

This is an Accepted Manuscript of a
book chapter published by
Routledge in “Debates in Education
Studies” on 23/8/2017, available
online:

<http://www.routledge.comContemporary-Debates-in-Education-Studies/Marshall/p/book/9781138680241>

Education and the digital revolution

This chapter explores:

- Various theoretical perspectives on the nature of technology;
- The effects that the digital revolution is having on education and;
- How education and should respond to this phenomenon.

“We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another... The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres .”

(Schwab, 2016).

Klaus Schwab, founder of the World Economic Forum, sets out the basic theme of this chapter, the fundamental change to the world that has been brought about by the digital revolution. The advent of the internet, social media, mobile devices and other technological breakthroughs is creating a decisive change to our world equivalent to the advent of the industrial revolution. Schwab (2016) sees this change as one which is “...blurring the lines between the physical, digital, and biological spheres.” This blurring can be seen in the way practices such as recruitment and dating increasingly have digital elements; or how products such as Google Glass and smartwatches change how we interact with the world around us; or in the debates around who owns online data and who has the right to delete it.

This chapter will explore how education could rise to the challenge of the digital revolution. This will be done by exploring the intersection between different understandings of the

digital world and education. The debate of this chapter will be around what should education do in response to the digital revolution?

Digital Literacies

Activity: Digital Literacies

Before reading this section consider how you would define the term “digital literacy”. Can you make a list of various aspects that describe someone who is digitally literate?

Digital literacies aim to describe the underpinning abilities that are needed to interact with digital technology. Just as traditional literacies aim to describe an individual's ability to work with words and numbers, digital literacy aims to describe how an individual works with digital technology and digital environments. Jisc (2015) describes digital literacies as the “...capabilities which fit someone for living, learning and working in a digital society.” This describes how in a “digital society” something fundamental has changed that has led to these skills being needed. This supports Schwab (2016) and Wheeler’s (2015) analysis that the world has been fundamentally changed by the digital revolution; therefore education must now put digital literacies alongside other literacies in the curriculum.

There is a wide range of different frameworks that describe digital literacies. Belshaw (2011) identifies eight essential elements of digital literacy as shown in the table below:

Cultural	Uses technology appropriately in different contexts
Cognitive	Effectively uses different tools, softwares and platforms
Constructive	Creates and shares new resources as well as remixing and reusing existing ones
Communicative	Able to effectively communicate across different devices, platforms and networks
Confidence	Is a self-learner, developing personal learning systems and practices

Creative	Takes risks to create new artifacts of value to themselves and others
Critical	Is aware of the power structures behind the digital world and is aware of how they will be received by others
Civic	Uses digital resources to enhance and engage in a wide range of networks as a global citizen

Table 13.1 Elements of digital literacy adapted from Belshaw (2011)

This chapter is less concerned with the exact details of what constitutes digital literacies and instead focuses on what the concept of digital literacies in general implies about the nature of education. The implication made by Belshaw (2011) and others who attempt to describe digital literacy is that an individual who develops the capacities described above will be equipped to live a fulfilling life in the digital world in which we live. Following on from this education's role is to develop learners with this set of skills. Similarly to Schwab (2016) we see the claim that because the world is encountering a digital revolution we need to therefore revolutionise teaching in order to impart different skills for different ages. This view of education sees the curriculum having to match and keep pace with the changing digital world and its demands.

There are two responses to this that we should consider. Firstly we need to consider to what extent digital literacies can actually be taught. Prensky (2001) is famous for popularising the idea of digital natives and digital immigrants. A digital native is someone who has grown up inside a technological environment and is what Prensky (2001) would see as digitally fluent. This is in contrast to digital immigrants, people who come from non-digital generations and cultures and need to learn to adapt to the new languages and cultures of the digital world. Prensky's work cultivates the idea then that education has little to say to natives who have developed their digital literacy informally through constant exposure to a digital environment. Going slightly further Law (2012) raises the question of whether education's attempts to step into the digital space which young people are already native to is a form of imperialism whereby digital space is colonised.

There are some significant problems with Prensky's (2001) analysis, Longridge and Hooley's (2012) research, for example, has provided evidence that just because someone grows up

around technology does not mean that they can use it, especially when it comes to high level skills such as critiquing online information or curating an online identity. Similarly Livingstone (2008) has shown that just because someone may access more information online does not mean that they have the critical capacities to understand what they find. This suggests a need to teach digital literacies across the spectrum to digital natives and digital immigrants.

But Prensky (2001) still raises an interesting point. The idea of a digital native stems from the notion that individuals are exposed to and learn how to use technology outside of formal education. Wheeler (2015) describes how individuals combine personal web tools and online personal learning networks to create a personal learning environment or PLE. The focus here is on personal; social media and online tools allows individuals to build their own networks, resources and learning tools away from institutions. No longer do individuals need to go to an institution, such as a school, university or library, to learn. We only need the smartphone in our pocket and its access to Google, Twitter and Youtube to engage in a wide range of learning. The danger with some discussions around digital literacy is they do not always recognise how technology has challenged the institution as the place where learning occurs.

Our second response to digital literacy comes from Lankshear and Knobel (2015) who claim that digital literacy is often conceived of in abstract terms. In their words digital literacy “consists in so many lists of abstracted skills that a proficient person can “do”. Once they “have” these “skills” they can use them purposefully at work, at home, at school etc., and function “competently.”” They point to the work of sociocultural theorists such as Street (1984) who complain about the idea that any literacy can exist in abstract. Literacies instead “take on very different forms when embedded in different social practices involving different purposes and where different kinds of meaning are at stake.” (Lankshear and Knobel, p.17) This view of literacy challenges the view that we can prepare people with literacies in general before launching them into the real world. Learning about how to exist in the digital world takes on different social practices, it is born out of the social situations of the individual learner. Lankshear and Knobel (2015) challenge us that learning is contextual and personal, these claims chime with social constructivist views of education put forward by thinkers such as Dewey (1916) and Piaget (1995). Here education grows out of an individual's own experience of the world and the meaning they attach to them, in this case their own involvement in the digital world and what that means to them.

In conclusion we may learn some important things from digital literacy as a concept but note that it is potentially weak by being abstract and not adequately describing the context that learning occurs in. Digital literacy rightly points out that different skills and abilities are needed in a digital world but it could be argued that it does not go far enough to adequately engage with the importance of the social context.

Activity: Digital Literacies

What do you think of the concept of digital literacies? Do you think becoming digitally literate is something that you can actually teach someone? Is focussing on digital literacies a helpful approach for institutions to take? Be prepared to justify your answer.

Digital Disruption

One of the key points we noted above was the way the digital world disrupts the primacy of educational institutions for where learning occurs. The digital revolution creates the potential for learning to take place in informal online communities, knowledge and learning is no longer monopolised inside institutions such as schools, universities and libraries.

This has led to theorists such as Siemens (2005), Downes (2010) and Cormier (2008) to argue that there is a need for new theories of learning to respond to this change. Connectivism, as espoused by the above theorists, attempts to give this account. Siemens (2005) sees Connectivism underpinned by the realisation that in the digital age ‘know-where’ has replaced ‘know-what’ as the most important aspect of learning. Siemens (2005) claims that traditionally knowledge is viewed as long lasting and held inside institutional bodies such as public libraries and universities; however, the digital age has radically increased the scale of knowledge alongside humanity’s capacity to access it and increasingly knowledge is found in online communities and networks away from institutional dominance. Connectivism is therefore the belief that the task of education is to equip learners to access informal online communities and engage in their own learning as an ongoing life-wide activity. Siemens

(2005) has produced a series of principles that underpin connectivism as an educational theory;

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances e.g. computers.
- Capacity to increase knowledge is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is in itself a learning process.

Cormier (2008) similarly argues that the digital revolution has profoundly altered the nature of knowledge and how it is created and accessed. Especially, according to Cormier, the idea of institutional expertise is no longer valid in the digital age. Cormier (2008) describes how a rhizomatic model of learning may create an alternative model for learning;

“In the rhizomatic model of learning, curriculum is not driven by predefined inputs from experts; it is constructed and negotiated in real time by the contributions of those engaged in the learning process. This community acts as the curriculum, spontaneously shaping, constructing, and reconstructing itself and the subject of its learning in the same way that the rhizome responds to changing environmental conditions.”

Rhizomatic learning is therefore best seen as a mode of informal learning that particularly challenges authoritarian views of knowledge and education. It focuses on the potential for online communities to create learning which is personal, dispersed and driven by a learner's own motivations and subjective understandings of the world. Cormier's (2008) approach can be summed up by his expression that the “community is the curriculum”; knowledge is not vetted and defined by experts but exists in a variety of expressions in a variety of communities. Though Rhizomatic learning is not necessarily unique to the digital age, it is a response to how the digital revolution has challenged traditional ideas of knowledge and is

enabled by the ability of digital technologies to create the context for communities that support rhizomatic learning.

While it is perfectly possible to take digital literacies and add them to the pre-existing list of learning outcomes a school offers to its students this approach is not possible with connectivist approaches to learning and teaching. Connectivism fundamentally argues for a different relationship between student and teacher to underpin education as well as education being moved to a fundamentally different place away from the confines of an institution. While digital literacies are an additional set of aims for education which can sit alongside others connectivism argues for the transformation of education.

It is important to focus on what makes connectivism unique when we attempt to see how it responds to the “Fourth Industrial Revolution” as discussed before. The re-articulation of the relationship between student and teacher found in connectivism very much echoes Freire’s (2007) banking model of education with the focus on an individual’s interest and learning in the real world as opposed to the classroom links in with the social constructivism of Dewey (1916) and Vygotsky (1978). What is unique about connectivism is how it takes themes from radical, social constructivist and informal understandings of education and re-purposes them for the digital world.

As part of this debate there are two critiques of connectivism we want to consider. Firstly it is worth noticing connectivism’s description of knowledge and especially on new knowledge as the outcome of education. Connectivism links in heavily with the idea that knowledge is expanding too fast for traditional models of education to cope. There may be a general feeling in society that the speed of knowledge creation is moving at an increasingly exponential rate; it is worth asking if this applies equally to all forms of knowledge. Is the rate of expansion in fields such as engineering, computing and some parts of the natural sciences the same as in mathematics, social sciences or humanities based disciplines? This raises the question whether connectivism applies equally to all types of knowledge or whether there is an unconscious focus on some areas more than others? Similarly it could be argued that this description and focus on knowledge fits better with subjects (such as technology and science based subjects) where knowledge and facts are more central to how the curriculum is structured. Other subject areas that focus more on building skills, attitudes and tacit information do not fit so easily into the categories which connectivism uses. This is not to say

that connectivism is only useful to some subject areas but that its central premise on the nature of knowledge does not fit equally with all subject areas across the educational spectrum.

The second critique of connectivism is around how it views technology and the internet. Why is the internet necessary for connectivism as a theory? As we have noted before connectivism holds much in common with social constructivism and informal learning; connectivism argues for learning to be individualised, lifelong and lifewide and that this happens through accessing and making use of online communities. Connectivism argues that these aspects are enabled by the internet but it is unclear whether this can only be done online, especially when we consider our previous critique about how connectivism understands knowledge.

Connectivism appears to have an assumed positivism around the internet; that it must be good and will make our lives better. Connectivism sets out to describe how the internet has and could reform learning in the digital age but the answers it comes up with are universally positive about the potential for the internet to transform learning. As we will see in the last section this overlooks important critiques of learning in the digital age which we would be wise to consider.

In conclusion an understanding of the implications of digital disruption for education contains an important perspective for debate. The ideas that have been discussed from connectivism provide a fresh outlook on what education could look like in the fourth industrial age.

Connectivism responds to the changing nature of knowledge in the digital world and provides a perspective on education that is decentralized, personal and social. That said there are some concerns about how knowledge is understood by connectivists and if technology is entirely necessary for this pedagogical approach.

Activity: Connectivism

Connectivism argues the need to rethink the relationship between teachers and pupils in the digital age. What might the advantages and disadvantages be of rethinking this relationship? What place does this give to traditional institutions in the digital age?

Digital Scepticism

The two perspectives we have considered so far in this debate have both assumed that technology is positive and that education can benefit individuals by helping them make better use of it. In our critique of connectivism in particular we questioned whether some of their pedagogical ideals necessitated the use of technology. The final perspective we will consider in this debate, digital scepticism, challenges the assumption that education should be uncritically wedding itself to technology.

Though there are a variety of criticisms that could be made of assuming that education should make use of technology we are going to focus on critiques linked to technological determinism. Technological determinism is the idea that the technologies that society makes use of is deterministic of the shape of these societies. This is an idea originally associated with Marshall McLuhan and his book *Understanding Media* (1964). McLuhan famously coined the phrase the “medium is the message”. In other words, it is, the media itself rather than how it is used which determines the effect it has on society. He goes on to say that “...the “message” of any medium or technology is the change of scale or pace or pattern that is introduced into human affairs... it is the medium that shapes and controls the scale and form of human association.” (1964, p.2). This is to say that media has a profound effects on society beyond the specific content it contains or how people choose to use it. How education responds to the digital age should be grounded not just in how digital technologies could be used but also in the effects digital technology has on society. McLuhan (1964) was not necessarily a sceptic about technology as a whole and he did not live to see the advent of the digital revolution but his ideas create a starting point for understanding explicitly sceptical positions. In order to explore this further the next section will consider three main effects that technology has on society and what this means for education; speed, individualisation and privacy.

Speed

As Mejiias (2013) discusses digital networks removes distance as a property from human relationship, we can connect with information and people the other side of the world. There is a temptation to see this speed as inherently positive, quicker is better. Virilio (2012) describes this differently noting how societies have developed a “cult of speed”. As Virilio (2012) argues, society has become dominated by the instant but we have little space for reflection

and critique if we are constantly assaulted by the new. This is similar to Rushkoff's (2013) concept of "present shick" where society's ability to discuss the future is diminished by a variety of forces, including digital technology, which create a world which is always-on and so trapped in the present. What Virilio (2012) and Rushkoff (2013) argue is that our ability to think and understand the world around us and the future are decisively changed by how technology brings speed into our lives. This should be of great concern for education. How we think and how we consider the future appear self-apparent aims for education.

Individualism

Technology heightens a sense of individualism with individuals on personal devices making their own personal decisions. But this individualism obscures educational problems. Duckworth and Cochrane (2012, p. 589) note this casts the learner as an entrepreneur in an environment in which "...learners are expected to succeed against the odds and if they do not, the fault is their own and not [due to] structural inequalities many encounter..." Selwyn (2016) proclaims that there is a tendency to call for individuals to be resourceful and nomadic in their pursuit of learning online but those who call for this often fail to account for this flexibility is often linked to being economically and socially positioned to do so. Technology, here, creates the conditions for inequality to exist and prosper. Meijas (2013) makes a similar point by arguing that social media inevitably creates inequality because they require individuals to compete for attention and connections online, something which some are better able and better positioned to do so. Andrew Keen (2012) picks up the same point noting that networks are dominated by a few super-nodes who disproportionately benefit from the network. Because technology has individualised learning it both puts unfair pressure on individuals to be responsible for what is out of their control and obscures how digital networks create the conditions for some individuals to thrive more than others. Finally this individualisation has implications for the nature of education; as Selwyn states "If we are all immersed in our own personalized learning journeys, what implications might this have for education as a social, supportive and shared endeavour?" (2016, p.78).

Privacy

Van Dijk (2013) argues that the organisations behind social media sites are creating a different friction between individuals desires for privacy and control over their data and commercially organisations desire to access this data. Van Dijk (2013) sees social media sites on the one hand re-assuring users they are control of their privacy while on the other

encouraging commercial organisations they can exploit this information through advertising among other activities. As Mejias (2013) notes this creates a situation where users are increasingly encouraged to put their lives online where the information is consumed by corporations whose use of this data is largely hidden and not accounted for. This creates a challenge for educators about if they should encourage students to engage in this sort of environment. Though it may be tempting to say that educators can still enthusiastically promote digital technology while encouraging individuals to protect their digital identities online Mejias (2013) notes how corporate organisations and government agencies sidestep these privacy controls. This can be particularly of concern for people with marginal political views or who have misdemeanours in their past. Though education may have values of allowing people to develop in safe environments where they can move on from their mistakes, it is not clear if this is equally true online. This creates a situation where individuals have to increasingly control their identities online and present a socially acceptable vision of themselves. Foucault's (1977) concept of the panopticon describes how the fear that someone may be watching forces individuals to conform to socially acceptable behaviour and are in effect "trapped" by this fear. Keen (2012, p.77) discusses how the internet heightens the control mechanism Foucault describes, stating "if visibility is a trap, then hypervisibility is a hypertrap". It is important to note that Foucault (1977) and Keen (2012) are discussing the fear of being observed, it is this fear that control behaviour beyond whether anyone is even watching. In the context of this debate we need to ask if this fits in with liberal educational values of enabling people to become individuals confident in themselves?

In light of these three phenomena it seems important to ask how education equips people to respond to the digital age and if education needs to ask if it is actually initiating people into this digital world, with its apparent difficulties, without thinking through the consequences. These sceptical voices create a position that asks education to be more critical of the digital age and to equip learners to do the same.

In the context of this debate there are two main responses to these views. Firstly stemming technological determinism ignores the power of individuals to make decisions and respond to the problems they face. Particularly in the context of education it could be argued that though these concerns are worth noting it does not follow that education should step back from

technology entirely. Secondly there are concerns about how practical these positions actually are. We live in a technological age, the digital revolution has occurred and we cannot ignore it. A critical response to this digital scepticism is it just encourages a ludditism that is not practical in the real world. Should education not be about preparing people for the real world rather than postulating about what we want society to be like?

Activity: Digital Scepticism

Mejias (2013) argues that individuals should step “off the network” as a response to the inherent difficulties with networked life such as encouraging individualism, widening inequality and compromising privacy. What reasons might students of education have for encouraging this? Is this realistic in the digital age in which we live?

Debate Conclusion

When we step back and look at the three positions that have made up this debate we see that we have a debate centered around what the nature is of technology and what the nature is of education.

Firstly, let us consider technology. From the position of digital literacy technology is seen as something that is under the control of the individual and which does not represent a substantial change to the world. This leads to a position where structures such as education can stay as they are and can respond by adding in the extra set of requirement that technology requires. Technology is additional rather than transformational. Connectivism takes the position that technology is transformational rather than additional; we have undergone a paradigm shift with the advent of the digital age which has disrupted domains such as politics, the media, social life and education. But in connectivism as in digital literacy people are ultimately agents able to respond to a make use of technology in this new environment. This is in contrast to the view of digital scepticism which focuses on the effect that technology has on individuals outside of their control. Like connectivism it focuses on the paradigm shift that technology brings in but while connectivism sees this as an opportunity

for the individual to make use of digital scepticism argues there are substantial negative changes beyond the individual's control, including how individualism, privacy operate in a digital world. To summarize we see two fundamental questions around technology emerging from this debate; to what extent has technology changed society and to what extent is technology an instrument for individuals?

Secondly, amongst the views we have discussed, there are differences in the approach to education. When we consider approaches from digital literacy and from connectivism the primary difference is around where the center of power resides. Much discussion around digital literacy maintains the position of institutional authority and adds digital literacy to the list of outputs it determines. Connectivism by contrast explicitly takes aim at this institutional dominance and aims at producing learners able to manage their own learning in a digital environment, learners who are nomadic and able to make their own decisions about what to learn. It should be noted that digital literacy is often discussed as a skill by connectivists, the two terms to blur with each other, we are more contrasting the general approach to digital literacy that many institutions take that preserves their own power structures with connectivism's focus on disrupting them. This then creates a question around if education in the digital age should preserve or challenge institutional authority? Digital scepticism creates an interesting departure for us here because though it has a lot to say about education it has no explicit plan for delivery. Authors such as Selwyn (2016) and Keen (2012) highlight problems with education's relations to technology. The sceptical view encourages us to think philosophically and sociologically about the world around us before engaging in it. This in itself can create a valid approach to education. It helps us move past the distinction that Collini (2012) sees education as often having between "useful" and "useless" knowledge. Education should as much be about understanding the essence and the effects of technology as it is preparing people to use it. We are left then with two key questions; what place should institutional authority play in education and should education be about helping people live differently or understand the world differently?

Case Study: LinkedIn And Education

Consider this fictional situation. Jane recently returned to education in her thirties and has started a law degree. At a recent talk one of her lecturers encouraged students to join the

social media network LinkedIn to network with lawyers to help them gain work experience and work towards landing a lucrative training contract. Jane had not heard of LinkedIn before and thought the site looked really interesting. Jane is very keen to pursue a career in Law after her studies but is nervous by how the legal sector is based around networking. It appears that neither Jane nor anyone she knows has any personal contacts in the legal profession. LinkedIn with its focus on building professional networks therefore looks like it might be of real benefit to Jane. Despite this she has a number of concerns.

Firstly Jane is finding it difficult at university to get used to using technology in general. Jane has always avoided using social media. She doesn't like what her friends say about it and how easy it seems to be to make mistakes. She is also worried as it seems the media is full of stories of people being compromised on social media either through bad news about them personally or through falling victim to a scam. All of this makes Jane very nervous about using social media in any form.

Secondly Jane is worried because of something that happened in her past. Three years ago Jane's brother was involved in a difficult child protection case that made it into the local press. He is now spending time in jail having been found guilty. At the time Jane wanted to stand up for her brother and went on record in the press protesting his innocence. She feels like she did the right thing but knows that it would be easy for people to find the story about what happened and what she said online as they share a surname. She knows she has committed no crime but feels the story does not paint her in a good light as a prospective lawyer. She is worried that by joining LinkedIn more people will start looking her up online and they may come across the news story.

Thirdly Jane is already struggling with her degree and time management. She is a single mum with three children to look after as well as holding down a part time job while she studies. She already feels stretched with time and LinkedIn just feels like another thing for her to worry about. She's worried she's not keeping up with all of the reading she needs to study Law as it is. Is LinkedIn really worth the bother? She doesn't want to start it and find out she doesn't have the time to see it through.

Key Questions:

- How might the various theoretical positions mentioned in this chapter understand Jane's situation?
- What might someone be able to teach Jane to help her resolve her situation?
- What is your response to Jane's situation? What does this say about how you might naturally relate to technology? How do you feel about this?

Suggested Reading:

Wheeler, S., & Gerver, R. (2015) *Learning with 'e's: Educational Theory and Practice in the Digital Age*, Camarthen: Crown House Publishing.

This provides a helpful and accessible introduction to learning and teaching in the digital age. It is particularly helpful for separating practice that uses technology from understandings of education that conceptualise technology.

Selwyn, N. (2016) *Is Technology Good for Education?* Cambridge: Polity Press.

Neil Selwyn's short book provides a much needed counterpoint to some of the extremes of positivity around education and technology and a helpful companion to Wheeler and Gerver. Selwyn raises pertinent questions to how education is currently making use of technology and critiques some of the common claims of technological enthusiasts.

DRAFT

References

- Belshaw, D (2011) *What is digital literacy? A Pragmatic investigation*, Available from [WWW] at: <http://dmlcentral.net/wp-content/uploads/files/doug-belshaw-edd-thesis-final.pdf>
- Beetham, H. & Sharpe, R. (2013) *Rethinking pedagogy for a digital age: Designing for 21st century learning*, London: Routledge
- Cormier, D. (2008) 'Rhizomatic Education: Community as Curriculum', in *Innovate: Journal of Online Education*, 4(5), Available from [WWW] at: <http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1045&context=innovate>
- Deleuze, G., & Guattari, F. (1988) *A Thousand Plateaus: Capitalism and Schizophrenia*, London: Bloomsbury Publishing
- Dewey, J. (1916) *Democracy and Education: An Introduction to the Philosophy of Education*, New York: Macmillan.
- Dobbs, K. (2000) Simple Moments of Learning, *Training*, 35(1), 52-58
- Livingstone, S. (2008) 'Taking risky opportunities in youthful content creation. Teenagers' use of social networking sites for intimacy, privacy and self-expression'. in *New Media & Society*, 10(3), 393-411
- Downes, S. (2010) 'New Technology Supporting Informal Learning', in *Journal of Emerging Technologies in Web Intelligence*, 2(1), 27-33
- Duckworth, V. & Cochrane, M. (2013) 'Spoilt for choice, split for choice', in *Education Training*, 54(7), 579-591
- Eshet-Alkalai, Y. (2004) 'Digital Literacy: A Conceptual Framework for Survival Skills' in *Digital Era Journal of Educational Multimedia and Hypermedia*, 13(1), 93-106
- Foucault, M. (Trans. Sheridan, A.) (1977) *Discipline and Punishment*, New York: Pantheon
- Freire, P. (2007). *Pedagogy of the Oppressed*, New York: Continuum,
- Jisc (2015) *Developing students' digital literacy*, Available from [WWW] at: <https://www.jisc.ac.uk/guides/developing-students-digital-literacy>
- Keen, A. (2012). *Digital vertigo: how today's online social revolution is dividing, diminishing, and disorienting us*. London: Macmillan.

Lankshear, C. & Knobel, M. (2015) 'Digital Literacy and Digital Literacies:-Policy, Pedagogy and Research Considerations for Education', in *Nordic Journal of Digital Literacy*, (9), 8-20

Law, B (2012) *Digital Literacy*, Available from [WWW] at:
<http://www.hihohiho.com/newthinking/EVColonist.pdf>

Longridge, D. & Hooley, T. (2012) An experiment in blended career development: The University of Derby's social media internship programme', in *Journal of the National Institute for Career Education and Counselling*, 29(1), 39-46

McLuhan, M. (1994) *Understanding Media*. Routledge Classics: London

Mejias, U. A. (2013) *Off the network: Disrupting the digital world*. Minneapolis: University of Minnesota Press

Piaget, J. (1995). *Sociological Studies*. London: Routledge.

Prensky, M. (2001) 'Digital Natives, Digital Immigrants part 1.', in *On the Horizon*, 9(5), 1-6

Rushkoff, D (2013) *Present shock: When everything happens now*, London: Penguin

Ryberg, T. & Christiansen, E. (2008) 'Community and social network sites as Technology Enhanced Learning Environments', in *Technology, Pedagogy and Education*, 17(3), 207-220

Schwab, K. (2016) *The Fourth Industrial Revolution: what it means, how to respond*, Available from [WWW] at: <http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond>

Selwyn, N. (2016) *Is Technology Good for Education?* Cambridge: Polity Press

Siemens, G. (2005) *Connectivism: Learning as Network Creation*, Available from [WWW] at: <http://www.elearnspace.org/Articles/networks.htm>

Street, B. (1984) *Literacy in Theory and Practice*, Cambridge: Cambridge University Press

Van Dijck, J. (2013) '“You have one identity”: performing the self on Facebook and LinkedIn', in *Media, Culture & Society*, 35(2), 199-215

Virilio, P. (trans. Polizzotti, M.) (2012) *The Administration of Fear*, Los Angeles: Semiotext(e).

Vygotsky, L.S. (1978) *Mind in Society*, Cambridge, MA: Harvard University Press

Wheeler, S., & Gerver, R. (2015) *Learning with 'e's: Educational Theory and Practice in the Digital Age*, Camarthen: Crown House Publishing

DRAFT