1 SHAPING SOCIETY, TECHNOLOGY AND LEARNING IDENTITY

Rewiring and remixing education

Since the 1980s the educational uses of new information and communication technologies and digital media have been expanding. Whether in the form of computers in the classroom, as 'educational technologies' designed for explicit pedagogic purposes, or in the form of everyday new media being aligned with educational intentions, practices and activities, new technologies and media have become, it seems, almost naturalized as a common-sense feature of educational life. Schools are now seemingly built around a complex apparatus of electronic screens and surfaces, technical infrastructure, computing hardware, software and code, all hardwired to electronic communication networks.

Yet this has been no simple process of importing technological devices into classrooms and wiring them up to informational and communication networks. It has signalled the emergence of new ways of thinking about education, and about the future of education in an era that seems bound to become incessantly more digitalized. As a consequence of this massive rewiring of education itself, the ways in which many aspects of learning, the curriculum and pedagogy are *thought,* understood and practised have been gradually amalgamated with emerging ways of conceiving, understanding and practising with new technologies and media. In the process, new ways of imagining the future of education, schools, learning, pedagogy and curriculum have been generated. The future of education itself has been made thinkable, intelligible, and amenable to intervention in terms translated from the domain of new technologies and media. The outcome is the emergence of a new style of thinking that remixes and amalgamates educational concepts and ideals with technological concepts and ideals, along with wider social connections to political imaginaries like the 'knowledge economy' and intellectual constructs such as the 'network society.' In the chapters that follow, we explore education and technology as *objects of thought*, understood and shaped by different types of questions, problems and forms of analysis. We are using the term 'thought' as a sociological concept, to refer to a systemic rationality, rather than a

psychological process in the head. And we suggest that education and technology are now being *re-thought*, re-imagined and reshaped according to a complex and heterogeneous mixture of social and material elements and conflicts and contests over their future.

As this book will show, education and technology are constituted by societal (economic, political and cultural) and technical components, and completed by the biological components of their embodied human users. That is,technology and education consist of a 'socio-technical' system. The term 'socio-technical' recognizes that technologies and society are mutually constitutive; technology influences social relations, while social relations influence the development and take-up of technologies. Technology and society are constantly interacting. Conceived as a socio-technical system, education and technology are therefore made up of interacting elements of educational practice and technical systems, as well as aspects of social policy, digital media culture, and economics, among other things. Education in the digital age is now becoming an increasingly hybrid domain comprising technological artefacts, physically embodied human action, social relations and institutions, and a range of new and emerging theories and practices of learning, curriculum and pedagogy all being assembled together. The future of education involves attempts to radically 'remix' these socio-technical elements, though the result, as we shall see, is to produce an inchoate, messy and sometimes incoherent vision of the future.

Such messy processes of socio-technical amalgamation have taken place over an extended historical duration often given the short-hand periodization of 'the digital age', , which has given rise to all sorts of breathless techno-utopian claims that we are now on the cusp of new breakthroughs in learning, curriculum and pedagogy for the digital age. Grand historical claims about a digital age – or any of its temporal equivalents, the 'information age', the 'knowledge age', and so forth – as an epochal break with the past need to be treated extremely cautiously. The effects of new technology and media on education, for example, are highly (and often rightly) contested. Yet it is clear that new technologies and media are now a significant element of our age, as shown by high-profile events including the Wikileaks scandal, and the use of social media in the Middle East conflicts, uprisings and revolutions. In everyday life, millions of people sign in to their social networks in order to

access social groups, and they take their social worlds and their preferred media with them in their pockets, contained in mobile, portable and pocketable devices. For some, work in the 'knowledge-based economy' is dominated by computing; wages are increasingly earned through informational labour. Moreover, our cities, towns and buildings are today extensively wired up to technical infrastructures and communication networks, their surfaces animated with pixellated informational displays and moving imagery. Less visibly or spectacularly, our finances and our personal data flow constantly as transactional traces through complex databases ... . We could go on, but the point is clear. Today, new technologies appear to be everywhere. They are both spectacular and also invisible, sometimes appearing as a major force on the world's stage, but much more often working behind the scenes of society, shaping it in subtle ways through mundane everyday things like office software, web searches, templates, text messaging, GPS, email, photo manipulation, and databases. For that reason new technologies do need to be taken seriously as a component (albeit amongst other social, intellectual and material components) now exerting influence over the future of education. The key question is how such changes, collected under the periodization the 'digital age,' are being interpreted, thought, and translated into visions and prescriptions for the future of education.

Learning, curriculum and pedagogy have, in this period, been subject to a series of attempted reconfigurations. Beyond the mundane importation of computers into classrooms, new models of learning with digital tools have been put forward, curriculum reforms and other experiments in developing a curriculum for the digital age have been tried out, and diverse pedagogical innovations have been put into practice. Some enthusiasts see such developments as the breakers of great waves of educational transformation. We are far more circumspect, cautious and critical, motivated by a desire to begin to understand, interpret and explain the merger of new technology and media with education as a complex set of social processes with human consequences and effects. This is a highly messy merger, an ongoing process rather than a state of completion, and it is embedded in socio-economic, political, and cultural issues and problems in contemporary society. Ultimately, what is at stake here is the way in which young people are being sculpted and moulded in order to deal with social change. The future of education is being reimagined and young people's

personal and social futures are being reimagined along with it.

This book is an attempt to untangle some of the consequences of the hybridization of new technology and media with education for young people's sense of identity. Who do young people today think they are? What futures do they imagine before them? What place does education have in shaping these identities? The book addresses three main questions.

> (1) How is the future of education being *thought and re-thought* in relation to new technology and media?
> (2) What kinds of learning identities are presupposed and promoted by the merger of new technologies and media with education?
> (3) How are these learning identities to be organized in emerging models of learning, curriculum and pedagogy?

We therefore stress 'learning identities' in order to emphasize how young people's identities are intricately connected to their ongoing learning, but also to indicate how identities themselves increasingly need to be learned through active, ongoing pedagogic opportunities both within the formal institutions of education and in the informal pedagogies accessed via new technology and media. Identities are not fixed forever, but are the subjects of constant lifelong learning.

Our central claim is that new technology and media are increasingly being articulated and constituted in various forms of knowledge, practical techniques, forms of expertise and authority within the educational domain, and organized in emerging models of learning, curriculum and pedagogy, in a variety of ways that are beginning to make it possible for children and young people to think and act in new ways. We are witnessing a rethinking of the future of education itself; a future already being anticipated, represented and 'made up' in our present. In the terms 'made up' and 'making up' we are indexing ideas about assembling, constructing, composing, creating and constituting the future of education, but we also recognize that 'make up' implies a cosmetics of appearance, as well as indicating an imaginative act, perhaps with the intent to deceive. What we take to be the archetypal institutions of education, schools, colleges and universities, are themselves under threat in educational futures

where learning is now being 'made up' and imagined as being distributed via networked media into the textures of everyday life, aligned with and woven into the experiential worlds and personal aspirations of young people. In the background of our analysis, we have tried to remain alert to how such futures are now being constructed and 'made up' by a variety of new kinds of actors, organizations and influencers, not just from government education departments but from all manner of public and commercial sector positions. How are such actors working to reimagine and reassemble the future of education, according to what objectives and aspirations, on what authority and expertise, and how are these efforts intended to shape the actions, thoughts and identities of learners?

In addressing these questions it is important to remain cognizant of the fact that that many of the claims made for new technology and media in education should not be viewed as statements of empirical fact or as straightforward accounts of an already-existing material reality in schools. Instead, what we are dealing with here are *objects of thought*, a complex entanglement of normative visions, ideals, imaginary futures, prototypical arrangements, objectives, aspirations, hopes and problematizations, all generated by particular social actors operating in the educational realm, that may or may not correspond with the material contexts in which educational processes take place. Rather than focusing on technical aspects of learning, curriculum and pedagogy with new technological devices and media platforms, here we are making a stronger argument that education and learner identities are being re-thought, reimagined and reshaped at a time when many aspects of socio-economic, political and cultural existence are themselves being influenced and reshaped in relation to technological change.

For those reasons, we are interested in how visions of the future of education are thought and 'made up,' and in how the identities of learners are 'made up' too. The reshaping of identities is no mere process of driving up educational standards, test scores, student motivation and so on. It involves the reshaping of the modes of living and the futures to which young people aspire. It reshapes and realigns their relations with socio-economic, political and cultural realities and makes certain futures seemingly plausible and thinkable. Certain presuppositions about learners' identities are built into emerging practices of

learning, curriculum and pedagogy. The question of how learners' identities are being reimagined and reshaped is therefore embedded in social structures and power relations and in economic, political and cultural contingencies. Learners are being thought and shaped as certain kinds of persons who can think of themselves and feel and act in certain sorts of ways – as kinds of learners who, in a very real sense, did not exist before, equipped for futures still to come.

We concentrate on learning, curriculum and pedagogy because these constitute three 'master discourses' of education through which young people are offered specific positions of identity and agency from which to think, feel and act. We want to query, for example, how theories and approaches to learning are being reshaped according to new technological framings and new models of 'competence'; how the curriculum is being reimagined for the future; and how pedagogy is increasingly imagined to be taking place beyond the formal institutional boundaries of school, in informal and everyday contexts, especially those made available through new technologies and digital media.

These shifts in thinking about the future of learning, curriculum and pedagogy will affect the shaping of learner identities. Rather than operate from the pretext that learners possess particular fixed identities, we query how learners have been encouraged to think of themselves and their aspirations anew, and what the future repositioning of learning identities might mean for education. The amalgamation of new technologies and media with education has been made possible through a variety of discourses, institutions, materials and practices that, over time, have deposited and sedimented new possible forms of learning, curriculum and pedagogy in schools in order to inculcate particular new learner identities. Consequently, young people have been encouraged to identify themselves in relation to new technologies and media, to think in terms of new technologies and media, to act in terms of new technologies and media, and to aspire to the future in terms of new technologies and media.

A corresponding array of technological reconfigurations of 'learning identity' have been promoted in different places, by different institutions and actors, through different approaches to new technology and learning. Young people themselves have increasingly been understood and encouraged to understand themselves in terms of their supposed 'digital learning identities' and even

through collective identification with a 'digital generation'. The mixing of new technologies and media with learning, curriculum and pedagogy in much recent thought on the future of education, then, holds enormous significance for the shaping of who learners think they are and where they think they would like to be in the future, and this in turn has great potential consequences upon their socio-economic, political and cultural alignments and aspirations.

Technology in society/society in technology

What do we mean by 'technology'? When we talk of new technology we are usually referring to tools, hardware, devices and an assortment of material items, along with the operating systems, software, graphic interfaces and other sensorial displays which mediate the user's encounter with information and content. But this is a very innocent caricature of technology. It represents new technologies as simplified asocial containers of information, as artefacts without histories, as products without politics, and as objects seemingly without origins. But this is to neglect the complex social processes involved in the creation, design and development of any technological device, system, product or artefact. It locates technology as a separable and independent factor outside of society. Likewise it proposes a naïve technological determinism which holds that technological change is driven by its own internal dynamism and then that these technologies will have effects on society and the material, physical and biological conditions of our lives.

The opposite view, which we advocate, is that technology is inextricably a part of society. These arguments have been developed in the field of Science, Technology and Society (STS) studies (e.g. Bijker and Law 1992; Latour 1987). What STS research tells us is that all technological devices and systems are both *socially shaped* and *socially shaping*. As the products of intentional design processes, they are socially constructed and historically contingent, the outcomes of conflicts and compromises amongst designers, developers, programmers, funders and all kinds of other actors. One way of phrasing this is that technologies have 'social lives', as STS researcher Law (2010) puts it: they come into being with a purpose, through the efforts of sponsors, and through drawing upon previous resources. And just like most social lives, a lot of factors make them up. There is no single dominant shaping force which socially constructs technology but a multiplicity of heterogeneous shaping factors.

There is plenty of mess, conflict, alliance, breaking up, making up and compromise between all the different social actors and groups involved in the development of a technology.

Reciprocally, however, technologies have a 'double social life' (Law 2010) because they also help to influence and shape human thought and action, even to influence the form and structure of society itself. This is no simple, causal and technologically deterministic process of technology imprinting itself upon human will and agency. Instead, STS claims that all technologies are 'interpretively flexible' (Woolgar 2002) at the point of use: whatever the intended purposes and objectives of their design, they can be interpreted and put to use in myriad other ways. This is why STS researchers talk of 'social shaping' and 'influencing' rather than either technological determinism, which privileges the supposed 'laws' of technology over human agency and social relations, or social constructionism, which can tend to over-privilege the dominance of human agency and social relations over technology. Rather, technology and society are in a reciprocal relationship. The emphasis on the social shaping of technology looks at 'the influence of social relations upon technologies', and also at 'the influence of technology upon social relations', so that it is 'mistaken to think of technology and society as separate spheres influencing each other: technology and society are mutually constitutive'—they are 'symmetrical' and 'made of the same "stuff" ' (Mackenzie and Wajcman 1999: 23–4). Societal values are embedded in technologies and reciprocally 'our technologies mirror our societies. They reproduce and embody the complex interplay of professional, technical, economic, and political factors,' and 'the processes that shape our technologies go right to the heart of the way in which we live and organize our societies' (Bijker and Law 1992: 3–4). Technologies, understood in this way, are things that humans have made which are then involved symmetrically in many of the ways that humans think and act – they help create society. This reciprocal relationship between the social and the technological is captured in the term 'socio-technical'.

In a powerful study taking up these socio-technical conceptual orientations to new technology and education in a sustained critical fashion, Monahan (2005: 9) deploys the concept 'built pedagogy' to refer to the 'lessons taught by technological systems'. Built pedagogy articulates how all technologies are

inherently political, engendering power relations that are embedded in the same values and ideologies which catalyzed their invention. The implication is that the scripting of built pedagogies reshapes not only the practices and activities of pedagogy but learners' internalized sense of self and identity. In Monahan's detailed ethnography of new technology implementation in high schools in Los Angeles, technology includes more than just technical infrastructure, computers on desks, wiring and cabling, software and programmes – although it certainly does require those things too. It additionally requires the shaping and privileging of certain modes of human action, social activity, and states of being; new techniques for the body, new practices of the self, and new mental capacities; and the normalization of modes of conduct, behaviour and comportment that may be internalized in learners' identities and carried out of the classroom into the world. The uses of new technologies and media in education therefore need to be scrutinized for the pedagogies they constitute in material and virtual form, for the politics they embody, the experiences they generate, and the actions they make possible and foreclose.

Yet such studies perhaps neglect the very simple issue of how to classify and name the relations between education and new technology and media. Actor–network theorists Fenwick and Edwards (2010: 70), for example, usefully show how different terms deployed to frame our understanding of 'technologized learning', terms such as 'e-learning, networked learning, online learning, open learning, distributed learning, virtual education, digital media and technology for learning, technology-enhanced learning', all have their own genealogies of concepts, references, and vocabularies, usually linked to assumed affordances of particular devices, that characterize and privilege different relationships among electronic devices, teaching and learning.

From a similar perspective, Woolgar (2002: 3) refers to 'epithetized phenomena' where terms like virtual, interactive, digital, network, and so forth, are applied as an epithet to various existing activities and social institutions in order to 'conjure a future consequent upon the effects of electronic technologies.' The point made by such researchers is that the relations between technologies and education are extremely contingent, provisional, and prone to change over time. To take one very simple example, the popular term 'technology-enhanced

learning' promotes a highly normative and positive view of technologies as an 'enhancement' to learning. Moreover, to focus on technology in terms of its effects on 'learning' also implies a certain kind of set of relations between tools and persons – a set of relations therefore amenable to certain kinds of psychological study – whereas focusing on technologies in terms of 'education' or 'schooling' would emphasize relations between devices and social institutions, making it the basis for more sociological investigations.

What we are getting at here, then, is not just the politics of built pedagogies embedded in technologies, but a more subtle politics of naming, the establishment of normative positions, and the role of our social scientific gazes in framing the objects we wish to study. At least in part the theories, concepts and vocabularies of social scientific disciplines such as psychology and sociology have played their own part in establishing the parameters and objects of study in the field of education and technology. Social science, that means, provides more than just explanatory resources; its dominant ways of representing education, technology, teachers, learners, and so on, have been enrolled and translated into a common-sense view of the roles and relations between education and technology. The very terms and theories we use to describe and explain technologies, devices, media, tools, and education, learning, teaching, and schooling, arrange and organize certain kinds of relations between them. This understanding makes it very important not only to identify the different technologies and practices that have been brought into education over time, but to trace the very different ways in which these historical developments have been paralleled by genealogies of concepts, frames, interpretations and knowledges that have been proffered by their advocates and enthusiasts as authoritative statements, whether from positions of social scientific authority or from other sites of expertise.

Authorities, experts and ensembles

To recognize the politics embedded in and catalyzed by new technologies and media, especially as they are transported as thought into schools and other pedagogic spaces, also requires us to identify some of the social and political actors involved in such shaping processes. Here we are influenced in our thinking by research on educational 'policy networks' (Ball and Junemann 2012) and 'policy enactment' (Ball, Maguire and Braun 2012). In ways that are similar

to the perspective on technology and society derived from STS, these education policy studies emphasize the messy material and discursive reality of both policy creation and enactment. In particular, they focus on the variety of actors who participate in shaping educational policy. These actors come both from within the public sector education system and from the private sector, but also increasingly include a whole constellation of intermediaries and 'boundary spanners' who straddle sectoral divisions to form new cross-sectoral policy networks. Symmetrically, they examine the 'policy actors' within schools – teachers, school leaders, administrators – who, in different ways, are positioned to interpret, translate, and enact those policies as 'policy work'.

Such studies of policy thus seek to avoid a reductive form of policy determinism that assumes policies are set through bureaucratic institutions and administrative procedures and then implemented within schools and classrooms by educators. Instead it recognizes the diverse social, contextual and material circumstances and the complex networks of actors through which policies are made up, circulated and enacted in practice. Educational policy, like new technology, is interpretively flexible too. And it also recognizes that policies are constitutive of wider social processes of schooling in which the identities of both students and teachers may be remade as 'policy subjects', that is, as the subjects of policy inculcated with new ways of being. Ball, Maguire and Braun (2012: 141) deploy the thinking of Michel Foucault to explain educational policies as 'heterogeneous ensembles' of discourses, statements, propositions, institutions, social regularities, organisational vernaculars, pedagogical subjects, and much more besides. It is through policies understood as such heterogeneous ensembles that learning, curriculum and pedagogy are to be reimagined, not least through the deployment of new technologies, and learner identities are to be reconfigured.

Following this analytical perspective on policy networks and policy enactments, it is insufficient to seek to understand new technology uses within educational settings as a simple matter of technological implementation following policy mandate from the political centre of authority. Instead, increasingly it involves the participation of diverse actors and agencies from both official political positions and seemingly non-political areas of authority and expertise. This is not a phenomenon peculiar to education policy. Rather, it

reflects changing understandings of the organization of society and the idea of the state. The theories of power associated with Michel Foucault have been particularly important to such understandings. For Foucault (1990: 92–3) 'power is not an institution, and not a structure'; it 'must not be sought in the primary existence of a central point', but rather should be traced in a multiplicity of mobile, heterogeneous, unstable and tense relations and confrontations that are present everywhere. Institutional and structural forms of power such as state apparatuses, sovereignty, social order, the form of the law, or any hegemonic system of domination, are understood by Foucault as crystallizations, terminal forms, outcomes and effects of this omnipresence of power rather than as being given at the outset. It is Foucault who has demonstrated the importance of being alert to the modes of thought and familiar assumptions upon which our day-to-day practices and actions rest.

Inspired by these theoretical cues, sociologists have begun to detail the limitations of the idea that society today is being programmed by the formal bureaucratic and administrative instruments and powers of state governments. Rather, modern societies make use of highly diverse forms of formally independent authority and autonomous expertise which connect the forces and institutions deemed 'political' with norms of individual and collective conduct that are considered 'non-political':

> One needs to ask how, and in what ways, have the rationales, devices and authorities for the government of conduct in the multitude of bedrooms, factories, shopping malls, children's homes, kitchens, cinemas, operating theatres, classrooms, and so forth, become linked up to a 'political' apparatus.
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> (Miller and Rose 2008: 200)

The expertise of medicine, the law, finance, education, and the human sciences are amongst the varieties of forms of authority that diffuse as modes of thought throughout contemporary society. Each bears its own ideas, theories, vocabularies, practices and forms of knowledge, which mediate and translate the political and economic goals and visions of society through a multitude of mundane activities into the personal concerns and private mentalities of individuals. The professional expertise of psychology, medicine and economics, for example, is increasingly deployed at a distance through the everyday expertise of self-help 'experts', diet experts, money-saving experts. These little

experts of everyday experience act as mediators who translate big ideas, powerful capacities and styles of thought such as those of governments into the mundane and distant concerns, aims, anxieties and aspirations of individuals (Dean 2010; Rose 1999a; 1999b). These arm's length relations are currently being exacerbated through the technologies of the internet. Increasingly, the internet promotes the 'experiential expertise' of a multitude of 'lay experts' (Rose 2007: 128) who mediate professional expertise at a distance and who are, reciprocally, involved in 'making up citizens' through reshaping the ways in which persons are understood and interpreted in the deliberations, calculations and strategies of experts and authorities (140).

Schools, too, now increasingly translate a multitude of voices of authority into programmes and practices which work upon the minds and mentalities of the young, which 'make up' learners as understood and interpreted as particular kinds of people. Particular kinds of policy specialists, entrepreneurs and 'intellectual workers' with good ideas, in addition to formal policymakers with big legislation, are becoming more and more involved in setting policy agendas, driving forward new initiatives, and propelling an educational culture of innovation (Ball and Exley 2010; McLellan 2004; Osborne 2004). Political parties and their associated think-tanks, commercial organizations, consultancies, non-governmental and semi-governmental organizations, non-profit start-ups, philanthropic and charitable operations, as well as academic research departments from a panoply of disciplinary positions within the social sciences, computer sciences and learning sciences, are all now involved in programmes concerned to shape the future of learning, curriculum and pedagogy in the digital age (Williamson 2012). They bring diverse forms of expertise and authoritative perspectives into the field of education. Many of them are non-political in the conventional sense; they lie outside the traditional organs and instruments of the education system. Moreover, many of them represent bodies of knowledge and expertise which are seen as depoliticized, innocent, and neutral. Theories and emerging sciences of human learning, for example, are proffered in place of overt analyses of the politics of educational institutions and structures.

New educational uses of technology and new technology-inspired visions of the future of education are now being assembled together through a composite of

activities among all these political, semi-political and nonpolitical actors and agencies. The relatively brief history of technology in education epitomises new ways of working in public education, with a variety of authorities actually now doing parts of the work of the state on its behalf. All of these organizations, agencies and the individuals who people them, work as actors in an ongoing series of contests and alliances involving the invention of programmes and strategies whose object is the reshaping of learning, curriculum and pedagogy, and the sculpting and promotion of learners' future identities in a blurry hinterland of political, nonpolitical, and depoliticized forms of expert authority. If we are to get to grips with how new technologies and media have been articulated in education, and with the ways in which learner identities have been sculpted, shaped and promoted in the process, then we need to look at it as an ensemble of different authorities and expertise, a messy and heterogeneous network of actors, ideas and materials from across a spectrum of political and social positions, which has somehow come together to get things moving.

Styles of thinking

One way of conceiving of all the various activities and actors involved in this growing area is to see it as a 'thought community' with a distinctive 'style of thinking'. Rose (2007) articulates a style of thinking as a particular way of thinking, seeing and practising within a given field, based upon shared terms, concepts, assertions, references and relations that can be organized into arguments and explanations. Yet the style of thinking of a thought community does not merely explain the objects of its focus; it also shapes and establishes the objects of explanation, modifying them so that they appear in a new way, with new properties.

This idea needs to be set in a little context. By the late twentieth century, contemporary thought had become saturated with 'cybernetic' metaphors of information, networks, nodes, dynamics, flexibility, multiplicity, speed, virtuality and simulation (Osborne and Rose 1999a: 749). The contemporary cybernetic style of thinking, however, should not be seen as simply representing or explaining real concrete social changes. 'We do not live in cybernetic societies, but in societies that are increasingly understood and governed by means of a kind of cybernetic style of thought' (750). The result is that the

cybernetic style of thinking reshapes the ways in which various aspects of society are acted upon. Moreover, these cybernetic metaphors have been extended into how we think about human subjectivity and identity. Individuals and social collectivities are increasingly understood cybernetically, as, for example in the recent proliferation of 'social networks' and 'digital identities' as indices of human existence. What this means is that how we think about ourselves and our identities is twinned with how we think about technology, and these ways of thinking about ourselves have changed historically alongside technological change; genealogies of technological devices have been paralleled by genealogies of human identity (Osborne and Rose 1999b). Different identities have been 'made up' through technologies at different points in history, and people have come to identify with and fit those identities. We are increasingly encouraged to take ourselves to be certain kinds of persons, to adopt certain kinds of identities. Thus we are at a moment when human identity itself is to be made up through cybernetic metaphors, images and styles of thinking.

Such cybernetic styles of thinking have now been folded into education, not merely in the physical form of digital devices and technological infrastructure itself, but as part of a modern vision for the future of education. In the cybernetics of education, our familiar ways of conceiving learning, pedagogy and curriculum have been modified around metaphors such as virtuality and networks, although the use and meaning of the metaphors themselves keeps changing. The heterogeneous field of new technology and education thus operates as a loose kind of thought community whose objects and explanations and style of thinking have changed and been modified over recent decades. This is a cybernetic style of thinking with a complex genealogy rather than a rigid intellectual structure.

To give some sense of what this means, from our contemporary location in the twenty-first century, educational technology is not the same as it was in the 1980s when the field was concerned with Logo, programming, microworlds and so on. For the original entrepreneurs and innovators of educational technology in the 1980s, such as Seymour Papert, the prevalent style of thinking was 'constructionist'. By the late 1990s, however, constructionist styles of thinking had largely mutated into a concern with 'flexible interactive pedagogies' as a 'system of reasoning' with productive effects which construct learners as

'flexible subjects' (Fendler 2001: 133–4). More recently, the new style of thought that has taken shape in the twenty-first century is one of networked connectivity and 'connected learning', with learning increasingly being shaped around a constellation of web-like terms and concepts including social networks, networked publics, participatory media cultures, peer-based learning, systems thinking, cloud learning, DIY learning and so on (e.g. Ito e*t al.* 2010; Jenkins *et al.* 2007; Salen *et al*. 2011).

Practices of learning, curriculum and pedagogy involving new technology and media are not, therefore, pre-given. They are lines of thought, embodied in various aspirations, programmes and strategies, traversed by social, economic, political and cultural debates and conflicts. How education and learning are to be understood is thus incessantly being reshaped, modified, and 'made up' anew through the creation and deployment of new explanations, arguments, terms, concepts, references, and new ways of thinking and acting. These shifting terms impact on the ways in which learners' identities are to be understood.

Prospective identities

Recent social theories about identity in the twenty-first century have been animated with ideas about digital and networked identities (Castells 1997). In discussions about the kind of learner identities that are considered desirable for the future, increasingly images of informal digital identities formed through interaction with digital culture and social networks are being amalgamated with images of the formal pedagogic identities inculcated through school. Yet the image of the youthful, technologically connected identity that has seemingly become so ubiquitous today itself needs to be understood as invented, assembled and composed of various operative elements rather than as something that is intrinsic to the body, mind or agency of the learner. Here we make use of Rose's (1996: 171) notion of humans as 'being-assembled-together'. Again, there is a conceptual resonance with the Science, Technology and Society perspective on technology and society as reciprocally constitutive. Only here we are dealing with the invention of humans instead of devices. Young people today are being 'addressed, represented and acted upon' as if they are people of a 'particular type' (Rose 1996: 169). This particular type of people possesses an identity – or rather a variety of identities – assumed to be technologically

reticulated and extended through social networks. They appear to be motivated by aspirations and anxieties concerning their increasingly online and mobile lifestyles and social relations. Their very 'human agency' is itself fabricated and inscribed in terms of free choice and self-actualization. And it appears as though many young people are coming to recognize, identify and relate to themselves in such images and assumptions. They are being 'made up' as particular 'kinds' of people (Hacking 2006).

With the widespread prevalence of cybernetic, networked styles of thinking about education, it appears that the digital lives, experiences and identities of the young have been aligned and assembled together with an increasingly digital vision of education in the twenty-first century. Consequently, we are seeing the emergence of images of young people's digital identities that are simultaneously aligned and interwoven with the ideals, visions, politics and techno-euphoric beliefs and institutions of the web and its techno-fundamentalist correlates of global informationalist capitalism (Mager 2012). But we do not take a simple view that young people have naturally evolved new digital identities as a result of wider technological changes, nor in fact that we have witnessed anything so grand as an epochal transformation in which young people have been socialized by the effects of new technology. Instead, the emerging digital learning identity is an 'assemblage' formed of a multiplicity of parts. It is a construction formed out of complex contests and alliances over the future of education being acted out by the multitude of new authorities and experts on learning in the digital age.

These identificatory practices are mirrored in images of the 'schooled child' that are shaped by preferred ways of thinking about young people as members of a society and embodied in various functions of schooling (Austin, Dwyer and Freebody 2003). As Bernstein (2000) has noted, educational policy since the 1970s has been increasingly concerned with the formation of learners' 'prospective identities'. Prospective identities are pedagogic identities constructed by authorities and promoted in educational institutions to deal with cultural, economic and technological change. Prospective identities ground identity not in the past but in the future; they stand in contrast to the 'retrospective identities' promoted by a traditional curriculum of canonical texts, official knowledge, cultural heritage and so forth. The hope of

government is that the inculcation of such identities will bring about new economic and cultural configurations and stabilities in the future.

Moreover, today more than ever, as Rose (1996) has shown, governments are concerned with the promotion of personal identities construed as active, creative, autonomous and self-responsible. Identities are the result of myriad techniques and norms which are implanted via the mundane routines and rituals of schooling into the lives and experiences of children. The active, autonomous, creative self that is promoted through new technological languages of schooling is no natural category but a new prospective pedagogic identity and a mode of life which is to be organized in pedagogy and curriculum. It is a way of understanding and acting upon the learner as a certain kind of person. Today, it seems, the ideas and images that are coming to shape young people's self-understandings and self-techniques are both disseminated through the authoritative channels of pedagogy and curriculum and through the heterogeneous lay expertise enabled by the internet.

The analysis we present is an attempt to trace some of the heterogeneous pathways in education, technology and creativity in the digital age that have led to the 'making up' of the prospective pedagogic identity associated with new technology – making up digital learning identities. In the face of all sorts of claims about the ameliorative potential of new technologies and media in education, and their role in expanding and enhancing the learning identities of the young, our aim is much more modestly to question how it is that educational technologies have been assembled in terms of particular sorts of problems and ambitions by a variety of authorities and experts. What we are trying to grasp is how learner identities have been made thinkable and intelligible by certain authorities for certain ends. What is it that these various authorities have wanted to happen? How have prospective digital learning identities been assembled? What objectives (of these authorities) have they been assembled to achieve? How have they sought to intervene in the management and shaping of learners' thoughts and actions, their conduct and identities? How is it that early in the twenty-first century learners have been positioned in terms of their supposed digital identities? How have such understandings of identity been assembled? How have they been promoted? Where have such assemblages travelled and settled? The prospective digital

learning identity has not been formed through any single event or procession of events, or by political will from any single or central hegemonic or marginal position. It has been formed and shaped through a network of interconnections among a number of developments.

What we are dealing with here, then, is not a straightforward empirical record of technological implementation in schools followed by an assessment of its impacts on learning, or a study of the actual identity work done by young people and educators. Rather, it examines how ideas about learners and learning, teachers and pedagogy – about identities and about the acquisition of knowledge required for pedagogic identity formation – have been put together, promoted, circulated, and then picked up, translated and embedded in local and distant sites. What we are looking at, in short, is the making up of a prospective digital learning identity, or the assembling of a subject who is understood to be active, creative, autonomous and self-responsible. We are not putting this as a name to what we believe is an empirically observed kind of person who actually exists; we are trying to identify how ideas and ways of thinking about such a kind of person have been assembled and made plausible, how this kind of person has been made intelligible, how this kind of person is being made up in new approaches to learning, curriculum and pedagogy. The ambitions and objectives of the new authorities of education in the digital age have been aligned with the experiential worlds and personal aspirations of young people, nowhere more clearly than in the ongoing and incessant positioning of new technology and media in education.

Organization of the book

Throughout the book we trace and reflect on education in the digital age from different disciplinary perspectives, using conceptual tools and perspectives from sociology to comprehend these changing times, and tools and perspectives from sociocultural psychology as well as educational theories to understand the implications for learning and teaching. In Part I, four chapters focuss on key social developments related to the amalgamation of new technologies and media with education.

2 Mapping the digital age. Chapter 2 explores a series of apparent changes in the social system linked to the proliferation of new technology and digital media in

many cultural, political, and economic dimensions of social existence. We seek to understand a historical conjuncture which has now become known as 'the digital age', a period commencing roughly in the 1980s and continuing into the twenty-first century.

3 Reconstructing education. In Chapter 3 our focus is on how educational research and practice has acted to translate claims about the digital age into concepts and theories for learning – that is, how social, economic, political and cultural problems have come to be redefined as problems to be addressed through technology and education and solved through pedagogic techniques in the classroom. The kind of questions we ask are concerned with how certain ideas and visions of the digital future have been enacted through a multiplicity of programmes, strategies, techniques and devices in schools. How has the digital age been studied and understood, and what specifically have been the educational developments which have taken place over this time? In other words, how has the digital age been constructed as a set of problems, opportunities and challenges in the educational domain? And how have these changed over time? Here, we'll be tracing how educational technologies have been framed in terms of emerging ideas and ideals such as constructionism and LOGO in the early 1980s through the emergence of 'network society' analyses and high-tech 'knowledge economy' policies in the 1990s to the explosion of educational interest in social networks and 'connected learning' in the 2000s. We do not aspire to narrative historical completion but to explore important analytical insights from the 'memory' of education and technology.

4 Digital identity. Practice and research in education during the digital age has resulted in the creation and promotion of distinctive kinds of identities for learners. The period has seen the promotion, variously, of:

> a *construction-based identity* which emerges from a focus on the educational benefits of model construction, simulation building, and other forms of programming;
> an *'interactive' identity* emphasized by a more instrumentalist focus on the role of education in promoting the skills of 'human capital' for a future high-tech workforce; and
> a *'connected' identity* which is promoted by a 'Web 2.0' emphasis on

learning through networked communities and interest-driven affiliations.

All three of these identities are historically particularistic creations which, at different times and in different places, have been promoted in the digital age. These are future-facing prospective identities constructed through particular pedagogic and curricular arrangements to promote particular kinds of 'desired' futures. They are constructed around a set of interlinked ideas about the digital age and education, ideas about ICT and media, innovation in the knowledge economy, and so forth. Learners, in short, are being positioned to adopt the identities required to create and maintain particular visions of the future, and educational institutions are being positioned to incubate these identities.

5 Educational creativity. We argue that a concern with creativity has become one of the most important, though highly contested, areas for the development of new practice and research in education in the digital age. Again, we trace creativity from different disciplinary perspectives and explore its shifting meanings. Creativity has been mobilized in different, conflicting, even paradoxical and contradictory ways as a political, social and economic project, particularly in the 'creative critique' of capitalist power structures from the late 1960s, and more lately in an explosion of creativity situated as an economically and commercially valuable set of personal dispositions and skills in using digital technologies. In the early twenty-first century, creativity has been associated closely with the latest internet developments as we have moved from a web based on user consumption of content, to a web based on user-created content. Responses to this digital 'democratisation' of creativity in the digital age in the educational domain have called for far more creative approaches to teaching and learning. The result of this emphasis on creativity has been the construction and promotion, of new prospective identities based on particular kinds of interpretations of creativity. We argue that understandings of creativity have been appropriated and hollowed out, yet there are still spaces for learners to encounter creative alternatives.

In Part II of the book we examine how such arguments about social and technological change, digital learning identity, and creativity have been mobilized and deployed in relation to theories and practices of learning,

curriculum and pedagogy.

6 Learning tools. Digital learners are now organized in a pedagogy of action mediated by tools. Here we are looking at how digital technologies have been conceptualized as tools for learning with affordances to shape the nature of creative learning activities and environments. Our theories of learning in a 'digital age' are useful if they afford insights into the mutual interaction between people and the digital tools which are embedded in the contexts of our learning experience. We argue that the development of learning identities is underpinned by four characteristics: learner agency; the design and use of tools; the awareness of context; and openness to improvisation. *Agency* is the active participation in the social and cultural contexts in which we are learners. *Tools* express our relationship with technologies and the role they might play in our engagement in intelligent action. *Context* creates and shapes the learning environments that are appropriate for the demands of our lives and futures. *Improvisation* enables us to imagine and construct new contexts and communities to meet the challenges of our learning lives. Digital tools in physical, virtual and augmented environments can contain metaphors of learning as reproduction, synthesis and expression, and can generate new metaphors of production, performance and 'remix' in prospective learning identities.

7 Curricular reforms. This chapter follows developments in curriculum. The curriculum represents the knowledge that a society chooses to select from the past to bring into the present and from there project into the future. While mainstream developments in curriculum have tended to emphasize increased centralization, standardization of content, internationally comparable assessments, and so forth, a range of alternative curriculum visions has suggested different possible futures. The curriculum has been envisaged as a potentially connective apparatus that links knowledge domains, that may be constituted as a kind of non-linear, digitally hyperlinked text rather than embodied in the linear form of the textbook. Such curriculum visions reinscribe learner identities as active, connective identities.

8 Pedagogic practice. Here we argue that teachers can be recognized in our society as those who engage in the design of learning for others, regardless of

their formal or informal status, accreditation, or setting in society. Good educators demonstrate three dimensions in their practice: depth, scope and reach. They know their 'stuff', they know why it matters, and they can connect with people to help them to learn. The conceptual depth of educators' understanding relates to the questions of knowledge in subject domains that identify and debate disciplinary structures, conceptual organizations and principles of enquiry. An educator's 'contextual scope' is their awareness of their relationship to other people, ways of knowing, identity, culture, politics, networks and power within wider contexts. Pedagogic reach describes the connection between educators and learners, where the purposeful designs of learning environments and experiences are successful in the transformation of understanding. The concept of 'didactic analysis' offers a useful framework for thinking about pedagogy that is grounded in a critical approach to the purposes of teaching, and presents a series of questions that help to link pedagogy with the wider context of being an educator in a digital age.

Throughout, the book is concerned with how a prospective digital learning identity has been assembled and promoted. Essentially what we are arguing, from a reflexive position, is that the shaping of digital learning identities has taken place through a dense, heterogeneous web of practical developments, political objectives, conceptual and theoretical advances related to the deployment, in various ways and through various programmes advanced by various authorities, of technologies in education. All these things must be thought in a particular way. The book represents an attempt to trace something of the genealogical developments and modes of thought which have brought new technology and education together in the ways that they have been, and to glimpse some of the ways they are being imagined into the future. We have tried to apply, as a loose kind of method, what Thrift (2005:2) calls a 'backward gaze,' to think 'rather as a historian from the future might, looking back at our present time and seeing vast numbers of unresolved issues, differences of interpretation and general confusions.' Looking with a backward gaze serves to remind us to be wary of the familiar and unchallenged assumptions and modes of thought upon which many educational practices and ideas in the digital age have been constructed and promoted. We want to avoid taking a hyperbolic view of the future, yet also to avoid falling into the opposite trap of dystopian despair. Rather, through a more limited form of critique we hope this book can

make a modest contribution to interrupting some of the seemingly unquestioned modes of thought, presuppositions and assumptions about technology, creativity and the future of education.