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Theorising Technology in Education: An introduction

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This is a special issue of *Technology, Pedagogy and Education* which showcases the application of a range of theories in the conceptualisation and analysis of educational technology. In this introduction we describe what led us to organise this issue, we stress the importance of theorising and we introduce the contributions that appear later.

Why discuss theory in technology research?

Our special issue has stemmed from an awareness of shortcomings in the field of education technology research. At the outset we recognise that there is much to be celebrated in our field too. For example in terms of methodologies and frameworks research is comparatively free from the 'one size fits all' approach that characterises some disciplines and researchers are often open to innovative methods (for example analysis of digital archives) and new methodologies (for example design thinking as a way of understanding the user participation in creating new technological tools). Indeed its very novelty offers those researching technology the freedom to develop new approaches, and these can include innovative interdisciplinary ones. Another strength of educational technology research is its concern to exchange experiences with practitioners and often a deep-seated desire to inform practice.

However there is no getting away from the complaints made about the education technology literature (e.g. Underwood 2004; Selwyn 2011a, Oliver, 2011; Drew and Mann, 2018) and criticisms that include: over-determinist approaches; binary categorisations; excessive romanticism; overly descriptive outputs; a lack of engagement with decolonising methodologies; and too little theorisation about tools. Each of these is dealt with in turn.

First, overly deterministic accounts of technology use. Technological determinism assumes that it is possible to predict the consequences of user interaction with technology as all users will interact in broadly similar ways. Perhaps one reason for this over determinism is a rush to focus attention on the most appropriate (or most desirable) 'affordances' of a new tool before other less desirable uses take hold. For example, early researchers saw virtual learning environments (VLEs) as tools for communication, leading to social constructivist learning, and expected that they would be used for those purposes. However, in practice VLE use often coalesced around providing information

and in the process replicating, as put by Blin and Munro (2008), 'behaviourist, content-driven models'. Examples like the VLE show that what the user does with technology is not solely determined by the design of the tool, or the properties of the tool, but is mediated by socio-cultural contexts, ones which shape tool use in certain directions. Users of technology are not disembodied as some researchers assume, rather they experience constraints that make some practices more likely and make other practice less likely.

Second, there is, congruent with technological determinism, a tendency to theorise the use of technology through a binary lens: for example a divide between *adopters* and *resisters*, *deep learners* and *surface learners*; and, most cited of all, between '*digital natives*' or '*digital immigrants*' (Prensky, 2001). This is not to rule out generalisations based on certain characteristics but a reminder that people as well as their practices do not necessarily fit the pattern. Indeed, any one individual's technology use can be inconsistent and very dependent on the circumstances in which they find themselves; technology use is neither static nor timeless (Costa and Harris, 2017).

Third, research focusing on digital technology and education has suffered from romanticism. There is of course plenty to be said in favour of optimism as a stance and indeed the German philosopher Bloch (1938/1995) famously argued for a Principle of Hope on the grounds that it was by imagining a different future that we could find the energy needed for change. Optimism is the natural stance for the educator, but optimism should not be pushed to the point of naivety and research into technology has often been naively optimistic both about technology in general (see Robins and Webster, 1988 for an early critique) and educational applications of technology (Papert, 1993). Technological optimism makes a leap from what is happening to what ought to happen with little in between. For example an observation, say, that learners seem able to connect online with each other can lead all too easily to a belief that such connectivity is not just possible, but will almost necessarily bring about valued educational outcomes (e.g. Siemens, 2005). Caution is needed, but if excessive optimism is to be avoided so too is its corollary excessive pessimism. Pessimism is an important counterweight, especially when coupled with a call for action (Selwyn, 2011b), but pessimism should avoid reinforcing a sense of powerlessness, there is scope for change in the face of commercial interests and curriculum rigidity.

Fourth, education technology research can be excessively descriptive. This is not to dismiss the contribution of description to understanding the role of technology in education, but to draw attention to limitations. For example, research has often surveyed individuals' technological uses, preferences and tastes or explored the positive and/or negative effects of certain tools, but the end results can be one-dimensional, quasi-positivist for they lack engagement with the social, cultural and political contexts on which the digital operates. Lack of theorisation extends well beyond survey research so that while many case studies account for findings they fall short of offering meaningful ideas that to shed a new perspective on the phenomena being explored.

Fifth, social researchers are facing persistent calls to critically examine power imbalances in the conduct of research (gender and class imbalances, but also economic and geographical ones) which those researching technology have been slow to embrace. These imbalances require researchers to consider their own positions and the socio-cultural contexts, including the digital divides, in which their work is carried out (see, for example, work conducted by van Deursen and van Dijk, 2014). Researchers need to take into account not just gender, ethnic, class and disability backgrounds but more recent discussion of intersectionality and the ways in which research may be made both critical and useful. Here Timmis and Muhuro (2019) see the value of decolonisation narratives instead of taking the digital as a 'universalist mechanism'.

Finally, it is striking that in the field of educational technology there is little theorisation about technology itself. Here important theoretical work has been carried out in cognate fields which has only slowly found its way into education technology research. Moreover education researchers have been slow to interrogate the ways that our worlds have become increasingly hybrid so that digital technologies have become part and parcel of daily life. Researchers need to draw on theories not only in the analysis of data, but also in the conceptualisation of a critical inquiry (Costa and Murphy, 2016).

Where theory helps

Having more theory is not a panacea for addressing the shortcoming highlighted earlier but it can help in conceptualising technology in more nuanced and critical ways – a point made some time ago in Bulfin et al. (2015). Theory helps by providing a lens on a given phenomenon and by providing a language to develop understandings and/or critique. A consequence of theorising is not only a way of talking to other researchers, but a vocabulary for communicating ideas as seen when terms such as Bourdieu's social and

cultural capital, Castell's networked society and even Habermas's performative contradiction become part of public discourse. Theory is important as it develops a new layer of language that is able to illuminate, sometimes amplify, the understanding of the world we aim to explore. Theory that stands the test of time - just like language - is adaptable, dynamically adaptable, to accommodate the introduction of new vocabulary (new concepts) that reflect contemporary developments. This means that those advocating theory need to pay particular attention to the provenance of key terms and point to the nuances in their usage. A particular challenge in theorising technology research is to articulate the relationship between person, tool and environment and, in particular, to say something about the opportunities for individual agency, without, as seen earlier, being excessively optimistic or pessimistic. This can be done by drawing on different disciplinary traditions – not only sociology, but also philosophy, linguistics or literary studies and so on. It also needs to be done by looking backwards by using past conceptual categories but adapting them for new contexts. Theorising balances past research with future possibilities (Hammond, 2018).

What is in this collection of papers

In the first part of the edition there are four examples of using theory in particular contexts: Arnott, Palaiologou and Gray; Beckman, Apps and Bennett; Colton; and Levine.

Arnott, Palaiologou and Gray look at internet-connected toys across homes (informal learning) and early childhood settings (formal learning) and they develop a social-ecological framework to explain what is going on. They resist easy binary distinctions between home and school and instead reach for a more holistic frame which conceptualises human behaviour as a function of the multiple interactions within which children live and learn. Arnott, Palaiologou and Gray offer a series of observations about home and school use, for example they note there continues to be a digital disconnect between home and early childhood education and this will never erode while technological developments, such as the emergence of IoT toys, advance at a greater pace than the preschool infrastructure. By developing a social ecological framework the authors are able to acknowledge children's agency but notice that such agency takes place within a set of nested relationships.

Beckman, Apps and Bennett begin by looking at patterns of inequality in school students' digital literacy and note that Bourdieu's theory of practice is one example of

social theory that has potential in explaining social disparities. Students' technology practice is influenced by their dispositions or inclinations towards technology but it is also shaped by their access to technology practice via cultures of technology use, particularly through networks and social exchanges (referred to as capital). Access to social and cultural capital is critical in building digital skills and framing our conceptualisation of future possibilities with technology. Bourdieu's conceptual tools were used in two case studies - the first looking at primary students' school-based digital literacy and the second at secondary students' technology practices as they traversed school and everyday life fields. The authors' use of Bourdieu allowed for an understanding of both the subjective (individual disposition) and objective (the predefined structure of social worlds). In their research this meant identifying the technological capital valued within school fields but also what was valued within the everyday life contexts which students experienced. This allowed the authors to see the complexity of students' technology practices and relationships within home, school and the broader social field of power.

Colton explore the use of actor network theory (ANT) in her research into teaching and learning practices with early secondary learners in a school in Australia. She describes the ANT tradition in social science, including the classic study of scallop fishing in Brittany, and its take-up in research into technology in education. The value of ANT lies in the idea of assembling – 'a dynamic and interactive process through which the network is continually forming or falling apart'. To explore the idea of assemblage Colton looks at challenge based learning in one classroom. In this study challenge based learning was not achieved by teachers or by students alone. Nor was it embedded in the way that the tables and chairs were set out or in what particular software was designed to do. Instead the key to understanding such learning lay in the assemblage of these various agents. However assemblages are not fixed and a further merit of ANT is that it draws attention to the fragility of assemblages; networks are being continually reformed.

Levine tackles the use that young people make of technology and is interested in explaining their behaviour. Her approach was based first around Valsiner's zones theory as this had the potential to provide a perspective on agency as accounting for both social participation and internalisation. However, such a zones analysis was limited and Levine looked for a more fluid or continuous way to describe an individual's development. She further wanted to take fuller account of the role of biological and physiological change as a factor in young people's use of technology. This moved her to consider another

theoretical resource, the life course perspective, with its focus on developmental trajectories, social pathways, social convoys, adapted with a further focus on *technological pathways*. Levine found that blending zone theory with life course perspectives was not straightforward but it enabled a much richer analysis as reported in the case study of 'Megan', a participant in her study.

In the second part of the edition are three explorations of particular concepts: Blayone (activity theory); Dawson (networked learning); and Gray (writerly texts).

Blayone is interested in our capacity to use digital tools but notes that literacies, competences and skills are often seen as individual possessions rather developed within social cultural settings. In addressing this shortcoming activity theory (AT) can provide an important lens and Blayone offers an in-depth investigation of AT, charting its development from the earlier work of Vygotsky, Leontiev and Luria to later accounts dealing more fully with the relationship of person and environment. Blayone introduces a perspective which he describes as an Activity-Theoretical Grammar made up of elements and dynamics. Important in this grammar is that activity begins with human agency—purposeful action taken by a subject to address physiological and/or psychological needs. Blayone sees the AT tradition as affording opportunities for abstracting (selecting and ignoring phenomena); explaining (naming concepts that undergird some phenomenon); contextualizing (positioning phenomena within a broader spatial-temporal whole) and positioning (establishing an investigative approach). However he stresses the need for a flexible stance on theory and a future-oriented research agenda concerned with human development and transformation.

Dawson engages with the process of 'automization' associated with networked digital technologies and the consequences of this process for the alienation and for the decline of theory. Dawson draws primarily on the cultural theorist Bernard Stiegler, and his notions of disorientation and malaise. In Steigler the capacity of technologies to process data at increasingly faster speeds, has short-circuited our capacity to 'think, dream and individuate the law, truth, and the beautiful'. This Dawson discusses as a 'proletarianizing tendency'. There needs to be a rebuilding of spaces for the nurturing of intellectual activity and Dawson sees the research tradition of networked learning as helpful in offering a different theoretical perspective on technology. However a networked approach is not straightforward and Dawson describes how in one institutional context networked learning unsettled academic identity and led to a loss of presence, such loss is

disorienting but can be potentially empowering, because it goes hand in hand with the very possibility of thinking otherwise.

Gray explores quality within online courses – quality is not the same as quantity, a more traditional measure of 'effectiveness'. He argues that interaction is key to learning, and in education an end in itself, as through interaction the learner becomes the agent experiencing change in a 'dialogic, reciprocal manner, enacting as much change as receiving'. Gray's interest is the interaction of learner with text in online learning and suggests that literary theory can provide a conceptual tool for understanding that interaction. In this particular paper he draws on Eco's idea of open and closed texts; Iser's Reader-Response Theory and, a key contribution, Barthes distinction between readerly and writerly texts. Readerly texts are constructed to offer a limited number of possible interpretations, they place the reader in a passive position. In contrast writerly texts are constructed so that the reader must play an active role in the construction of meaning; there is not a single reading of text, rather a proliferation of meanings to uncover. Gray suggests that writerliness is not just a powerful tool for the analysis of online learning but a means of organising online courses so that meaningful interaction happens. Writerly courses lead in directions not intended or even foreseen when a course was designed and learning outcomes set.

This special edition only touches the surface of what can be covered and the myriad ways in which theory can be used but it offers important insight into particular theoretical approaches, ranging from social psychological (activity theory, zones framework and social ecology), psychology (the life course), sociological (Bourdieu and Callon) and literacy and semiotics (writerly texts) traditions. The papers provide insight not just into theory itself but theorising and putting theory to use. The papers speak to the agenda of a critical interdisciplinary research into technology. They provide a resource not just for further debate but for further action.

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