Chapter 2
A Brief History of E-mediated Education

Abstract This chapter considers the ways in which the new affordances of computers for learning have influenced learning. While the general scope is broad, the focus is on the ways in which computers make it possible to personalise learning in novel ways for learners. The simple move from reading the same text on a page to a screen and completing the text with a keyboard rather than a pen is not a significant change, if the approach to learning is still massified. Electronic mediation of learning, however, offers new possibilities for tailoring learning to the learner, and this chapter is focused on this possibility and the ways in which it has played out.

A Brief History

The affordances of new media for teaching and learning have, of course, been exploited throughout history. Media for drawing, reading, and writing were turned to educational uses, gradually replacing the vocally mediated learning that occurred in oral cultures. Media influence the shape of learning experiences and what is learned, and—more profoundly—what is considered most worth learning. The invention of writing, for example, reduced the importance of memorising long poems and stories, since they could be stored and shared in written form. It could be argued that it also changed the form of the stories—a bard or storyteller or shaman or priest tells a story “in the moment” to a particular audience. While a writer may have an audience in mind as s/he writes, there is no guarantee that the reader will be that imagined reader. The tale takes on a life of its own, while also becoming less specific to the expectations and experiences of the audience. Accessibility of knowledge also increases, as with the “Gutenberg explosion” occasioned by the development of printing and movable type, and the roles of those who possess knowledge change as do the processes of developing knowledge.

In discussing e-mediated education, we are speaking of the use of computers to mediate learning experiences (computers being broadly defined to include such things as tablets, smart phones, smart watches and other such devices). For the purposes of this book, we will ignore the use of earlier electronic media such as...
radio—both broadcast and two-way—and television to disseminate learning experiences, since our focus is on experiences personalised to learners. Places such as Australia and Canada with large sparsely populated areas used two-way radio along with “paper-and-mail” correspondence materials to teach students in rural and remote areas, but this use of radio was essential to bring the experience of face-to-face teaching or tutoring to these students. As early as 1932, Darrow talked about “Radio, the assistant teacher”. Cuban (1986) offers a valuable overview of these early technologies. It was with the use of the first computers to differentiate the learning experiences of learners in response to their different learning needs that e-mediated education as we are discussing it began.

The period since the first experiments with educational computers in the 1950s and 1960s and the present can be divided into two broad eras: before and after the advent of the World Wide Web in the early 1990s. The earlier era typically involved one student working directly with one computer, whereas the advent of easily accessible networks led to much more interactive learning experiences, where learners interact with computer-based materials as well as with one or more teachers and one, few, or many other students, potentially all around the world.

One further brief note before moving into a brief historical survey: in 2006, David wrote “computers don’t teach people, people teach people” (Geelan 2006, p. 109). The corollary is that computers mediate this communication between people, but (arguably) until genuine machine intelligence (this term is now preferred over artificial intelligence) becomes available, the mind of the teacher will always be a human mind. The learning experiences will be planned by a teacher and/or learning designer and mediated by a computer (broadly defined). Teaching and learning remain inherently human activities, reflecting human interests (Habermas 1972).

**Programmed Learning**

As early as 1960, Lumsdaine and Glaser summarised earlier research and theories around “learning machines” and programmed learning. Much of this earliest work was based on the behaviourist theories of Skinner (1954). Coulson and Mullin (1963) reviewed programmed approaches to teaching physics. Hartley (1974) offers a two-decade retrospective on machine and programmed learning, beginning with Skinner’s 1954 call for educators to developed personalised and programmed approaches in his paper *The science of learning and the art of teaching*.

As would become a pattern that continues to the present, these approaches overpromised and underdelivered in terms of (a) educational effectiveness for learning and (b) the extent to which they were adopted in education. In part, this would have been due to the sheer cost and cumbrousness of 1950s’ computers, but it could also be argued that in attempting to make learning teacherproof and have students interact only with computers (at the time through monochrome text and keyboards, or switches alone), this approach removed the essential human
dimensions of learning. These are the dimensions re-emphasised by the constructivist models of learning—Vygotsky’s emphasis on the importance of language and culture more than Piaget’s (1971) more individualist approach—that rapidly replaced Skinner’s behaviourism as the dominant theories of education.

Papert’s (1980) *Mindstorms: Children, Computers, and Powerful Ideas* describes his work developing the computer language Logo which allowed primary school students to write simple programs and, through its structure and rules, scaffolded them into correct mathematical thinking—Papert’s was one of the first major initiatives in a second age of e-mediated education. Much less programmed—in the sense of the students being programmed rather than doing the programming—this work is still influential and is relevant to the current push for all students to learn to code in school. While it was influential at the time, the use of Logo remained a relatively niche innovation and did not broadly influence school education.

Later waves of e-mediated education included the use of videodiscs in classrooms (Hasselbring et al. 1987). This approach, like a number of different e-mediated education initiatives through the years, was to a greater or lesser extent focused on attempts to “teacherproof” education. Perceived shortcomings of teachers’ content knowledge and pedagogical skill were seen as being overcome by creating high-quality materials to be disseminated to all classrooms. Engelmann and Carmine’s (1982) direct instruction model, indeed, reduced the teachers’ classroom role to behaviour management and using the remote control to move to the next section of the videodisc. The media changed from cassette tapes to floppy disks to CDs (compact discs) and video to DVDs, but the attempt to develop teacherproof curricula remained tempting to education systems clinging to industrial models of teaching and learning.

There were other trends and approaches during this period, and the increasing advent of colour, graphics, faster processors, and more data storage meant that computers became more powerful and capable. Attention began to be paid to the use of educational computer games or the use of games in educational contexts (Squire 2003 offers a good review). The next major development in e-mediated education, however, was the development of the World Wide Web in the early 1990s.

### Beyond Distance Education

The first wave of web-based education was focused on replacing paper-and-mail approaches to distance education (Geelan and Taylor 2004). These approaches offered quicker and more direct contact between tutors and students, but more importantly broke down the isolation of distance study by allowing students to interact with one another in synchronous chats and asynchronous discussion rooms.
Developing web-based courses occurred in a variety of contexts and ways, and often those developing courses were academics without learning design qualifications or experience. Some such courses were derogatorily referred to as shovelware (Thalhimer 1994), implying that lecturers had simply “shovelled” their existing lecture notes onto the web verbatim with no consideration of the affordances of the new medium.

I (David) was involved in web-based instruction at this time, learning to develop courses and teach online as I went along. With my colleague Peter Taylor, I taught a postgraduate course in science education at Curtin University for several years in succession, reflecting on and seeking to improve my teaching and my students’ learning experiences (Geelan and Taylor 2004). Some students resisted the move from information delivery towards a focus on perspective transformations and on open and critical discourse (Habermas 1985). For myself, I initially resisted the move from manually developing my own course sites in HTML (Hypertext Markup Language) and creating scripts for discussion boards in Perl (a programming language) to using learning management systems (LMSes) such as WebCT (Web Course Tools) and Blackboard, because it made the sites unavailable to the world and—after a single semester—to the students. I still value the idea of openness and open forums for learning and teaching (Geelan 2015).

While it is arguable that more professional approaches to online course development improve quality, there was something exciting about the amateur days of the mid-1990s, with very large numbers of people working separately and together to develop new approaches to pedagogy, curriculum, and assessment using the new affordances of web-based communication.

By the early 2000s, increased bandwidth and new protocols were leading to the use of more images, video, social media, and other technologies on the web generally, and these technologies were moving into e-mediated education. Collectively referred to as Web 2.0 technologies (Alexander 2006; O’Reilly 2005), we would argue that the pedagogical changes were pedagogical—and indeed, in some ways retrograde. The ability to simply record traditional lectures and upload them may have led to web-based education moving closer to the most “industrial” features of on-campus tertiary education. At the same time, the use of more interactive approaches including videoconferencing, interactive simulations, web-based interactions, and collaborative sites provided further opportunities for collaborative learning.

The extent to which web-based learning is personalised for learners varies. McLoughlin and Lee (2010) considered the ways in which personalised learning occurs—and sometimes fails—in Web 2.0 contexts. Some politicians and university administrators think of web-based teaching as being cheaper to deliver than on-campus instruction, but if developed, maintained, and staffed properly, online modes of instruction are about as expensive as on-campus modes (Bartley and Golek 2004). It is interesting to note that universities are engaged both in very large moves into online learning and in major new on-campus building investments.
Massive Open Online Courses (MOOCs)

While the earliest Massive Open Online Courses (MOOCs) were developed in the mid-2000s, they really came into their own in about 2010. Pappano (2012) called 2012 the “Year of the MOOC”, but already may have been a little behind the curve. These courses are often offered by or in conjunction with large, prestigious universities or consortia, and typically enrol tens of thousands of students. Most are offered free, with a small fee option for a “verified certificate”. These certificates can sometimes be applied towards course credit at participating universities. MOOCs are able to work on the scale they do by automating the learning process. Most use lecture videos, combining video of instructors with voice-over-slides or voice-over-written notes, and use computer-marked quizzes and assignments as the primary forms of assessment. The largest organisations offering MOOCs include Udacity, Coursera, and EdX, but there are more start-ups and a number of universities either offering courses through those platforms or are creating their own. McAuley et al. (2010) describe “The MOOC Model for Digital Practice”, outlining the features of this mode of learning.

Many university administrators are very enthusiastic about developing and offering MOOCs, but typically only 10–15 % of the students who enrol complete the MOOC (Jordan, 2013; Rivard, 2013), and the more students who enrol in a MOOC, the lower the completion rate.

Belleflamme and Jacqumin (2014) explored four models for monetising the public good of MOOCs through private provision, but White (2014) asks “Is “MOOC-Mania” over?” and notes that operators have so far failed to effectively monetise these platforms. The future of MOOCs remains unclear—they are likely to continue in some form and offer participation in lifelong learning for many members of the community who may not otherwise have these opportunities, but they are unlikely to supplant more traditional models of higher education.

Connectivism

Partly in response to their own experiences with some of the earliest MOOCs as well as in online learning in general, and drawing on insights from constructivism (Geelan 1997), Stephen Downes and George Siemens in Canada developed the theory of connectivism (Downes 2008; Siemens 2005). In the context of an explosion of knowledge and accessibility, they note the way in which the role of the teacher as curator of knowledge becomes both more and less important. The teacher cannot control all of the learning experiences of the student, leading to an increased focus on the ways in which students learn to make judgements about the worth of knowledge and information (Siemens 2005, p. 3). In a networked world, the
relations of power and access to knowledge change. Teachers are no longer the unchallenged experts in the learning environment, and students can bring—and develop—their own expertise and share it with the teacher and their fellow students. Siemens (2008) says “emergent, connected, and adaptive knowledge provides the epistemological framework for connectivism as a learning theory”.

While the early papers outlining connectivism are exciting to read and suggest novel approaches to thinking about learning and teaching in a networked world, I would argue that connectivism is perhaps more like a framework for an eclectic learning theory drawing on other learning theories such as constructivism (Geelan 1997) and enactivism (Davis 1997) than a fleshed-out learning theory in its own right. Kop and Hill (2008) asked “Connectivism: Learning theory of the future or vestige of the past?”, and in some ways, this seems like a question still in search of an answer. Those hints of an original perspective in the first papers outlining connectivist theory do not appear to have been operationalised as a research programme and thoroughly investigated. Kop and Hill (2008) note that “[t]he analogy is intuitive and powerful because of the ubiquitous use of the Internet in today’s world” but that “[p]resently, connectivism is lacking an extensive body of empirical research literature to lend it support” (2008, p. 7). This largely remains the case eight years later.

We would argue that one of the issues with connectivist theory is that Downes (2008) and Siemens (2005) imagine all learners as being like themselves—competent, confident navigators of multiple networked information sources, rapid judges of the quality and value of information, skilled synthesisers andappers of knowledge. This does describe some students, particularly once intentional efforts have been made to scaffold their development of these skills and to induct them into the networked world, but many students are timid, unconfident, lacking in desire or skill to draw on multiple information sources and draw inferences or make judgements. Kop and Hill (2008) note:

Current research in adult education shows that the levels of confidence and learner autonomy, in addition to discipline, are of crucial importance to the level of engagement by the learner in a personalized learning environment, as lack of these in the majority of participants hampered their learning online. Nearly all students preferred the help and support of the local or online tutor to guide them through resources and activities, to validate information, and to critically engage them in the course content…. which would indicate the need for a localized tutor presence. (p. 10)

Whether the tutor is local or at a distance, the notion that it is people who teach people, rather than networks and information, seems to hold. In terms of theories for and of learning in e-mediated contexts, older candidates such as constructivism and enactivism still seem to have much to offer. In particular, the notion of the ZPD (Vygotsky 1978) offers a framework for understanding the value of personalising education and developing effective learning experiences. If connectivism is operationalised and an evidence base is developed in future, this view may be challenged.
Current Developments

O’Connor et al. (2014) discuss the challenges of developing educational experiences within an e-mediated context of Web 2.0 technologies with dynamic design and assessment. They discuss the importance of scaffolding learning and supporting students’ development of the necessary skills for navigating and succeeding in these environments. The role of assessment, in particular, is worthy of notice. It is almost a cliché in the field and has been for decades, to decry the assessment of student learning that occurred in dynamic, interactive, networked spaces using static paper-and-pencil tests. Evaluations of the effectiveness of e-mediated learning often lack face validity precisely because the scores used as measures of learning do not appropriately mirror the type of learning experiences undergone by students.

Bishop (2008) describes the use of computer-based testing to measure student progress and achievement in a multidimensional way for an individual student rather than comparing students with one another. Developing dynamic, reactive online testing approaches that more closely mirror the context of learning is one important field in current research and development. Australia’s National Assessment Plan: Literacy and Numeracy (NAPLAN) testing programme is moving towards online administration and responsiveness to students’ demonstrated levels of achievement from 2016 (Finger 2015). Finger discusses the technological and leadership challenges of administering such a nationwide test online and the issues of equity and access that attend such a development.

Conclusion

E-mediated learning, understood as learning personalised for the learner using computers, has been with us for more than 50 years, and the pace of change continues to accelerate. Pedagogy, ethics, and learning theory are in some senses scrambling to keep up with the pace of technological and social change, and as much as e-mediated learning offers exciting opportunities, it also offers significant challenges. Choosing to take a critical approach to the adoption of technologies, pedagogies, and policies, rather than to succumb to technobooterism (Geelan and Mukherjee 2010), seems to us essential to ensuring that new learning opportunities enhance, rather than harm, social justice and equity and access to the benefits of education. This book constitutes one contribution to the development of such a critical perspective.
Provocations

- Is progress (in the context of e-mediated education context) linear? Is the movement uniformly from less to more personalised learning as the “e” in “e-mediated learning” evolves? If so, how would we support that claim, and if not, how would we support that counterclaim?
- What comes next? Will the most influential developments in relation to e-mediated personalised learning be technological, pedagogical, some rich mix of both or some other kind of evolution or revolution?

References


Darrow, B. H. (1932). Radio, the assistant teacher. RG Adams & company.


References


Theorising Personalised Education
Electronically Mediated Higher Education
Garrick, B.; Pendergast, D.; Geelan, D.
2017, XXI, 155 p. 15 illus., Hardcover
ISBN: 978-981-10-2698-0