 2000s, as Barad's (2007) theory of agential realism began to be used by educators to emphasise how objects or phenomena can only come into existence through their relations or 'intra-actions'. For Barad, 'the very nature of materiality is an entanglement. Matter itself is always already open to, or rather entangled with, the 'Other'. The intra-actively emergent 'parts' of phenomena are co-constituted. Not only subjects but also objects are permeated through and through with their entangled kin.' (pp392–393)

Some education practitioners used these new materialist ideas and the imaginaries of emergence and entanglement to re-think learning environments as constituted through complex relations between the human and non-human (for example Rousell, 2016), or as an opening for the disruption of hierarchical power in the classroom by seeing teaching as 'an intra-active material process' (Benavente & Cielemecka, 2016, np). In digital education research these (and related) ideas were primarily used in order to critique the increasing influence of data-driven technological infrastructures in education systems and digital education practices. For example, Introna and Hayes (2011) surfaced the ways in which plagiarism-detection algorithms in commercial services and software actively constitute certain groups of students as 'cheats', Knox (2014) drew our attention to the problematic ways in which algorithmically-determined 'personalisation' in learning environments sits beyond the control of individual human agency, while Williamson (2018) extended the critique into the biotechnological domain of educational genomics.

Resistances

By the late 2010s, the 'cyborg' imaginary and the possibility of pleasure in the confusion of boundaries between human and 'machine' was – at least in critical education research – giving way to serious concerns about the implications of the use of 'big data', AI and other extractive technologies within education, and their effects on the agency of students, teachers and whole education systems. The rise of 'big tech' and its complicity with the depredations of advanced capitalism were by this point clear, to the extent that in 2022 Jonathan Crary was able to claim that digital technologies – and the internet in particular – are an entirely lost cause with no place in a future society supportive of human and planetary flourishing:

> The internet complex has become inseparable from the immense, incalculable scope of 24/7 capitalism and its frenzy of accumulation, extraction, circulation, production, transport, and construction, on a global scale. (Crary, 2022, p.5)

For Crary, a shift beyond the digital age to a 'post-capitalist world', and a complete refusal of digital infrastructure, is the only way to ensure planetary and human survival. However, affirmation of the place of digital technology, and the theory and philosophy of new materialism, continue to have a central place within the research field of digital education. The now influential 'postdigital education' movement re-frames the imperative to reject digital technology by emphasising the need to move beyond the digital/analogue binary, foregrounding the 'endless indeterminacies' of our current technological age, 'the crossing and hybridization of borders between the human and nonhuman, the analog and digital, the subject and object' (Jandric & Ford, 2022, p7).

For years now there has been a very strong critical thread within digital education which takes seriously its responsibility to interrogate and push back on technologies of extraction, surveillance, bias and exclusion – work in journals such as *Learning, Media and Technology* and *Postdigital Education and Science* exemplifies this. However we are also now seeing more work which proactively focuses on rebuilding and re-making digital education in new forms which emphasise planetary and social justice, for example by acknowledging its need to contribute to de-growth (Selwyn, 2025), its place within collectively-imagined new utopias

(Bayne, 2023) and the possibility of re-framing it according to the principles of reparation, sovereignty, care and democratisation (Sriprakash et al., 2024).

Conclusion

This chapter has navigated through the history, theory and philosophy of digital education from the 1960s to the present, drawing out some of the sociotechnical imaginaries that have shaped its past, and continue to shape its futures. These have included personalised learning and automated teaching, frictionless and 'any time, any place' learning, universal access, teacher and system inadequacy, human enhancement and the entanglement of human and machine. Underpinning these, and woven through them, are what we might think of as the meta-imaginaries of technological progress, solutionism, techno-determinism, instrumentalism, and techno-capitalism.

There are some gaps in the above, including two particularly notable ones. First, the imaginary of technology as neutral 'tool', and second the highly determinist imaginary of the 'digital native', both of which continue to inflect contemporary discussions of digital technology in education. No overview and summary chapter will ever be complete – the stories we tell ourselves about the place of digital technology in our world and within our education systems will always evolve, change and grow, and perhaps it is in this that lies our greatest hope for the future.

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