Electronic technology has been used in earnest in education for over 40 years, from the development of interactive multimedia resources through to the use of the Internet, and mobile and augmented technologies in recent years (Spector, Merrill, van Merrienboer, & Driscoll, 2008). This chapter provides a review of the area and reflects on the promises and challenges of trying to incorporate technologies into education. Research in the field has matured; now a vibrant sub-set of different research areas, such as exploring learners’ perceptions of the use of technologies, practitioners’ practices, the use of Open Educational Resources, and more broadly open approaches to the design and delivery of educational offerings, help guide the use of pedagogical patterns and learning design as a methodology to enable teachers to make informed decisions about using technologies.

**The Emergence of the Field**

Educational technology as a field can be traced to the beginning of the 19th century, however, significant investment in the field dates back to the 20th century, specifically the sixties with the development and use of teaching machines and the emergence of multimedia software in the eighties. In
parallel, there was a shift from a focus on behaviourist approaches to learning (with a focus on the individual and stimulus and response approaches) to more constructivist (building on prior knowledge) and social situative (learning with others and in a context) approaches (Thorpe, 2002; Mayes & de Freitas, 2004) to recent focus on connectivist pedagogies (Dron & Anderson, 2012) with a focus on personal network development.

New technologies appeared to offer much to support these new pedagogies, particularly through new social and participatory media that have emerged in the last five years or so. Molenda (2008) states that educational technology as a field has developed through a series of phases as new technologies have emerged. Its origins are in the use of visual and audiovisual systems; then radio, television, teaching machines; the design of instructional systems; computers; and ultimately the use of the Internet for both storage and processing of information and communication.

In addition to educational technology, over the years different terms have been used with respect to researching the use of technologies for learning and teaching. These include: e-learning, learning technology, networked learning, and technology-enhanced learning. Each term has a subtle nuance, for example: Kehrwald (2010) citing Steeples and Jones (2002) argues that, “networked learning, by definition, involves the use of information and communication technologies to create connections” (p. 2). By utilizing those connections, learners have opportunities for interpersonal interaction and more complex social activity. Thus, networked learning is an active, social endeavour in which the mediating technologies provide an infrastructure for social activity.

Educational technology suggests the emphasis is on formal learning, however it is important that the term covers the tools and techniques of non-formal and informal learning as well. Conole and Oliver (2007, p. 4) favour the term e-learning and make the following distinctions:

- **E-learning** is the term most commonly used to represent the broader domain of development and research activities on the application of technologies to education.

- **Information and communication technologies (ICT)** refer to the broad range of technologies used in education.

- When both terms are used in the context of their use in learning and teaching we tend to use the term learning technologies.
For some, the term *e-learning* has become too closely tied in with a particular subset of technologies, namely learning management systems, and the term *technology-enhanced learning* (TEL) has been favoured in many European contexts, as it is thought that TEL emphasizes the support of learning by technologies. For the purpose of this chapter the term *e-learning* will be used as I think it most adequately encapsulates the nature of the field, which is, researching the use of technologies (covering Internet-based technologies as well as mobile and other devices) to support learning and teaching.

**THEORY AND METHODOLOGY**

E-learning as a field is inherently applied and interdisciplinary. Researchers come from a wide range of disciplines and bring with them a rich set of theoretical perspectives and methodologies.

A group of influential thinkers were identified in a series of interviews with key researchers in the field (Conole, Scanlon, Mundin, & Farrow, 2010). There appears to be a common shared discourse underpinning the field. Socio-cultural approaches—in particular the work of Vygotsky (1978), Engeström and others around cultural–historical activity theory (CHAT) (Engeström, Miettinen, & Punamäki, 1999), Laurillard’s theory on rethinking university teaching and learning (Laurillard, 2002), and Mason (Mason & Kaye, 1989). Other theoretical perspectives these researchers are drawing on include the following: Alan Collins on design-based research (Collins, 1992); Michael Patton on utilization-focussed evaluation (Patton 2008); Barbara Rogoff on cultural psychology (Rogoff, 2003); Maggie Boden on artificial intelligence and psychology (Boden 1989); Lave and Wenger on communities of practice (Lave & Wenger 1998); Alan Blackwell and others on inter-disciplinarity (Blackwell, Wilson, Street, Boulton, & Knell, 2009); Howard Gardner on multiple intelligences (Gardener, 1993); James Wertsch on mediating artifacts (Wertsch, 1991); and Michael Cole (Cole, Engeström, & Vasquez, 1997).

Looking at some of the specific texts that were cited as influences is also insightful. These included *Educating the Reflective Practitioner* (Schön, 1987), *Academic Tribes and Territories: Intellectual Enquiry and the Cultures of Discipline* (Becher & Trowler 2001), *Distributed Cognition* (Salomon...

In the same interviews the following were cited as the methodologies that were most frequently used: socio-cultural research, activity theory, qualitative research methodology, design research methodology and grounded theory. It should be noted that these researchers were primarily European and, arguably, more quantitative approaches are evident in other parts of the world, such as North America.

Therefore, these texts and methodologies give us a rich insight into the nature of the field and how it is being researched, as well as an indication of the key areas of research focus.

TODAY’S TECHNOLOGIES

This section will provide a review of the current spectrum of technologies that are available to support learning and will consider some of the ways in which they are being used to support different pedagogical approaches. An emphasis will be placed on types of technologies and their associated characteristics and how these can support different pedagogical approaches and mechanisms for learners to communicate and collaborate with peers and tutors in an online learning context.

Conole, Smith, and White (2007) provide a timeline of technologies in education from the sixties to 2000. They describe the emergence and influence of the following: mainframe computers, desktop computers, graphical interfaces, the Internet, virtual learning environments (VLEs),\(^1\) managed learning environments (MLEs), and mobile and wireless devices. Use of these tools included the creation of interactive multimedia materials and e-assessment, the creation of departmental web pages to store course materials, the use of e-mail and discussion forums to support communication between tutors and learners, and the creation of holistic online learning environments using VLEs.

Since 2000 we have seen the emergence of new technologies that provide a plethora of ways in which teachers and learners can interact and

\(^1\) Also termed learning management systems (LMSs)
communicate. These include new social and participatory media, which O’Reilly referred to as Web 2.0 technologies (O’Reilly 2004; O’Reilly 2005), virtual worlds such as Second Life, game-based technologies, and, more recently, augmented and gesture technologies. The 2011 Horizon Report lists the technologies that a group of experts believe are most likely to have an impact within a one-, three-, and five-year timeframe. For 2011, these were: e-books and mobile devices, augmented and gesture technologies, and, within five years, learning analytics (Elias, 2011). Siemens (2010, para. 2) defines learning analytics as “the use of intelligent data, learner-produced data, and analysis models to discover information and social connections, and to predict and advise on learning.”

In a review of social and participatory media, Conole and Alevizou (2010) categorize them as follows: media sharing (such as YouTube and Flickr), media manipulation and mash ups, instant messaging, online games and virtual worlds, social networking, blogs, social bookmarking, recommender systems, wikis and collaborative editors, and syndication tools. In addition, they identified a number of important affordances (Gibson, 1979) that these technologies offer to support learning. De Freitas and Conole (2010) list the following as key technological trends that have emerged in recent years:

1. A shift towards ubiquitous and networked technologies.
2. The emergence of context and location aware devices.
3. The increasingly rich and diverse different forms of representation and stimulatory environments possible.
4. The trend towards more mobile and adaptive devices.
5. A technical infrastructure that is global, distributed, and interoperable.

Conole (2013a, p. 48) notes the following trends:

1. A shift from the Web as a content repository and information mechanism to a Web that enables more social mediation and user-generated of content.
2. New practices of sharing (for example, Flickr for images, YouTube for videos, and SlideShare for presentations) and mechanisms for content production, communication, and collaboration (through blogs, wikis, and micro-blogging services such as Twitter). Social
networking sites provide a mechanism for connecting people and supporting different communities of practice (such as Facebook, Elgg\(^2\) and Ning).\(^3\)

(3) A scale, or “network effect,” is emerging as a result of the quantity of information available on the Web, the multiplicity of connectivity, and the scale of user participation. As a result, new possibilities for sharing and harnessing these network effects are occurring.

Conole goes on to argue that these trends point to new ways in which users are behaving in online spaces and provide a range of opportunities for supporting learning and teaching practices. Through these new technologies the Web is more participatory and user-centred, supporting more open practices. A number of characteristics define social and participatory media and demonstrate the ways in which they enable these more participatory approaches. First, the ability to peer critique on the work of others is now common practice in the blogosphere. Second, tools that enable users (both students and teachers) to generate their own content. Third, these technologies enable collective aggregation on a global scale, which refers both to the ways in which individuals can collate and order content to suit their individual needs and personal preferences, as well as the ways individual content can be enriched. Fourth, a rich ecology of community formations have now emerged, from tightly defined communities of practice (Wenger, 1998) through to looser networks and collectives (Dron & Anderson, 2007). Lastly, new forms of digital identity are emerging; individuals need to define their digital identity and how they “present” themselves across these spaces (Keen, 2007). The avatars we choose to represent ourselves, the style of language we use, and the degree to which we are open (both professionally and personally) within these spaces, give a collective picture of how we are viewed by others.

In addition to social and participatory media, we have seen the emergence of smart phones, tablets, and e-book devices in recent years, which provide learners with access to a rich range of learning materials. Many of these devices enable some degree of interactivity, for example, the ability to annotate resources or share and discuss them with others. The affordances of mobile learning include the ability to learn anywhere and anytime and

\(^2\) http://elgg.org

\(^3\) http://www.ning.com
being able to bridge between formal, informal, and non-formal learning. In the MyArtSpace project, Sharples, Lonsdale, Meek, Rudman, and Vavoula (2007) explored the use of mobile devices between schools and museums. The students were able to view multimedia presentations of museum exhibits, take photos, make voice recordings, write notes, and see who else has viewed the exhibit. Mobile devices are particular powerful when combined with location-aware functionality and can be used to promote activities such as geocaching. Clough (2010) defines geocaching as a leisure activity in which participants use a global positioning system (GPS) mobile device to locate a hidden cache. The cache is usually a physical container concealed somewhere in the landscape. Participants are given a starting location (a car park or other easily identifiable spot) and then use the GPS coordinates to guide them to the cache. Geocaching involves exercise and getting about outdoors. Clough reports on a study on the use of GPS with social technologies. The study aimed to consider whether these technologies can provide an effective focus for community activities and, if so, whether this combination of location-awareness, mobile, and Web 2.0 technology results in the creation of novel informal learning opportunities (Clough, 2010).

An active area of research is the exploratory use of games and virtual worlds to support learning. These can be particularly useful in fostering situative pedagogies such as authentic and role-based learning. A JISC briefing paper (2007) refers to this technology as game-based learning (GBL), which ranges from rich immersive virtual worlds, such as Second Life, to simple interactive and quiz-based games. The paper argues that serious games, services, and applications have a role to play in relation to their potential to provide greater opportunities for personalizing learning experiences (O’Donoghue, 2010). The report goes on to cite a number of benefits of GBL, which include motivation, integrating a range of tools, and the spontaneous formation of social networks. Games such as World of Warcraft have a vibrant and extensive network of online gamers distributed worldwide, supporting and peer-critiquing each other as they develop their gaming competences. Gros (2010) lists the following as some of the benefits of games-based learning: games as a powerful context, immersive learning, development of soft skills, and the ability to support complex learning. Virtual worlds, such as Second Life, can promote authentic and role-based learning. For example, they can be used to create art galleries and museums, to support virtual exhibitions, to simulate medical wards or law courtroom
role plays (EDUCAUSE, 2008). The power of Second Life is that it provides an authentic virtual environment acting as a proxy for the real world and allows users to inhabit personas and situations that might otherwise be unavailable to them. The SWIFT project\(^4\) has created a virtual genetics laboratory that is being used with students at the University of Leicester to provide them with an authentic environment to get accustomed to working in a laboratory—from learning basic safety rules through to the use of virtual equipment such as microscopes and centrifuges (Rudman, Lavelle, Salmon, & Cashmore, 2010).

Haptic technologies, which involve the sense of touch, are increasingly being used, particularly in vocational and applied learning contexts, primarily for robotic, medicine, and space industries. Their development, like previous technologies, often spins down to valuable application in education. For example, Tse et al. (2010) describe a virtual dental training system (hapTEL), that allows dental students to learn and practice procedures such as dental drilling, caries removal, and cavity prevention for tooth restoration.

One of the key affordances of many new technologies, particularly social and participatory technologies, is the way in which they can promote more open approaches to practice. Conole considers what adopting more open practices might mean in terms of the design and delivery of educational interventions and in terms of digital scholarship and more open approaches to research (Conole, 2013a).

Learning design and pedagogical patterns have emerged in recent years as more open approaches to the design of learning interventions. Conole (2013a) introduces a new learning design methodology, which aims to help practitioners make more informed design decisions that are pedagogically effective and make innovative use of technologies. The methodology aims to shift teacher practice from an inherent and belief-based approach to one that is explicit and design-based. The aspiration is that such an approach will guide teacher design practice and help make the design process more explicit and hence sharable. The methodology includes a range of conceptual visual design tools, as well as approaches for fostering the sharing and discussing of learning and teaching design, through structured real events and via specialized social networking tools, such as Cloudworks.\(^5\)

\(^4\) http://www2.le.ac.uk/departments/genetics/genie/projects/swift

\(^5\) http://cloudworks.ac.uk
In parallel, there has been significant interest in the area of pedagogical patterns (Goodyear, 2005; Goodyear & Retalis, 2010). The concept of pedagogical patterns is derived from the work of Alexander et al. (1977). They define a pattern as something that:

describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice. (1977, p. x)

Bergin states that a pattern is supposed to capture best practice in some domain. Pedagogical patterns try to capture expert knowledge of the practice of teaching (Bergin, 2002). A number of projects have now developed libraries of pedagogical patterns to support different types of pedagogy (see for example, the design patterns in the e-learning Pointer Project,\(^6\) the E-LEN project,\(^7\) the TELL project\(^8\) and the Pedagogical Patterns Project (PPP)\(^9\)).

In terms of open delivery, an area of interest that has emerged in recent years is the development and promotion of open educational resources (OER). The OER movement is based on the premise that educational resources should be freely available. It has been promoted by organizations such as the Hewlett Foundation and UNESCO. Early work focussed on the creation and population of OER repositories, and there was perhaps a naïve assumption that if these resources were made available learners and teachers would use and repurpose them. However evaluation of the use of this repositories showed that this was not the case (Petrides & Jimes, 2006; McAndrew, et al., 2009). As a result, research effort has now shifted to identifying the practices around the design, use and repurposing of OER. The OPAL initiative\(^10\) analyzed over 60 case studies of OER initiatives and from this derived a set of OER practices, namely: strategy and policy, staff development and support, tools and tool practices, and enablers and barriers (Conole, 2013a). These have now being incorporated into a set of guidelines for key stakeholders

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6 http://www.comp.lancs.as.uk/computing/research/cseg/projects/pointer/pointer.html
7 http://www2.tisip.no/E-LEN
8 http://cosy.ted.unipi/gr/tell
9 http://www.pedagogicalpatterns.org/
10 http://oer-quality.org/
(learners, teachers, institutional managers, and policy makers). Individuals or organizations can use the guidelines to benchmark their existing OER practices and then as a guide to the creation of a vision and implementation plan. The hope is that practical use of these guidelines will result in better uptake and use of OER.

In addition to free resources, we have also seen the emergence of free courses, often referred to as massive online open courses (MOOCs). The New York Times referred to 2012 as the Year of the MOOC. Daniel (2012) overviews many of the challenges and promises of this format—most notably the affordance of offering educational programming to large number of students at almost no cost to the students. For example, Siemens and Downes developed and delivered a twelve-week online course on connectivism called Connectivism and Connective Knowledge. This course provided a nice example of an extension of the open movement, moving beyond the OER movement to providing a totally free course. Not only were the tools and resources free that they used in the course, but so was the expertise. An impressive 2,400 students joined the first course in 2008, although ultimately the number of active participants was only about 200. Recently, private for-profit companies have emerged to partner with prestigious universities to cover MOOCs with registrations in the hundreds of thousands of students (Rodriguez, 2012). However, these free resources and courses are challenging existing educational institutions: in a context where expertise, tools, and resources are free, what is the role of traditional institutions? In addition, we are seeing new business models emerging as a result, such as the Peer-to-Peer University, which provides a peer-accredited, “badging,” scheme for competences and the OER University, which is an international consortium of institutions. With the OER University, learners can work through any materials they want and when they are ready can choose to be accredited through one of the consortium member institutions.

Weller discusses what it might mean to adopt more open approaches to scholarship and research (Weller, 2011). He argues that there are three interrelated characteristics: open, digital, and networked. He argues that new

11 http://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html?_r=0
12 http://ltc.umanitoba.ca/connectivism/?p=189
14 http://wikieducator.org/OER_university/Home
technologies mean we can do things differently. He cites the way in which Twitter, for example, can enable researchers to have access to immediate expertise. We have also seen how the social networking site, Cloudworks,\(^{15}\) which was developed for academics, can be used as a means to promote the sharing and discussion of learning and teaching ideas. Academics are increasingly using a range of social tools (such as Twitter, blogs, wikis, social networking sites, social bookmarking sites, etc.) to support their academic practice and to be part of a global network of peers.

Finally, two relatively new areas of inquiry are the work on learning spaces and learning analytics. The Spaces for Knowledge Generation (SKG) project,\(^{16}\) which aimed to inform, guide, and support sustainable development of learning and teaching spaces and practices (Keppell, Souter, & Riddle, 2011). It explored what new forms of learning spaces might be needed to use new technologies effectively in a blended learning context. The project developed seven principles for designing learning spaces:

- **Comfort.** A space that creates a physical and mental sense of ease and well-being.
- **Aesthetics.** Pleasure that includes the recognition of symmetry, harmony, simplicity, and fitness for purpose.
- **Flow.** The state of mind felt by a learner when totally involved in the learning experience.
- **Equity.** The consideration of needs as defined by cultural and physical differences.
- **Blending.** A mixture of technological and face-to-face pedagogical resources.
- **Affordances.** The ‘action possibilities’ that the learning environment provides the users, including such things as kitchens, natural light, WiFi, private spaces, writing surfaces, sofas, and so on.
- **Repurposing.** The potential the space has for multiple uses.

Learning analytics is an emerging field—the first international conference was held in Banff in 2011. In the 2011 Horizon Report (Johnson, Smith, \(^{15}\) http://cloudworks.ac.uk

\(^{16}\) http://www.skgproject.com/
Willis, Levine, & Haywood, 2011), learning analytics was listed as the technology most likely to have the greatest influence on education within a five-year timeframe. Learning analytics can be used as a tool to understand learning behaviour, to provide evidence to support design of more effective learning environments, and to make effective use of social and participatory media.

**CHALLENGES OF THE FIELD**

Despite the clear potential of technologies to promote and foster different pedagogical approaches, a number of challenges remain. Five main challenges are outlined below:

- the slow uptake of technologies
- the lack of a theoretical foundation for the field application of research findings to policy and practice
- the need to better integrate research, policy, and practice
- the changing existing cultures
- the challenges faced by developing countries

Despite the rhetoric and significant investment in the field, technologies are not being used extensively to support learning and teaching (Cuban, 1986). The reasons for this are complex and multifaceted (technical, organizational, and pedagogical). Molenda (2008) observes that the barriers cited for the lack of use of audiovisual tools in the 1940s and 1950s are similar to those cited for lack of use of computers in the 1990s, namely: accessibility issues, lack of training, unreliability of equipment, limited budgets, and the difficulty of integrating technologies into the curriculum. Despite the promise of technology, we have not seen it revolutionize education (Beabout, et al., 2008). Cuban reviewed the use of technology from the 1920s onwards. His central argument was that despite the policy directives on more use of technologies in classrooms, technologies have not had a significant impact on classroom practice. It seems that, although the technologies may change, the barriers and reasons for lack of uptake remain much the same. Teachers lack the appropriate digital literacy skills (Jenkins, 2009) to make effective use of new technologies to support their teaching.

Bennett and Oliver (2011) argue for the importance of theory to underpin e-learning research. They suggest that the focus of much of the research
in the field tends to be on practical implementations and that it is not adequately grounded in theory. They conclude by stating that this lack of theoretical underpinning,

risks turning the field into a narrow and derivative area of work: at best, only able to draw from other areas; and at worst, only of relevance to those with a vested interest in the specific practical situation currently under study. (p. 187)

Conole (2010) has argued that there is a disconnect between research findings in the field and their impact on policy and practice. She describes a technology intervention framework that can be used to enable a closer integration of research, policy, and practice (see figure 8.1). In related work, she describes how this framework is applied in the OPAL initiative to promote and foster the uptake of open educational resources (OER) (Conole, 2013a).

Figure 8.1 A framework for policy intervention.

Shifting teacher practice away from a focus on content to an emphasis on activity and the learner experience is a real challenge, particularly for distance education institutions, which are predominantly built on a Fordist industrial model. This modern economic model is largely based around a social system that utilizes an industrialised and standardised form of mass
production, in this case centered on the provision of printed materials. Such a structure is inadequate in terms of the provision of digital materials, making effective use of the affordances of new technologies. Much more agile approaches are needed to meet the needs of today’s learners.

Developing countries face additional challenges. Many do not have mature technical infrastructures or adequate Internet provision. Indeed, for some countries even electricity is in limited supply. In such cases, clearly online learning is more of a dream than a reality. However, these countries are finding makeshift solutions, for example, the use of mobile devices (with longer battery lives) rather than computers, as well as making materials available on smart devices rather than online and use of free resources, such as open educational resources.

CONCLUSION

The new technologies described in this chapter clearly have significant potential to transform learning and teaching. The emergence of these technologies has shifted practice on the Internet away from passive information provision to active user engagement. They offer learners and teachers a plethora of ways to communicate and collaborate, to connect with a distributed network of peers, and to find and manipulate information. We are beginning to see ways in which teacher and learner practice and experience is changing as a result; however, we are only beginning to understand how to utilize these effectively.

These technologies also raise challenging questions: What are the implications for traditional educational institutions in a world where content and expertise is increasingly free? What is the appropriate balance of institutional learning management systems versus cloud-based computing? How are roles and identities changing? What are the implications of the increased blurred context of formal/informal learning, and teaching/learning?

Conole argues that a number of shifts in practice are evident (Conole, 2013a). First, researchers are increasingly adopting more open practices in how they disseminate and communicate their research findings. Many researchers now keep blogs as a means of publishing ideas in progress, which complement more traditional forms of publication through journals and books. In addition, many institutions now have open research repositories and require researchers to deposit their research outputs. Second,
we are beginning to see the collective wisdom of the crowd (Surowiecki, 2005) by using an individual’s Twitter network to ask questions and provide answers and harnessing the collective mass to address large-scale research questions and data collection. Thirdly, digital scholarship is becoming increasingly important and is challenging traditional metrics for measuring academic impact. Fourthly, open resources and courses are challenging traditional educational offerings; we are seeing the emergence of new alliances and business models as a result. Fifthly, learners are now technologically immersed and see technologies as a core learning tool. They are adopting more just-in-time approaches to learning and, increasingly, working more collaboratively (Sharpe & Beetham, 2010). Finally, the surfeit of tools now available is bewildering and institutions and individuals increasingly need to make informed choices of which technologies to use in which contexts, mixing institutional systems with freely available, cloud-based services. All raise direct or indirect challenges to policy, funding, individual and collective rights, privacy, and responsibility.

Thus, potential topics for future research in the field include:

(1) What might a coherent learning design language look like and how might it be shared?

(2) What other mediating artefacts do we need to develop so that learners and teachers can make more effective use of technologies to support learning? What are the different ways in which learning interventions can be represented?

(3) How can we foster a global network and communities/networks of practice to enable learners and teachers to share and discuss learning and teaching ideas? How can social networking and other dialogic tools be used to enable teachers to share and discuss their learning and teaching practices, ideas and designs?

(4) What tools do we need to guide design practice, visualize designs, and provide a digital environment for learners and teachers to share and discuss?

(5) What are the implications and likely impact of social and participatory media for education and how can they be harnessed more effectively to support learning?

17 See for example http://www.ispot.org.uk/ and http://www.galaxyzoo.org/
What will be the impact of new emergent technologies on the stakeholders involved in education?

What new pedagogies are emerging as a result of these new technologies?

What are the implications for learners, teachers, and institutions of new social and participatory media?

How will the processes of supporting learning (design, delivery, support, and assessment) change as a result of new technologies?

What social exclusion issues are arising with the increased use of new technologies? How can we promote more socially inclusive practices?

How are Open Educational Resources being design, used, and repurposed?

What are the implications for formal institutions of the increasingly availability of free resources, tools and even total educational offerings, such as Massive Online Open Courses (MOOCs)?

What digital literacy skills do learners and teachers need to make effective use of these technologies and resources? To what extent are they evident and how can they be developed?

How are the ways in which learners and teachers communicate and collaborate changing with the use of these technologies?

How can we create effective new digital learning environments to promote the use of social and participatory media and OER?

How can informal learning using OER be assessed and accredited?

What kinds of policy directives are in place to promote social inclusion through the use of OER and how effective are they?

What new methodologies and theoretical perspectives will be needed to address these research questions and to interpret the findings?

This is an exciting but challenging time for education, where we operate within an increasingly networked society (Castells, 2000) and under increasing financial constraints. Industrial modes of learning are no longer appropriate and do not meet the needs of an individual in today’s society. Learning needs to be contextualized, relevant, social, and just-in-time. New technologies provide an important part of the solution in terms of
addressing this, but teachers and learners need support, guidance, challenge, and opportunities to make informed decisions on how to harness these technologies for their particular needs.

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