R Routledge
Taylor & Francis Group

Making sense of young people, education and digital technology: the role of sociological theory

Neil Selwyn*
Institute of Education, University of London, UK

This paper considers the contribution of sociological theory to the academic study of young people, education and digital technology. First it discusses the shortcomings of the technological and socially determinist views of technology and education that prevail in current academic and policy discussions. Against this background the paper outlines the benefits of a number of different sociological perspectives on the social shaping of technology that, despite their popularity in other areas of science and technology studies, have been employed rarely in analyses of educational technology. In particular the paper outlines the provenance of theoretical approaches such as the social construction of technology, studies of domestication of digital technologies, feminist critical theory and the political economy of technology. Drawing on all these theoretical traditions the scene is then set for future empirical and theoretical examinations of young people's use of digital technology in formal and informal educational settings.

Keywords: *educational technology; technological determinism; social theory; sociology*

Introduction

Many criticisms can be levelled at academic discussions of education and digital technologies. In particular, the subject is usually approached in a decidedly a-social and a-historical manner. Researchers tend to concern themselves primarily with questions of what *should* happen, and what *could* happen once individual learners engage with digital technologies. Within the educational literature the predominance of these concerns has led to a rather uniform view of technology use led by enthusiasm for social-constructivist and socio-cultural theories of learning. As such, it could be

*Neil Selwyn, London Knowledge Lab, 23–29 Emerald Street, London WC1N 3QS, UK. Email: n.selwyn@ioe.ac.uk

argued that there is a tendency for educational technology writers and researchers to focus mainly on the potential of technology use to 'enhance' learning and cognitive development, with little or no concern for the 'wider' aspects of education and society (Selwyn, 2012).

Indeed, one of the most disappointing aspects of academic work in this area—especially from within the field of 'educational technology' studies—is a general failure to think carefully about the social nature of digital technology. This is not an altogether surprising shortfall as thinking critically about technology and society is, in many ways, a disconcerting thing to do—especially with regards to recent generations of supposedly 'digital native' children and young people. One of the most uncomfortable intellectual leaps for academics to make is that of disconnecting any analysis of young people, education and digital technologies from their own personal experiences of digital technology. As privileged, technologically competent researchers, the working lives of nearly all academics are imbued with digital technology. As individuals who are rich in economic, cultural and social capitals, the personal lives of academics (and the lives of their children and grand-children) are similarly entwined around digital activities and practices. Whilst usually fiercely critical in most other areas of their work (and indeed their daily lives) it seems particularly difficult for academics to distance themselves from their positions of technological privilege and 'make the familiar strange'. In particular it often appears a challenge for those academics working in the area of educational technology to think critically about something upon which they are dependent and something by which many of them have become passionately absorbed.

Against this background there is a clear need for any academic analysis of young people, education and digital technology to take a theoretically sophisticated and considered approach towards thinking about the technological and the social. As is implied in other papers in this special issue, the careful use of theory is an essential component of understanding education and technology. In particular, this paper will now go on to argue that the careful use of *social* theory is an essential component of developing rich understandings of the structures, actions, processes and relations that constitute uses of digital technology in educational settings and contexts. If nothing else, social theory should be seen as a pre-requisite to 'building better questions that can reveal aspects of the world that have hitherto been neglected or unimagined' (Amin & Thrift, 2005, p. 222). Thus it would seem worthwhile to reflect upon the full range of theoretical options applicable to an analysis of young people and education in the 'digital age'. Of course, choosing a theoretical perspective or stance is largely a matter of personal conviction and belief—there is no one 'correct' reading of technology and society. Yet it would seem reasonable to contend that anyone seeking to make sense of young people, education and digital technologies should consider taking as broad an approach as possible to thinking about technology and society. There would seem to be little sense in dismissing alternative perspectives out of hand simply because they do not chime with one's own experiences, opinions or intellectual standpoints. Thus while acknowledging the value of other approaches highlighted in this special issue, the present paper now goes on to outline the various benefits that

can be gained from sociological approaches which focus on the socially constructed nature of digital technologies and education.

The need to escape technological determinism

Looking back over the past three decades of academic work on young people, education and technology, it could be argued that the social nature of technology itself has been decidedly under-theorised—in contrast to the sophisticated theories of development and learning that have been utilised during the same time. Throughout the 1980s and 1990s the majority of academic writing was content to imbue educational technologies such as the television and computer with a range of inherent qualities. These qualities were then seen to 'impact' (for better or worse) on young users in ways which were consistent regardless of circumstance or context. The crude but compelling 'technologically determinist' perspective that 'social progress is driven by technological innovation, which in turn follows an "inevitable" course' (Smith, 1994, p. 38) has a long lineage in academic research—not least in terms of widely held assumptions about 'media effects'. For example, a determinist way of thinking underpins the wealth of claims that video games *cause* violent behaviour, or that online tuition *enhances* learning.

Of course, these 'strong' technologically-determinist explanations are appealing in as much as they offer straightforward accounts of an otherwise complex socio-technological age. Yet as soon as one considers the uneven and messy manifestations of such change in practice the inadequacies of these 'cause and effect' idealisations are obvious. First and foremost such thinking is misleadingly reductive in its analysis—obscuring or even ignoring altogether the complexities of social action and change. If the relationship between education and technology is only seen in terms of 'impact' and 'cause and effect', then the main task of anyone studying educational technology is simply to identify the impediments and deficiencies that are delaying and opposing the march of technological progress. This view is implicit, for example, in the increasingly popular proposals to dispense with the educational institutions or classroom teachers that appear to be impeding the benefits of technology in education. 'Strong' technological determinism of this type leaves little room for manoeuvre, deviation or any other form of social agency in the implementation and use of technology. At best teachers, learners and everyone else involved in education are placed in a position of having to respond to technological change by making the 'best use' of the technologies that they are presented with. Perhaps most importantly, taking this perspective serves to obscure the many non-technological factors at play in the educational use of technology—thereby introducing a number of silences into any discussion of education and technology. Issues such as gender, race, social class, identity, power, inequality and so on are all sidelined in favour of the technological. As John Potts (2008, n.p.) details, a strong determinist way of thinking lacks a 'dose of social perspective' on how technologies are used in society—ignoring factors such as 'social need, economic interest, political control, specific decision-making, the design of content: in a word, intention'.

With all these limitations in mind, it is perhaps not surprising that there has long been considerable unease within the social sciences over the descriptive limitations of such strong determinist analyses. The case against the orthodoxy of technological determinism was perhaps most succinctly put by Raymond Williams (1974). Building upon the earlier work of theorists such as Thorstein Veblen, Williams made a compelling case for understanding technological innovation as taking place within specific social and economic contexts, instead of new technologies somehow having inevitable internal logics of development. Following this line of argument there can be no pre-determined outcome to the development and implementation of technologies. Instead technologies are subjected continually to a series of complex interactions and negotiations with the social, economic, political and cultural contexts into which they emerge. Indeed, following Williams' lead, overt notions of strong technological determinism are now dismissed routinely by many social scientists who take great care to approach questions of technology in more nuanced ways that transcend simple 'cause and effect' agendas. Growing numbers of social science researchers are keen to insert disavowals of strong technological determinism into the opening paragraphs of everything that they write. Particular care is taken to avoid any potentially offensive use of the 'C'(ause) word. Instead softer phrasings are employed which portray the 'influence' and 'bearing' of technology but certainly not any notion of impact or effect.

Yet such semantic adjustments belie the fact that thinking about technology, young people and education without recourse to *some* form of technological determinism is a difficult task. This is due, in part, to the commonsense ways that 'technology' is talked about in the real (as opposed to the academic) world. Although it is rare to find anyone proclaiming herself to be technologically determinist, the view persists in many contemporary popular accounts of digital technologies. Indeed, most popular conceptions of technology are rooted in a degree of technological determinism. Current political understandings of the internet's profound effects on the 'shrinking' of the world and undermining of national boundaries are classic examples of technological determinism. Commercial marketing is continually selling us the notion of '*vorsprung durch technik*', whilst news media warn us of myriad technology-related dangers such as how text-messaging is stymieing the vocabulary of young people. Such interpretations can appear as 'natural' common sense and certainly appeal to those whose job it is to make sense of the apparently fast-changing nature of the 'digital age'. The belief that 'technology determines history' (Williams, 1994, p. 218) is difficult to shake.

Aside from the content of news reports and advertising slogans, it can be argued that the endurance of technological determinism in popular discourse has had a subtle bearing on academic conceptualisations of technology. Whereas most social scientists are able to resist a 'strong' or 'hard' determinist view of technology developing in complete isolation from social concerns, what can be termed a more passive form of 'soft' or 'diluted' determinist view persists throughout the literature on young people, education and digital technology. This soft determinist view sees technology impacting on social situations in ways which are, to a degree, malleable and controllable. Rather than the internet improving learning, it can be said that the internet *helps* improve learning—acknowledging the possible existence of other contextual

influences, while retaining the underlying notion of a technological effect. Akin to the notion of the 'diffusion' of technological innovations (e.g. Rogers, 1983), this way of thinking usually reaches conclusions that recommend the overcoming of any constraining or negative contextual influences (usually reduced to the pejorative status of 'barriers') so that the underlying 'inherent' effects of digital technology may be more fully felt.

As well as rationalising any lack of change in terms of structural barriers and individual deficiencies, the promises of potential educational improvement through technology also coalesce into powerful and persuasive grounds for educational change with technology. The logic of this perceived imperative for change is often presented by commentators around the world in simple but stark terms. First it is argued that digital technologies have initiated a series of learning practices amongst current generations of young people that cannot now be ignored or abandoned. Secondly, it follows that education systems are therefore left facing the challenge of how best to include digital technologies and practices within their provision of learning and teaching. This fatalistic sense of social institutions having to react to technological change is perhaps best summed up by Clay Shirky's (2008, p. 307) observation that:

> our control over [digital] tools is much more like steering a kayak. We are being pushed rapidly down a route largely determined by the technological environment. We have a small degree of control over the spread of these tools, but that control does not extend to being able to reverse, or even radically alter, the direction we're moving in.

While these forms of soft determinist thinking about education and technology may appear to escape the critique of strong determinism, they remain susceptible to all of the problems associated with overtly reductionist thinking. By ascribing any degree of agency to technological artefacts rather than the non-technological processes which shape their development and implementation, such soft determinism can be criticised as under-playing (or even ignoring) the crucial 'contingencies, particularities, oppositions, dis-junctures and variabilities' (Martin, 1996) which underlie technological change. Far from offering a 'comforting' and convenient 'way forward' (Cockfield, 2010), soft determinist accounts therefore retain an unwarranted faith in the essential properties of a technology regardless of context or circumstance—thereby vastly over-simplifying the complex nonlinear social, political, economic, cultural and historical processes of technology development and use. Put bluntly, then, any critique of the social and political aspects of young people, education and digital technology requires a more sophisticated understanding of the social and the technological that can be offered by a 'soft' technologically determinist approach. There is a pressing need in any account of education, young people and technology to acknowledge, as David Nye puts it, that 'devices and machines are not things "out there" that invade life' (Nye, 2007, p. ix).

From anti-essentialism to anti-determinism

Perhaps the most comprehensive corrective to soft technological determinism is the view that technology has absolutely *no* inherent qualities. In this sense technology can

be seen as open completely to interpretation and capable of determining nothing. This 'anti-essentialist' approach was advanced throughout the 1990s within the science and technology studies (STS) literature, offering the perspective that technologies lack any properties beyond the interpretive work that humans engage in to establish what these artefacts 'actually are' (see Grint & Woolgar, 1992, 1997; Woolgar & Cooper, 1999). From this perspective, what we encounter as 'technology' can be understood as simply the outcome of interpretive accounts—some more persuasive and influential than others.

To illustrate this argument, Grint and Woolgar (1997) proposed the notion of 'technology as text'. Here it was posited that technologies can be seen as open texts which are 'written' (configured) in certain ways by those social groups involved in stages of development, production and marketing. After some time, technologies are then 'read' (interpreted) by other social groups such as consumers and users with recursive 'feedback loops' between the different stages. Although technologies can have preferred readings built into them by dominant interests, these writing and reading processes are seen to be open and negotiable processes. The metaphor of treating 'technology as text' elegantly draws attention to the often unseen work by designers, financiers, marketers and others in both crafting the materiality *and* interpretations of devices. It also provides acknowledgment of the opportunities that exist for alternative appropriations and uses of technology. In short, seeing technology as text highlights the interpretive flexibility of the rhetorical *and* material nature of technologies and, crucially, reminds us that technologies are never completely closed, however established or advanced their development and use may be. Indeed, Grint and Woolgar playfully proposed an 'onion model' of technology, where technologies are seen to consist solely of layers of social and cultural factors without any 'hard' technical core at all. In this sense it is only the increasing difficulty of removing successive layers of interpretation which 'sustains the illusion that there is anything at the centre' (Grint & Woolgar, 1997, p. 155).

Anti-essentialism is a logical response to what Grint and Woolgar see as the 'residual technicism' of all other theoretical takes on technology. In this sense, the value of the anti-essentialist stance is highlighted in Ruth Finnegan's defence in the 1970s of technological determinism, i.e. that …

> it is both illuminating and stimulating to have the counter-view stated forcibly. The strong case is perhaps stated over-extremely—but its very extremeness helps to jolt us out of our complacency and draw our attention to a range of facts and possible causal connections previously neglected. As a suggestive model of looking at social development it may well have value, despite its factual inadequacies. (Finnegan, 1975, pp. 107–108, cited in Chandler, 1995)

Anti-essentialism therefore serves to remind us of the difficultly of maintaining a soft technological determinist view of technology in the face of its apparent malleability and interpretability. Yet we should remain mindful of the danger of setting technological determinism as a 'conceptual straw-man' (Winner, 1993) and then finding oneself forced into a viewpoint where nothing can be said to be influenced by anything else. Indeed, as Raymond Williams (1981, p. 102) warned, anyone simply

determined not to be deterministic faces 'a kind of madness'. To ascribe complete interpretability to any technology can be seen as an equally constraining and reductionist form of 'social determinism' where only social factors are granted any importance (see Potts, 2008). Of course, all but the most committed anti-essentialist would concede that not every technology is *completely* open to *any* reading by *any* person at *any* time. As critics of the technology-as-text metaphor have reasoned, if so one could just as successfully interpret a fruit machine to be a means of transatlantic communication as a telephone (Hutchby, 2001), or interpret a rose as a means of shattering skin and bone just as much as a gun (Kling, 1992). Anyone attempting to develop a more socially-sophisticated take on the technological is therefore faced with deciding how best 'to introduce elements of the social into explanations of the technical rather than granting the social an all-important standing' (Rappert, 2003, p. 568).

At best then, anti-essentialism is most useful in pointing us towards a mutual shaping approach where technology both is shaped and shaping in a number of enabling and constraining ways. The anti-essentialist position therefore reminds us to pay heed to wider theoretical debates, not least those between realism and constructivism. It also serves to illustrate the need to reconcile long-standing issues in social theory about structure and actor agency. Above all, as perhaps the most extreme anti-determinist position that one could adopt, the anti-essentialist position can guide us towards a range of theoretical 'middle ways' (Hutchby, 2001) which seek, as Wiebe Bijker *et al.* (1987) put it, to 'open up the black box of technology'.

An overview of anti-determinist approaches to understanding technology

Moving away from the extreme position of anti-essentialism there are a number of anti-determinist approaches to the technological which are worthy of consideration. These approaches are often grouped under the umbrella term proposed by MacKenzie and Wajcman (1985) of the social shaping of technology (SST). In essence the SST tradition is concerned with exploring the material consequences of different technical choices. Most proponents of SST would concur that the development of technology is best seen, to appropriate a phrase from Jorge Luis Borges, as a 'garden of forking paths' where different routes are negotiable and all lead potentially to different technological outcomes (Williams & Edge, 1996). SST studies tend to consider the organisational, political, economic and cultural factors which pattern the design *and* implementation of a technology. Crucially, SST researchers are interested in the relative bearing of different social groups on the technological pathways which are taken, and how these influences relate to the social consequences of technology use *in situ*.

Perhaps most well-known of these approaches is the social construction of technology (SCOT). SCOT studies start from the premise that the form and meaning of a technology is shaped socially rather than being a clearly defined product of a particular innovator. SCOT researchers seek to demonstrate the 'design flexibility' and 'interpretative flexibility' of a given technology, recognising that a technological artefact has different meanings and interpretations for various 'relevant social groups' (Pinch &

Bijker, 1984; Bijker & Law, 1992). These relevant groups are not only the stated designers and producers of the technology, but competing producers, journalists, politicians, users, non-users and other interest groups. Crucially, these groups will often have diverging interpretations of the technology in question. Against this background a SCOT analysis will first seek to reconstruct the alternative interpretations of the technology, analyse the problems these interpretations give rise to, identify the conflicts that arise from any differences in interpretation, and then connect them to the design features of the technological artefacts. SCOT analyses then attempt to identify the point where socio-technological systems can be said to have reached a state of 'closure' where the ability for alternative interpretations of a technology diminishes. Echoing the premise of Grint and Woolgar's onion model, SCOT studies often highlight the notion of 'obduracy'—i.e. the fact that some devices and systems are harder to alter than others based on their materiality.

Relating the content of the technological artefact to the wider socio-political milieu is a further but less often reached stage of the SCOT methodology. That said, many writers ostensibly working outside the SCOT tradition have provided illuminating accounts of the political economy of technology. The political economic approach tends to focus on the interpretations of technologies at the level of politics, policymaking and the economic and commercial activities of firms and governments. It examines how political institutions, political environments and the economic system intersect and influence each other at the point of technology. It thereby allows examination of how persons and groups with common economic and/or political intentions appropriate technology development to engineer changes which are beneficial to their interest(s). Here researchers are interested principally in the ways that technologies are appropriated and re-appropriated by political and economic interest groups in ways that diverge from the intentions and claims of designers (see Pfaffenberger, 1992). Prominent examples of the political economy approach to technology include Edwards' (1996) work on the relations between the political discourse of the Cold War and the attendant computer designs of the era, as well as Herb Schiller's (1995) work on the role of the military/scientific/transnational corporation nexus in the development of various new technologies such as the internet.

Another prominent example of the social shaping approach is that of the 'domestication' of digital technologies, which seeks to document what Ruth Schwartz Cowan (1987) terms 'the consumption junction' in relation to the development of technology. A host of sociology, media and communications researchers over the last two decades have explored the ways in which digital technologies are appropriated and incorporated into social settings such as households and workplaces (see Berker *et al.*, 2006). In terms of work on the incorporation of digital technologies in households, for example, these studies have detailed how technologies are appropriated into the domestic sphere through ongoing processes of gaining possession and negotiating 'ownership', 'objectification' within the spatial and aesthetic environment of the home and 'incorporation' into the routines of daily life (Silverstone *et al.*, 1992; Silverstone & Hirsch, 1992). In contrast to some SST studies which focus on the development and design processes, the domestication approach offers a focus on how digital technologies are

interwoven with domestic life (Silverstone, 1993). This approach has allowed researchers to examine 'how objects move from anonymous and alien commodities to become powerfully integrated into the lives of their users' (Lally, 2002, p. 1) as well as asking questions of how people 'make sense of, give meaning to, and accomplish functions through technical objects' (Caron & Caronia, 2001, p. 39).

The domestication approach aside, it can be argued that many SST studies perhaps underestimate the nature of user interaction with, or via, certain technological devices. Indeed, within the anti-determinist school-of-thought a growing number of researchers have asserted the need to recognise the enabling as well as constraining importance of materiality. In particular, growing interest has been shown in the sociological requisitioning of the evolutionary psychological notion of 'affordances' as a means of reconciling the opposing poles of pure realism and pure constructivism at the heart of the (anti)determinism debate. Setting a position apart from the 'technology as text' metaphor, it has been argued that acknowledgment should be given to affordances which constrain the ways in which technologies can be written and read, and thereby frame the possibilities that they offer for action (e.g. Norman, 1999). As Ian Hutchby (2001, p. 44) reasons, 'affordances are functional and relational aspects which frame, while not determining, the possibilities for agentic action in relation to an object'.

It should be noted that this sociological use of the notion of affordances moves away from the soft deterministic use of the term by socio-constructivist psychologists and learning scientists where tools and/or environments have concrete technological 'affordances' located within them for certain performances (e.g. Anderson, 2008). This popular use of the concept within the educational technology literature ignores the self-referential and subjective nature of these opportunities. Instead, in the anti-determinist sense affordances are *perceived possibilities* for action, referring to what people perceive and signify during their actual interaction with a technological artefact (Vyas *et al.*, 2006). Used in this way the notion of affordances allows a consideration of the obvious material enablements and constraints of technologies, without recourse to an essentialist analysis. In particular, it is argued that using the notion of affordances in this way allows social researchers to move beyond the known 'big issues' of representation, interpretation and negotiation which typify SST studies. Instead it allows closer examination of those actions and interactions between humans and technologies which are more mundane, occasional and local. As Hutchby (2003, p. 582) concludes, using the notion of affordances refocuses the sociological gaze towards 'the empirical question of embodied human practices in real time situated interaction involving technologies'.

Another theoretical tradition that can be located within the SST approach is the family of feminist approaches to addressing technology and society. Here writers have sought to highlight the ideologies imbued in technologies and thereby identify the potential for the development of various new technologies to allow women to control and (re)construct their bodies, identities and political positions. Such feminist theories focus in particular on the apparent marginalisation of women from high status technological development and use. For many feminists, digital technology is just another aspect of the social world that is organised fundamentally along lines of

gender and dominated by male participants. In particular it has long been argued that gender 'profoundly affect[s] the design, development, diffusion and use of technologies' (Wajcman, 2004, p. vi), although some authors take care to point towards the mutual shaping of digital technology and gender (van Zoonen, 2002). Against this male-dominated background a range of feminist responses to information technologies have been advanced since the 1970s. A 'liberal feminist' perspective, for example, argues that digital technology is an opportunity for women to 'catch up' with men. Liberal feminists therefore see a need to encourage women to use digital technology above and beyond the levels at which men are using them. Conversely, an 'eco-feminist' perspective argues that digital technology is yet another male attempt to control women and nature via technology. This school of feminism focuses on 'rejecting' digital technology as a masculine oppressive technology and seeks to develop new and alternative technologies.

However, over the 1990s and 2000s growing numbers of feminist thinkers sought to build upon both of these established viewpoints—contending that the 'beat them at their own game' stance of the liberal feminists restricts women and technology to conforming to male modes of technology use, whereas the eco-feminist argument is limited practically in its out-right rejection of new technologies. A loose collective of 'cyber-feminist' thinkers has therefore developed the view that instead of being something to either acquiesce to or reject, digital technology is something that women can challenge, change and ultimately control for themselves (see Rosser, 2005). In particular, cyberfeminists are interested in the potential for using digital technologies to allow women to control and (re)construct their identities, bodies and political positions. Cyberfeminism, then, can be seen as a provocative reconceptualisation of gender and technology—portraying new technologies as something that sub-ordinate groups can utilise, politicise, reclaim and use for potentially empowering ends.

Aside from these examples, a number of other theoretical approaches can be located within the SST family of social theories of technology and society. There has been a burgeoning interest in critical realist perspectives on technology (e.g. Smith, 2006; Mutch, 2010). This follows on from the development throughout the 1990s of the applicability of actor network theory (ANT) to technology use (Latour, 1987; Latour, 2005; Law, 1987), where researchers pursued a material-semiotic approach to the role of technologies within social systems. Most provocatively ANT ascribes equal agency to human and non-human actors in their interactions with and (re)inscriptions of technologies. This approach is distinctly different to the social shaping analyses outlined previously. As the cursory nature of these latter synopses suggest, there is neither the physical nor the intellectual space here to present a full exposition of all these important theoretical standpoints. At best this paper can only hope to act as a signpost for the theoretical opportunities on offer.

Conclusions

Constraints of space notwithstanding, this paper's brief consideration of the many available theoretical perspectives has advanced the case for taking both the

technological *and* the social seriously. In seeking to make sense of the many issues surrounding young people, education and digital technology, there is little value in lapsing into a determinist mindset either where digital technologies are shaped exclusively by stakeholders and end-users *or* are seen as autonomous shaping forces in their own right. On the basis of the discussion so far, it should be clear that any sensible analysis of young people, education and digital technology should strive to 'analyse the exchanges between everyday practices and the encompassing cultural and societal structures ... not los[ing] track of the bigger picture while allowing deep explorations into micro-practices of everyday life' (Berker *et al.*, 2006). Yet whilst maintaining a theoretical awareness it is worth remaining mindful of Manuel Castells' advice to 'wear one's theoretical clothes lightly' when approaching technology and society rather than displaying a dogmatic persistence to one viewpoint or approach. Indeed, Castells (2000) talks of 'disposable theory'—recognising theory as an essential tool but also acknowledging it is something to be discarded when it outlives its usefulness in illuminating the substantive world. In these terms, any analyses of young people, education and digital technology are perhaps best arranged around an assemblage of theoretical perspectives as, and when, they best fit. As Amin and Thrift (2005, p. 222) reason:

> Theory has taken on a different style which has a lighter touch than of old. For a start, few now believe that one theory can cover the world (or save the world, for that matter). No particular theoretical approach, even in combination with others, can be used to gain a total grip on what's going on. Theory-making is a hybrid assemblage of testable propositions and probable explanations derived from sensings of the world, the world's persistent ways of talking back, and the effort of abstraction.

While this paper has displayed an overt preference for theories of social shaping, it is important to remain mindful of the earlier qualification that there is no one 'correct' theoretical stance to adopt when looking at young people, education and digital technology. Indeed, the theories presented above are in no way consistent in their portrayal of technology and society, and each is best suited to different forms and levels of questioning the technological. For example, all these approaches differ in their characterisation of the malleability of technology and the significance attached to the relative importance of large-scale social and economic structures as opposed to the activities of individuals and groups. Although it is certainly not this paper's intention to cultivate theoretical divisions within what is a relatively harmonious area of academic study, it would seem worthwhile for researchers to at least consider the general issues raised by the anti-determinist take on technology, young people and education. In particular, it would seem worthwhile for researchers to give some thought as to how best to account for the increasingly complex social settings within which technologies are produced and implemented.

Of course, proponents of SST cannot claim theoretical superiority over other approaches to young people, education and digital technology. Most of the theories outlined above have been contested since their inception and all can be accused of displaying reductionist tendencies in their scope. For instance, the argument has often been made that SCOT accounts of the negotiated nature of new technologies

tend to over-concentrate on the processes through which technologies arise but ignore the processes through which the technology is used and shaped in situ. Indeed, as Winner (1993) and others have pointed out, such studies often over-privilege the processes of design and development whilst underplaying the (re)interpretations of users. Similarly, political economists can be accused of over-conflating the influence of policymakers and trans-national corporations, whilst overlooking the roles that local political interests play in the interpreting of technology. Perhaps most criticised of all these approaches has been actor network theory—not least in terms of its over-descriptiveness and dogged attribution of equality between all actants.

Yet as a whole, the collection of theoretical approaches presented in this paper illustrates the importance of recognising the social and interactional circumstances in which digital technologies exist and through which they attain their meaning(s). In particular, it would seem appropriate that the socially-shaped nature of the technological is now brought to the fore of academic analyses as a much-needed corrective to the ever-declining quality of contemporary public and political debate over young people, education and digital technology. Indeed, the current dominant discourses surrounding young people and 'the digital' are being steered mainly by policymakers, industry, content producers and other information society stakeholders who have little interest in the social nuances of technology and who are content to crudely frame the technological in terms of perceived impacts, causes and effects. Yet only by exploring and exposing the social roots of technology can we hope to make the technological amenable to democratic interpretation and intervention (Bijker, 1995). With this in mind, an over-riding challenge for academics working within the area of education is to seek ways of reconciling the everyday hard technological determinism of the real world with the softening theoretical conceits outlined in this paper.

There are, of course, already examples from the educational literature of what this sociological refocusing on educational technology scholarship could take. To date perhaps most interest has been paid to the contribution of actor-network theory to making sense of education and technology—especially the notion of 'giving artefacts a voice' in post-compulsory educational settings (e.g. Bigum, 2001; Waltz, 2004; Fox, 2005). That said, it is possible to identify authors and researchers who have brought other sociological perspectives to bear on young people, education and technology. For example, a small number of studies have provided rich and detailed insights into the complex social shaping of educational technologies such as the Logo programming system, university 'virtual learning environments' and online learning communities (e.g. Dutton *et al.*, 2004; Goodfellow, 2005; Agalianos *et al.*, 2006). Feminist accounts of education and technology continue to be produced—especially with regards to the gendering of technology-based education and female students' participation in digitally related learning (e.g. Henwood, 2000; Clegg, 2001; Reid, 2009). Additionally a small number of insightful studies have focused on the domestication of educational technologies in online and offline settings (e.g. Habib, 2005; Vuojarvi *et al.*, 2010). Finally, occasional analyses of the political economy of education and technology can be found in the

writing of authors such as David Noble (2002) and Torin Monahan (2005), as well as specific studies such as Greener and Perriton's (2005) analysis of the UK government's *UK-eU* online university project.

The strength of all these sociologically-led studies lies in their ability to allow a number of 'big questions' to be asked about technology and education that are otherwise absent from the research agenda for education and technology. These questions include how individual learning technologies fit into wider socio-technical systems and networks, as well as what connections exist between educational technology and macro-level concerns of globalisation, the knowledge economy and late modernity. These approaches also offer a direct 'way in' to unpacking the micro-level social processes that underpin the use of digital technologies in educational settings. From both these perspectives, the principal advantage of the more socially-nuanced theoretical approaches should be seen as the ability to develop a more socially grounded understanding of the 'messy' realities of educational technology 'as it happens'. In approaching education and technology as a site of intense social conflict, these approaches therefore allow researchers and writers to move beyond asking whether or not a particular technology 'works' in a technical or pedagogic sense. Instead, these approaches allow researchers and writers to address questions of how digital technologies (re)produce social relations and whose interests they serve.

Yet while insightful and well-intentioned, the few disparate examples of existing studies outlined above could hardly be said to enjoy a high profile with the academic literature on educational technology. At best sociological perspectives on education and technology tend to remain the preserve of a few individual researchers and writers, rather than constituting a coherent, collective field of academic endeavour. The time has perhaps come for these approaches to be more decisively advanced on a collective basis within the mainstream literature on young people, education and technology. Academic studies of educational technology would certainly benefit from more people engaging with these theoretical approaches. As such, sociological perspectives on educational technology need to be drawn upon by more researchers and more writers in the field. These perspectives need to be taught to students of educational technology as a matter of course. Above all, everyone involved in the academic study of young people, education and technology needs to explore ways of putting these theories into action, and develop socially nuanced analyses that concentrate on the social as well as the technical issues underpinning the application of technology in educational settings. As the 2010s progress and the use of technology in education becomes ever more entwined with the wider social, economic, political and cultural aspects of society, the need for an advancement of a 'sociology of educational technology' has perhaps never been greater.

Acknowledgements

Notes on contributor

Neil Selwyn is senior lecturer at the Institute of Education, University of London where his research and teaching focus on the sociology of technology use in educational settings. Recent books include *Schools and schooling in the digital age* (Routledge, 2011) and *Education and technology* (Continuum, 2011).

References

Agalianos, A., Whitty, G. & Noss, R. (2006) The social shaping of Logo, *Social Studies of Science*, 36(2), 241–267.
Amin, A. & Thrift, N. (2005) What's left? Just the future, *Antipode*, 37, 220–238.
Anderson, T. (2008) *The theory and practice of online learning* (2nd edn.) (Athabasca, AU Press).
Berker, T., Hartmann, M., Punie, Y. & Ward, K. (eds) (2006) *Domestication of media and technology* (Milton Keynes, Open University Press).
Bigum, C. (2001) Actor-network theory and online university teaching: translation versus diffusion, in: B. Knight & L. Rowan (eds) *Researching futures oriented pedagogy* (Queensland, Post Pressed).
Bijker, W. (1995) *Of bicycles, Bakelites and bulbs* (Cambridge MA, MIT Press).
Bijker, W. & Law, J. (1992) *Shaping technology/building society: studies in sociotechnical change* (Cambridge MA, MIT Press).
Bijker, W., Hughes, T. & Pinch, T. (eds) (1987) *The social construction of technological systems: new directions in the sociology and history of technology* (Cambridge MA, MIT Press).
Bolter, J. & Grusin, R. (1999) *Remediation: understanding new media* (Cambridge MA, MIT Press).
Caron, A. & Caronia, L. (2001) Active users and active objects: the mutual construction of families and communication technologies, *Convergence*, 7(3), 38–61.
Castells, M. (2000) Materials for an exploratory theory of the network society, *British Journal of Sociology*, 51(1), 5–24.
Chandler, D. (1995) *Technological (or media) determinism*. Available online at: www.aber.ac.uk/media/Documents/tecdet/tecdet.html.
Clegg, S. (2001) Theorising the machine: gender, education and computing, *Gender and Education*, 13(3), 307–324.
Cockfield, A. (2010) Individual autonomy, law, and technology: should soft determinism guide legal analysis? *Bulletin of Science Technology & Society*, 30(1), 4–8.
Dutton, W., Cheong, P. & Park, N. (2004) The social shaping of a virtual learning environment: the case of a university-wide course management system, *Electronic Journal of e-Learning*, 2(1), 69–80.
Edwards, P. (1996) *The closed world: computers and the politics of discourse in cold war America* (Cambridge MA, MIT Press).
Fairclough, N., Jessop, R. & Sayer, A. (2002) Critical realism and semiosis, *Journal of Critical Realism*, 5(1), 2–10.
Finnegan, R (1975) *Communication and technology* (Milton Keynes, Open University Press).
Fox, S. (2005) An actor-network critique of community in higher education, *Studies in Higher Education*, 30(1), 95–110.
Goodfellow, R. (2005) Virtuality and the shaping of educational communities, *Education, Communication & Information*, 5(2), 113–129.
Greener, I. & Perriton, L. (2005) The political economy of networked learning communities in higher education, *Studies in Higher Education*, 30(1), 67–79.
Grint, K. & Woolgar, S. (1992) Computers, guns, and roses: what's social about being shot? *Science Technology & Human Values*, 17, 366–380.
Grint, K. & Woolgar, S. (1997) *The machine at work* (Cambridge, Polity).

Habib, L. (2005) Domestication of learning environments in an institution of higher education. Paper presented at the *33rd Congress of the Nordic Educational Research Association,* Oslo, 10–12 March.

Henwood, F. (2000) From the woman question in technology to the technology question in feminism: rethinking gender equality in IT education, *European Journal of Women's Studies,* 7(2), 209–227.

Hutchby, I. (2001) Technologies, texts, and affordances, *Sociology,* 35(2), 441–456.

Hutchby, I. (2003) Affordances and the analysis of technologically mediated interaction: a response to Brian Rappert, *Sociology,* 37(8), 581–589.

Kling, R. (1992) When gunfire shatters bone: reducing sociotechnical systems to social relationships, *Science Technology & Human Values,* 17, 381–385.

Lally, E. (2002) *At home with computers* (Oxford, Berg).

Latour, B. (1987) *Science in action: how to follow scientists and engineers through society* (Milton Keynes, Open University Press).

Latour, B. (2005) *Reassembling the social: an introduction to Actor-Network-Theory* (Oxford, Oxford University Press).

Law, J. (1987) Technology and heterogeneous engineering: the case of Portuguese expansion, in: W. Bijker, T. Hughes & T. Pinch (eds) *The social construction of technological systems: new directions in the sociology and history of technology* (Cambridge MA, MIT Press).

MacKenzie, D. & Wajcman, J. (eds) (1985) *The social shaping of technology: how the refrigerator got its hum* (Milton Keynes, Open University Press).

Martin, B. (1996) Technological determinism revisited, *Metascience,* 9, 158–160.

Mingers, J. (2004) Realising information systems: critical realism as an underpinning philosophy for information systems, *Information and Organization,* 14(2), 87–103.

Monahan, T. (2005) *Globalization, technological change, and public education* (London, Routledge).

Mutch, A. (2010) Technology, organization, and structure—a morphogenetic approach, *Organisation Science,* 21(2), 507–520.

Noble, D. (2002) *Digital diploma mills* (New York, New York University Press).

Norman, D. (1999) Affordances, conventions and design, *Interactions* 6(3), 38–43.

Nye, D. (2007) *Technology matters: questions to live with* (Cambridge MA, MIT Press).

Pfaffenberger, B. (1992) Technological dramas, *Science, Technology & Human Values,* 17(3), 282–312.

Pinch, T. & Bijker, W. (1984) The social construction of facts and artefacts: or how the sociology of science and the sociology of technology might benefit each other, *Social Studies of Science* 14, 399–441.

Potts, J. (2008) Who's afraid of technological determinism? Another look at medium theory, *Fibreculture.* Available online at: http://journal.fibreculture.org/issue12/issue12_potts.html.

Rappert, B. (2003) Technologies, texts and possibilities: a reply to Hutchby, *Sociology,* 37(8), 565–580.

Reid, C. (2009) Technology-loving Luddites? Declining participation in high school computing studies in Australia, *British Journal of Sociology of Education,* 30(3), 289–302.

Rogers, E. (1983) *Diffusion of innovations* (New York, Free Press).

Rosser, S. (2005) Through the lenses of feminist theory: focus on women and information technology, *Frontiers: a Journal of Women Studies,* 26(1), 1–23.

Schiller, H. (1995) *Information inequality: the deepening social crisis in America* (New York, Routledge).

Schwartz Cowan, R. (1987) The consumption junction, in: W. Bijker, T. Hughes & T. Pinch (eds) *The social construction of technological systems: new directions in the sociology and history of technology* (Cambridge MA, MIT Press).

Selwyn, N. (2012) Rethinking education in the digital age, in: N. Prior & K. Orton-Johnson (eds) *Rethinking sociology in the digital age* (Basingstoke, Palgrave Macmillan).

Shirky, C. (2008) *Here comes everybody: the power of organizing without organizations* (London, Allen Lane).

Silverstone, R. (1993) Time, information and communication technologies and the household, *Time and Society*, 2(3), 283–311.

Silverstone, R. & Hirsch, E. (1992) *Consuming technologies: media and information in domestic spaces* (Routledge, London).

Silverstone, R., Hirsch, E. & Morley, D. (1992) Information and communication technologies and the moral economy of the household, in: R. Silverstone & E. Hirsch (eds) *Consuming technologies: media and information in domestic spaces* (Routledge, London).

Smith, M. L. (2006) Overcoming theory-practice inconsistencies: critical realism and information systems research, *Information and Organization*, 16(3), 191–211.

Smith, M. R. (1994) Recourse of empire, in: M. Smith & L. Marx (eds) *Does technology drive history? The dilemma of technological determinism* (Cambridge MA, MIT Press).

Van Zoonen, L. (2002) Gendering the Internet: claims, controversies and cultures, *European Journal of Communication*, 17(1), 5–23.

Vuojarvi, H., Isomaki, H. & Hynes, D. (2010) Domestication of a laptop on a wireless university campus: a case study, *Australasian Journal of Educational Technology*, 26(2), 250–267.

Vyas, D., Chisalita, C. & van der Veer, G. (2006) Affordance in interaction, *Proceedings of ECCE-Thirteen 13th European Conference on Cognitive Ergonomics*, 20–22.

Wajcman, J. (2004) *Technofeminism* (Cambridge, Polity).

Wajcman, J. (2008) Life in the fast lane? Towards a sociology of technology and time, *The British Journal of Sociology* 59(1), 59–77.

Waltz, S. (2004) Giving artifacts a voice? Bringing into account technology in educational analysis, *Educational Theory*, 54(2), 157–172.

Williams, Raymond (1974) *Television: technology and cultural form* (London, Fontana).

Williams, Raymond (1981) *Keywords: a vocabulary of culture and society* (London, Fontana).

Williams, Robin & Edge, D. (1996) What is the social shaping of technology? *Research Policy*, 25, 856–899.

Williams, Rosalind (1994) The political and feminist dimensions of technological determinism, in: M. Smith & L. Marx (eds) *Does technology drive history? The dilemma of technological determinism* (Cambridge MA, MIT Press).

Winner, L. (1993) Upon opening the black box and finding it empty: social constructivism and the philosophy of technology, *Science Technology & Human Values*, 18(3), 362–378.

Woolgar, S. & Cooper, G. (1999) Do artefacts have ambivalence? Moses' bridges, Winner's bridges and other urban legends in S&TS, *Social Studies of Science*, 29(3), 433–449.