

A literature review of the use of Web 2.0 tools in Higher Education

A report commissioned by the Higher Education Academy

Prof. Gráinne Conole and Dr. Panagiota Alevizou

g.c.conole@open.ac.uk; p.alevizou@open.ac.uk

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The Open University

Walton Hall, Milton Keynes

UK

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Introduction

This review focuses on the use of Web 2.0 tools in Higher Education. It provides a synthesis of the research literature in the field and a series of illustrative examples of how these tools are being used in learning and teaching. It draws out the benefits that these new technologies appear to offer, and highlights some of the challenges and issues surrounding their use. The review forms the basis for a HE Academy funded project, *'Pearls in the Cloud'*, which is exploring how Web 2.0 tools can be used to support evidence-based practices in learning and teaching. The project has also produced two in-depth case studies, which are reported elsewhere (Galley et al., 2010, Alevizou et al., 2010). The case studies focus on evaluation of a recently developed site for learning and teaching, Cloudworks, which harnesses Web 2.0 functionality to facilitate the sharing and discussion of educational practice. The case studies explore the extent to which the Web 2.0 affordances of the site are successfully promoting the sharing of ideas, as well as scholarly reflections, on learning and teaching.

Our aim in this review is to draw on the existing body of international literature in this field. It synthesises some empirical evidence on the patterns of use of Web 2.0 tools and social media in higher education and structures findings in themes relevant to communities of educators. Although evidence exists regarding the benefits of Web2.0 in informal learning environments, and within administrative contexts, results from longitudinal studies showing the depth of change in pedagogical practice in either tertiary or post-tertiary education are either scarce or far from consensual. And while an emerging body of literature focuses on experiences of learners, structured evidence regarding the issues surrounding integration in formal education, such as those outlined above, is only slowly emerging. The next section describes our methodology for the study. The report is divided into the following sections:

- Introduction
- Methodology
- Changing technologies
- Changing learning and learners
- Changing teaching and teachers
- Strategies for promoting the use of technology
- Contextual examples
- Conclusion
- Appendices
 - Appendix 1: An open approach to literature reviews using Cloudworks
 - Appendix 2: A typology of Web 2.0 tools
 - Appendix 3: A review of e-learning models and frameworks
 - Appendix 4: Paradoxes created by the networked and digital
 - Appendix 5: Factors influencing the lack of uptake of Web 2.0 in Higher Education
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- Appendix 7: Different approaches to shifting thinking and promoting change
- Appendix 8: Open Educational Resources
- Appendix 9: Issues raised by the introduction of Web 2.0 technologies
- References

Methodology

We have drawn on existing evidence from larger and smaller scale reports, anecdotal accounts of innovative practices of mainstream Web 2.0 in education, and conference papers and journal articles to identify and surface trends, experiences and challenges regarding the take up and use of Web2.0 in formal learning contexts. We have also scrutinised accounts of collaborative projects regarding the pedagogical integration of Web 2.0 within HE contexts, and searched for recorded experiences of practice from relevant edu-blogs and established networks on scholarship in education, as well as peer-reviewed papers. Being reflective and experimental in our research, we sought to open up the debate, solicit insights and share resources in a public space. The review was informed by secondary research pointing to the impact of social media/software and Web 2.0 in learning and teaching. The focus has been on emerging trends and evidence on practices and challenges in the field of higher education in OECD countries. Following an initial review of existing relevant reports with a UK, US or an international focus (e.g. BECTA, 2008; 2009; NSF Cyberlearning, 2008; Frankling and Armstrong, 2008; Ala-Mutka et al., 2009; JISC, 2009; Redecker, 2009; OECD, 2009), we devised an initial structure and set of sub-categories and started performing searches on each topic in progressively more detail, reducing the set until a listing of themes regarding trends, projects and evidence relating to practices and challenges was selected.

In order to collect evidence from research publications (peer reviewed journal articles, books and book chapters) we performed searches with specialised journal and conference proceedings databases including:

- ERIC
- Igenta connect
- Sage journals online
- Communication and mass media complete
- Elearning and TEL
- Informaworld
- Relevant e-learning conferences, such as ALT-C, ASCILITE and Networked learning

Additional Google scholar searches were performed, using keyword and boolean searches on terms including: 'Web 2.0' 'social media' 'social networking' 'higher education' 'learning 2.0' 'virtual words', 'social learning' 'participatory learning' 'teaching practices' 'reflection' and 'teaching'. Finally, specialised networking and community sites were searched (include ECAR, EDUCAUSE, EvidenceNet, ELSIG, JISC, Higher Education Academy subject centres and Cloudworks). As the second case study within the *'Pearls in the Clouds'* project focuses on the use of Cloudworks for supporting practices and discussions around Open Educational

Resources (OER), more targeted searches regarding openness and OER were also performed in the above databases and in specialised sites through Boolean operators.

It was clear from this initial round of searches that there is little in the way of meta-reviews and empirically-grounded or longitudinal studies. There are however many case studies on specific use of Web 2.0 tools and a rich body of evidence investigating the learners' voice. This learner voice research is giving valuable insights about the experiences and expectations that learners have about using technologies to support learning. Research looking at the 'teacher voice' and their expectations and experiences is smaller. Similarly, there is a dearth of evidence looking at the ways in which these new technologies are or could change learning and teaching practice. The largest body of evidence comes from scholars and educational technologists who are involved in e-learning and distance learning and from proponents of open learning and OER.

In addition to the traditional literature review strategy outlined above, we also conducted what we are labelling an 'open review' using the Cloudworks site. We define an 'open review' as one that uses a social networking space to aggregate and collectively discuss an evolving body of literature around a set of core research questions. To initiate the open review a cloudscape was set up¹. The nature of the project was described and an outline of how we planned to use Cloudworks to conduct the open review:

We are using Cloudworks as a place to share awareness of, and critically evaluate relevant literature, but also to elicit views, ideas, and experiences surrounding the use of Web 2.0 in Higher Education. The resultant Cloudscape will be referenced in the final report to the HEA and in appreciation of your contributions, you will be acknowledged explicitly in the report in the form of quotations. All comments will be subject to a Creative Commons Attribution licence. In part, this is a self-reflective exercise in that we want to see how this cloudscape evolves as an example of Web 2.0 practice in the HE context. The initial cloud representing the state of the review and some initial references is below.

A detailed overview of how Cloudworks was used to support an open review is provided in the first in-depth case study, part of the *'Pearls in the Clouds'* project. The way that the site was used to support the Web 2.0 review outlined here, is discussed in more detail in Appendix 1, 'An open approach to literature reviews using Cloudworks'². A summary explanation is provided here for completeness.

Five spaces ('clouds') were set up around core questions associated with the review, as a means of stimulating the debate:

- Is there evidence of productive and creative use of Web 2.0 in HE?
- What are the barriers and enablers to the use of Web 2.0 in HE?
- What are the barriers to sharing experiences and teaching ideas in a public space?
- Why has general Web 2.0 practices not translated well/ extensively into an HE context?
- Web 2.0 tools for building pedagogical wraparounds in OERs?

¹ Reviewing the use(s) of Web 2.0 in higher education: <http://cloudworks.ac.uk/cloudscape/view/1895>

² Literature review of the uses of Web 2.0 in HE: <http://cloudworks.ac.uk/cloud/view/2294>

In addition we adopted an 'open' approach to the literature review, using Cloudworks as a space to aggregate and discuss resources and references. The nature of the Cloudworks site is that it acts as a means of collectively aggregating resources, as well as a space for shared discussion. It combines some of the features of collective blogging, coupled with a discussion forum and social bookmarking. A screenshot of part of the literature review cloud illustrates this. After a description of what the focus of the cloud is, underneath can be seen the start of a discussion thread and an aggregation of links and academic references (see contribute tab below, in Figure 1 below).

More relevant clouds were added to the cloudscape on an ad-hoc basis, both by us as the literature review researchers, as well as the broader Cloudworks community. Some of the clouds (including those outlined above) focused specifically on the literature review, but in addition clouds were added that touched on topics of relevance to the review which were already available on the site or became available during the review. These included clouds on new literacies, Web 2.0 pedagogies, and the use of specific Web 2.0 tools in education (such as Twitter and blogs). The space acted as a means of harnessing a broad range of views on topics related to the focus of the review and acted as a conduit for sharing of relevant resources, academic references and emerging discussions. A few contributors put forward empirically based studies as well as anecdotal evidence to support their arguments.

The aim of using Cloudworks as a supplementary tool in researching for this review was to get broader input into the consultation than would have been possible with desk research alone. It was also as an experiment to work towards developing a model for social scholarship that could support the development of collective wisdom as part of the broader in-depth case study work. This has worked to an extent, and though most clouds illustrate 'outbursts' of expression and contribution for short periods (see for example 'Using twitter with students'³). Sustained interaction is also evident by a few users in clouds such as the one entitled 'literature review'.

³ Using Twitter with students: <http://cloudworks.ac.uk/cloud/view/2398>

Literature review of use of Web 2.0 in HE

☆ Favourite 1213 views 2 favourites

Evolving review of current literature in the area

This cloud has been set up as a space for our evolving review of the literature of the use of web 2.0 in HE. We will add more on the structure and links etc as they emerge. Our tentative structure for the report is:

- Introduction and methodology of study
- Key findings – themes from empirically grounded literature / studies
 - Types of Web 2.0 (peer-collaboration, networking, grid technologies for eScience, eSocialScience, public and private)
 - Higher education and informal learning: re-assessing boundaries?
 - E-research/e-scholarship, teaching and learning, blended models [c.f. the positionality of educational technologists in HE institutions]
 - Crowdsourcing in HE and OER platforms OERs
- Discussion - opportunities, risks and policies: beyond the hype and sustainability and media (information and skills) literacies
- Recommendations and suggestions for future work

As our work develops we will provide a link to the evolving report itself. Contact details: p.alevizou@open.ac.uk
g.c.conole@open.ac.uk

Contribute

Discussion (14) Links (33) Academic References (28)



[Gráinne Conole](#)

2:24pm 15 September 2009

Giota I have added the IPTS review of e-learning 2.0 and also the NSF cyberlearning report and reference Jenkin's report. Also of course Downes' original 2006 paper.



[Giota Alevizou](#)

1:39pm 30 September 2009

Gráinne, I have updated the structure above slightly. There's a plethora of resources, and a couple of issues arise regarding focus. Do we want to focus on reviewing existing empirically-grounded studies on the use of Web 2.0 in HE (experience from practice/use), or studies that review the potential drawing on smaller scale studies. Some ideas come to mind here to draw distinctions among a) the use of collaborative open infrastructures sharing/building knowledge (e.g. grid techs, dept wikis, scholars' blogs) b) the use of social

Figure 1: The literature review in Cloudworks (<http://cloudworks.ac.uk/cloud/view/2294/>)

A number of other sources of evidence were reviewed. In particular, a lot is written on this topic through personal blogs, self-published essays and reflective diaries. This includes reflections on the implications of new technologies for learning and teaching, strategies for more effective take up of technology, identification of barriers and drivers to adoption, and critiques of impact on learner experience and teaching practices. Although these softer sources of evidence are not subjected to the standard peer review process, they can offer valuable insights into the perceived state of the landscape of Web 2.0 in Higher Education; in some ways they are evidence of ‘practicing what you preach’, i.e. use of the medium to understand the nature of the medium. Although a systematic categorisation of these resources was beyond the scope of this review, we include a selection of relevant reflections in the section that outlines the contextual examples.

Changing technologies

The technological environment within which modern education operates is becoming increasingly complex; offering new possibilities but also giving rise to challenges. We have seen a continual evolution of technologies and how they are used since the introduction of the Internet. Web 2.0 tools, virtual worlds, simulations, haptics and mobile technologies continue this trend of co-evolution and we are only beginning to develop an understanding of what the trajectory of this co-evolution will be. De Freitas and Conole (2010) suggest five broad technological trends that are likely to have a significant impact on education:

- A shift towards ubiquitous and networked technologies
- The emergence of context and location aware devices
- The increasingly rich and diverse different forms of representations and stimulatory environments possible
- A trends towards more mobile and adaptive and adaptive devices
- A technological infrastructure which is global, distributed and interoperable

The emergence of Web 2.0 tools

Appendix 2 offers a detailed typology of Web 2.0 tools , categorising them according to the ways in which they are used. This section considers some of the key features of these tools. It concludes by describing some of the overarching features and patterns of behaviour that are emerging through use of these tools.

The term ‘Web 2.0’ is attributed to Tim O’Reilly (2005). Since then it has gained widespread use, penetrating also the discourse of learning and teaching. Related terms such as the ‘read and write web’ and the ‘social web’ give an indication that the term refers to a shift in web tools and practices towards more participatory, user interaction. Although the term has no single definition, there is a widespread agreement that it applies to a wide set of functional characteristics, within the context of computer-mediated communication and networked digital media. These not only point to the increased possibilities for publication (compared to earlier generations of the web), but also encourage, and are supportive of, user participation in the uploading and sharing of digital artefacts.

In the last few years much has been written about the ways in which these tools are changing practices; practices that involve shifting from the web as a content repository and information retrieval mechanism to a web that enables more social mediation and user generation of content. New practices are emerging:

- sharing of images, videos and documents (as is evident with sites such as Flickr, YouTube and Slideshare)
- mechanisms for content production, communication and collaboration (through blogs, wikis and micro-blogging services such as Twitter and social sites like Facebook, Elgg and Ning)
- opportunities to interact in new ways through immersive virtual worlds (such as Second Life).

The social interface of Web 2.0 offers novel ways for connecting people and sharing and discussing ideas. It can be used to support and enhance existing communities or to foster the development of new communities of inquiry and exploration. There seems to be a tantalising alignment between the affordances of digital networked media (the focus on user-generated content, the emphasis on communication and collective collaboration) and the fundamentals of what is perceived to be good pedagogy (socio-constructivist approaches, personalised and experiential learning) (Conole and McAndrew, forthcoming: 2).

The emergence of Web 2.0 tools sits within a broader context of continual technological change. The 2010 *Horizon Report* identifies four trends as key drivers of technology adoption in higher education for the period 2010 through 2015 :

- The abundance of online resources and relationships inviting a rethink of the educators' role in sense-making, coaching and credentialing.
- An increased emphasis on, and expectation of, ubiquitous, just-in-time, augmented, personalised and informal learning.
- The increased use of cloud computing challenges existing institutional IT infrastructures, leading to notions of IT support becoming more decentralised.
- The work of students being seen as more collaborative in nature and therefore there is potential for more intra- and inter- institutional collaboration (Johnson et al., 2010).

While the Horizon series of annual reports have contributed to research into future trends and emerging priorities within a US context (see for example the NSF Cyberlearning Report, 2008), several other reports have also outlined recent and developing international practice regarding the patterns of adoption and/or use of Web 2.0 in education (see for example, Armstrong and Franklin, 2008; OECD, New Millenium Learners, 2008; OECD-CERI, 2009). In particular, Redecker (2009) and Ala-Mutka et al. (2009) report findings from a European perspective focusing on formal and informal education respectively. In the UK, BECTA's *Emerging Trends of technology in Education* and *Harnessing Technology: Next Generation Learning 2008-2014*, as well as JISC's *Learner Experience* programmes have produced numerous case studies and reports (see BECTA/Crook et al., 2008; Davies and Good, 2009). JISC's most recent comparative report looks into the strategic and policy implications for higher education of the experiences and expectations of learners in the

light of their increasing use of Web 2.0 technologies (JISC, 2009). Engagement in Web 2.0 environments provides, it has been argued, more avenues for self-representation, expression or reflection and more organized forms of collaboration and knowledge building. Re-generation of content through remixing and repurposing, as well as networking and group-interaction are common activities.

While activities such as these were also evident in earlier generations of networked computing and online services (for example Usenet groups, bulletin boards and discussion forums, Multi-UserDomains and MOOs, use of Instant Messaging protocols, personal and institutional web pages to promote individual or project-based activities and interests; see BECTA/Crook et al. , 2008), 'Web 2.0' marked a watershed in terms of a significant shift in practices. A number of factors contributed to this shift. These include: advancements in the technological infrastructure, increased Internet and broadband adoption, and user-friendlier interfaces for navigating, archiving, communicating and collaborating on the web. Together, these have contributed to scaling up user access and involvement. In the OECD countries (OECD, 2009) web services are becoming less expensive, faster, and increasingly based on wireless technology. Advancements in access and speed have been accompanied by a similar level of advancement in terms of developments in software and data management. At its simplest, familiar web browsers have become more versatile, allowing not only a wider range of user interactions, but also interoperability with numerous desktop applications.

A typology of Web 2.0 tools

The following categorisation of Web 2.0 activities is derived from a BECTA-commissioned review of Web 2.0 tools in schools (Crook et al., 2008):

- **Media sharing.** Creating and exchanging media with peers or wider audiences.
- **Media manipulation and data/web mash ups.** Using web-accessible tools to design and edit digital media files and combining data from multiple sources to create a new application, tool or service.
- **Instant messaging, chat and conversational arenas.** One-to-one or one-to-many conversations between Internet users.
- **Online games and virtual worlds.** Rule-governed games or themed environments that invite live interaction with other Internet users.
- **Social networking.** Websites that structure social interaction between members who form subgroups of 'friends'.
- **Blogging.** An Internet-based journal or diary in which a user can post text and digital material while others can comment.
- **Social bookmarking.** Users submit their bookmarked web pages to a central site where they can be tagged and found by other users.
- **Recommender systems.** Websites that aggregate and tag user preferences for items in some domain and thereby make novel recommendations.
- **Wikis and collaborative editing tools.** Web-based services that allow users unrestricted access to create, edit and link pages.
- **Syndication.** Users can 'subscribe' to RSS feed enabled websites so that they are automatically notified of any changes or updates in content via an aggregator.

Appendix 2 ('A typology of Web 2.0 tools') provides a more detailed description of each of these and some specific examples.

It is important to note that the current wave of Web 2.0 tools have evolved from earlier tools for sharing and communication (see also boyd and Ellison, 2007). However the functionality of Web 2.0 tools means that previously diverse online services and niche social networks can be integrated more effectively. Common features include tagging, commenting, rating, syndication and the development of relationships (or 'friendships'). The network is seen as a platform for dialogue and collaboration and user-generated content as a mutually added value component for community building. In addition to the vast ecology of informal, professional, educational or blended crowd-sourced, open and semi-open projects, there exist community-based scientific resource sites and sites that emerge from the collaboration of public institutions, museums and charities; these depend on participatory exchanges, cultural and scientific citizenship to scale contributory interpretations and user generated content (see Von Hippel, cited in NSF Cyberlearning, 2008: 28).

The multiplicity of tools and mediated avenues for creativity and socialisation thus not only contributes to a boundary crossing between professional communities and groups concerned with recreational and fandom⁴ activities, but also, have given rise to novel ways for information organization, knowledge generation and learning facilitation. In the review of social software for learning, Grant et al. (2006) suggest at least three fundamental shifts in thinking about the relationship among knowledge, culture, learning and pedagogy. First, they note that the modes of inquiry encouraged by Web 2.0 practices tend to be less oriented to the traditional disciplinary boundaries of knowledge. Instead, the learner is invited to adopt a conception of knowledge as something available to be personalised or re-appropriated. Second, Web 2.0 encourages engagement with knowledge in new ways. For instance, it encourages a more animated browsing and scanning orientation. Third, practices of knowledge production are being altered. In particular, learners are being drawn into inquiry methods that are more collaborative and less solitary. The collaborative spirit and open ethos of the activities outlined above, and many others like them, are often combined into a prevailing sense that Web 2.0 'has created greater opportunities for access, debate and transparency in the pursuit of knowledge than ever before' (Wales, 2008: np).

A recurrent discourse around the application of Web 2.0 technologies in an educational context points to the notions of evolution and transformation; transformation, in terms of transcending formal educational contexts; evolution in terms of facilitating more informal and non-formal learning contexts which blur the boundaries between categories of learners (student, adult-learner, or informal learner, autodidact). The arguments for this also centres around the notion that learners are now able to become more active producers, authors, evaluators and commentators within the learning arena they are engaged with. The question then directs attention to the novel paradigms of learning and for knowledge

⁴**Fandom** (from the noun *fan* and the affix *-dom*, as in *kingdom*, *freedom*, etc.) is a term used to refer to a subculture composed of fans characterised by a feeling of sympathy and camaraderie with others who share a common interest (Wikipedia, Entry on Fandom: ' <http://en.wikipedia.org/wiki/Fandom>)

building, but also to foundational issues that will affect educational institutions and practice for the future.

Changing learning and learners

Theories of learning

This section considers different pedagogical approaches specifically in relation to Web 2.0 practices. Views on categorisation of learning theories are strongly contested and definitions for different aspects are not clear-cut. Furthermore, whilst theories of learning have never been static, arguably the ‘fluidity’ and complexity of new online spaces and the ways in which they are being used to support different forms of learning means that the distinction between pedagogical approaches (such as behavioural, cognitive, developmental and critical pedagogy) is being eroded. Nonetheless, it is possible to draw out some patterns as to what constitutes good pedagogy, irrespective of the underlying epistemological beliefs that different theorists and schools of thought hold. This section provides a review of current theories of learning in the context of their application to exploitation of new technologies for learning.

Mayes and de Freitas (2004) grouped learning theories into three categories:

- Associative (learning as activity through structured tasks)
- Cognitive (learning through understanding)
- Situative (learning as social practice).

In addition to the categorisation provided by Mayes and De Freitas, a number of other authors have written about learning theories and how they relate to e-learning. Conole et al. reviewed learning theories and mapped them against a pedagogical framework (Conole, et al., 2004). Dyke et al. (2007) built on this work by providing an overview of the main learning theory perspectives along with an indication of the kinds of e-learning practice they most obviously support. Ravenscroft (2003) linked pedagogical theory to specific examples of e-learning innovation. Learning theories are frequently captured in pedagogical models or frameworks that emphasise a particular approach. A recent review of the key models or frameworks that have been used in e-learning described twenty common models or frameworks across the different theoretical perspectives (Conole, 2010). Appendix 3 (‘A review of e-learning models and frameworks’) provides a summary of this work.

A lot of early application of e-learning was essentially behaviourist in nature. This ‘page turning’ mentality has been criticised resulting in researchers exploring the ways in which more interactional, student-centred and socially mediated approaches might be applied. Many argue that behaviourist approaches, which focus on prescriptive shaping and systematic guidance of the learner towards inscribed goals are inappropriate for Web 2.0 environments. Nonetheless Web 2.0 tools can support associative pedagogies and be used effectively in terms of providing structured guidance through tasks and through provision of effective and timely feedback. This might include the adaption of a learner’s personal learning environment to provide a structured learning pathway, using interactive e-

assessment activities, aggregation of resources around learning themes or effective use of collective intelligence tailored to individual learning needs.

Cognitivism emphasises the metaphor of 'information processing' to express the development of thinking and argumentation. This includes reflection of one's own thinking and outward articulation or orchestration of several different types of learning activities (i.e. attention, selection, reasoning, prediction, and reviewing). There is good evidence that outwardly articulating one's learning can enable self-awareness (e.g. Chi, 2000). Processes of self-publishing and reflective blogging can support this type of metacognition. Mejias (2006) describes the use of social networks to facilitate distributed research. He argues that social networks have the advantage of *both* engaging students in scaffolding experiences *and* developing the practical research skills needed to make best use of online information networks. He points out that the 'power of many' exposes an individual to far more research, resources and ideas than they could possibly generate on their own.

Constructivism has been a key strand of educational discourse for more than twenty years. Technologies have been seen as a means of enabling new approaches to constructivism, *both* in terms of enabling the learner to take control of their learning and in terms of enhancing the social dimensions of learning. Dalsgaard (2006) argues that social software tools can support a social constructivist approach to e-learning by providing students with personal tools and by engaging them in social networks, thus allowing learners to direct their own problem-solving process. A good example of a framework that promotes constructivism is one that was developed by Jonassen et al. (1999; 2003). It can be used as a guideline to develop Constructivist Learning Environments (CLEs). To integrate the social dimension into the pedagogy of online learning environments, Felix (2005) has proposed the synthesis of the cognitive constructivist and social constructivist approaches. In the cognitive constructivist approach, the focus is on cognition that occurs in the mind of the individual, with the learner making intellectual sense of the materials on their own. The social constructivist approach emphasises the socially and culturally situated context of cognition, in which knowledge is constructed through shared endeavours. The interactions in the online environment, for example through collaborations or discussions using forums, or in wikis and blogs, enable knowledge to be constructed individually, but mediated socially (see for example Minocha 2009: 12 for a recent example). The inter-subjectively rich, open dialogues that these environments can facilitate are valuable resources that can help shape the trajectory of learning as an exchange of strategic guidance (Crook et al., 2008: 31).

Social tools and interactive Web 2.0 environments enable learners to adopt exploratory and creative positions, without overlooking the social dimension of orchestration and design (or indeed governance if a community space is enabled). Building on this theme, social constructivism emphasises the importance of the learner being actively involved in the learning process. While the cognitive approach is concerned more with knowledge architecture and mapping, theories such as connectivism and distributed cognition emphasise the negotiated, networked and distributed nature of learning across physical and virtual spaces. Mason and Rennie (2008) accept Siemens' (2004) proposition that Web 2.0 methods and tools permit the educational process to transcend constructive theories by moving from isolated, individual activities to interactive exchanges amongst a community

of collaborating learners (i.e., collaborative constructivism, or connectivism, puts an increased emphasis on involving the student in active participation and in the process of learning). Siemens (2006) places the network and networking in the centre of the learning process. This 'net-centric' perspective sees knowledge not necessarily as a progressive accumulation, but rather as a process for building, maintaining and utilising connections. In contrast, Ackermann (2004) emphasises the experiential and active approach to learning and knowledge building, pointing to the process that builds on both individual and collective endeavours.

Socio-cultural perspectives emphasise the socially-situated and cultural dimensions of learning, that are arguably missing from the other perspectives. Across their long cultural history, human beings have constructed resources allowing them to drive cognition from the private or mental world of 'thinking' into the public and external world of acting with tools and artefacts (e.g. diSessa, 2001). This collection of resources for problem solving and reasoning is at the heart of what is meant by 'culture'. With this perspective of learning, what gets done is mainly organised in the externally designed space of action (rather than just the internal space of the mental world). This promotes the view of learning as acculturation rather than acquisition. The social is centrally located in the scaffolding approach of cultural appropriation. Mediation of the learning experience is, according to Vygotsky (1971), a form of intervention (a form of auxiliary stimulus). By focusing on experience during the processes of thinking and learning (metacognition), mediating artefacts (such as linguistic modes of address and tools that enable reflection and dialogue) can contribute to effective learning behaviour. Using mediating artefacts, experts and novices can co-construct ideas for problem solving and decision making. Conole considers this with respect to the range of mediating artefacts teachers, learner and developers used to support the design and delivery of learning (Conole, 2008). Personalised learning environments put learners in control, particularly regarding motivation around interfaces of learning. Participation in collaborative activities, and learning contexts as a community of practice, is seen as another component in the process of learning beyond acquisition.

Lave and Wenger's work on Communities of Practice (CoP) (Lave and Wenger, 2001; see also Wenger, 1998) has been drawn on extensively in this field. Wenger defines a CoP as incorporating important mechanisms for meaning negotiation, learning and identity building. Participation in shared goals, and through shared resources, can be seen as a process of appropriation of social and cultural aspects of knowledge, whereby the learner becomes prepared for participation through the process of participation itself (Rogoff et al., 2003). Although the notion of inscribed goals, boundaries, rules, monitoring possibilities and sanctioning are core characteristics of community sustainability (see Koper et al., 2004), social interaction, co-evolution of activities and tasks and humour are also core components of success and effectiveness (see Kester et. al, 2006; Engstrom, 2007). Mediating artefacts play an important role and the socio-cultural approaches move the focus away from the materiality of the tools themselves, towards the actions/contexts in which the media are used. If the social web shifts models of teaching from transmission to dialogue and is indeed capable of enable individuals to construct knowledge media (Dalsgaard, 2009), their use in the meaning making process is core.

Selwyn (2009) argues that educational practices that are concerned with the exploratory and social, the reflective or immersive aspects of knowledge building will find Web 2.0 tools and social media powerful. At the same time, it is also assumed that the core affordances of Web 2.0 tools blur the boundaries between production and use (Bruns and Humphreys, 2007). This can in turn have an impact on all four principle aspects of the learner experience: the cognitive, the constructive, the social and the situative (see also Mayes and de Freitas, 2007).

New forms of learning

Having provided a general discussion of learning theories and their relationship to Web 2.0 tools, this section describes four specific examples of the ways in which these tools might promote new forms of learning, namely:

- Inquiry-based and exploratory learning
- New forms of communication and collaboration
- New forms of creativity, co-creation and production
- Richer contextualisation of learning

Web 2.0 technologies and practices provide new mechanisms for inquiry-based and exploratory learning. Distributed collection of data is possible, as are new ways of organising and representing multiple data sources. New tools are emerging for interrogating and analysing data, along with rich social and information environments to support research communities. In this respect, cognitively, Web 2.0 invites users to familiarise themselves and develop confidence in new modes of inquiry. It also brings challenges to both learners and teachers in terms of a blurring of the boundaries of control in these contexts, as well as raising issues about the legitimacy of information in these new distributed, mixed-environments (e.g. Keen, 2007).

The ephemeral nature of web knowledge is not only an asset enabling multiple locations, users and re-mixing, but also a liability, which can lead to cognitive overload, confused authorship and loss of credibility. New forms of media and information literacy for filtering, navigating, organizing and manipulating relevant content (for a more developed discussion of literacy, see below) are required.

Social networks enable new forms of communication and collaboration. The importance of collaboration is a common ingredient in many of the learning perspectives, as it is generally considered to be an important means of developing understanding through shared dialogue and co-construction. An ecology of social networks has now developed, ranging from those congregating around common interests or kinship, through to those associated with more formal community contexts (such as formal learning contexts or professional networks). These ecologies are facilitated by a range of processes of engagement instantiated through the new technologies, making peer guidance, reflection and support possible in a variety of new ways and at a scale not seen before. For example, the ability to openly comment upon and critique other people's work has become a standard practice within the blogosphere and has been taken up by academics (through self-reflective blogs for teaching and digital scholarship) and researchers. In teaching contexts, students can socialise with peers through social networks, providing mutual support and a forum for shared dialogue.

Typical activities in these spaces can include practicing writing skills, contributing to collective cohort blogs, or critiquing each other's personal portfolios (Ellison and Wu, 2008). As such shared perspectives or crowdsourcing practices have become more common-place, there is a growing argument that these practices are key to innovative thinking and problem solving (Leadbetter, 2008; Surowiecki, 2004). Use of such social networks between students and teachers has been arguably less successful, with students often seeing this as an intrusion into their more personal, learning and social spaces (Farmer, 2006).

Similarly, creativity and new forms of co-creation and publication are also possible. The distributed nature of Web 2.0 technologies means that learners may have easier access to the expertise of others, to authentic environments and to distributed audiences. The creation of an audience for learners can be motivational in a number of respects: as a means of providing an outlet for demonstrating their learning and as a mechanism for getting feedback. Web 2.0 technologies not only blur the boundaries between learners and teachers, but also between teaching and research, meaning that learners can participate in and contribute to real research work. At the same time, participation and coordination in online social and creative spaces can appear in varying degrees of scale and depth, including more sophisticated levels of interpersonal dialogue and deliberation (Farmer et al., 2008; Kim, 2008). Such networks and environments need to be carefully constructed; it is important to build capacity for collaborative engagement under fluid, heterarchical structures. Similarly, participants (both the learners and the teachers) need to develop the relevant set of skills to be able to be effective co-creators. Key characteristics in such contexts include the ability to take flexible roles (learner as teacher and vice versa for example), as well as the development of an individual and collective sense of responsibility and pride (Burgess, 2006; Ellison and Wu, 2008; see also Bruns and Humphreys, 2007 in relation to wikis). Such notions of co-dependence, construction and fluidity however may clash with ideas about ownership and in a formal educational context raising fundamental issues about what types of assessment are appropriate and meaningful.

Socially situative learning perspectives emphasise the context within which learning occurs. Web 2.0 tools provide particular opportunities for personalising and contextualising learning. It is now possible to deconstruct resources, tools and activities so that they can be recombined or remixed according to individual preference (i.e. the educational application of the notion of 'mash ups' described earlier). Learners can also create their own content and resources, enabling increased creativity and flexibility within the curriculum. Such personalisation and re-appropriation of existing resources also has clear potential to support better forms of independent study and to facilitate personal resource management. Such user-centred approaches, many believe, are important, not least because of the affective and motivational benefits derived from the ability to personalise, but also because the process of appropriation by default leads to the learner developing their digital literacy skills and fosters participatory learning.

Patterns of technology use and the characteristics of learners

According to the 2008 ECAR survey of students' use of computers, students are using technologies both for academic purposes and for social activities. Similarly, the OECE report

on Millennium Learners (OECD, 2009) lists access to the library website (93.4%) and the use of course management systems/VLEs (82.3% several times a week) as the two largest uses of technologies for academic purposes. The significant use of VLEs demonstrates that they are becoming increasingly a mandatory campus commodity (OECD, 2009: 14). Of the entertainment-related and networking activities, use of social networking sites (daily 85.2%), Instant Messaging (73.8 % daily) and music/video downloads (77, 3% weekly) was also high. An Ipsos Mori survey revealed that 79% of British first-year students (Ipsos Mori, 2008) access course-specific materials at least once a week and 97% of this group found it useful. Among the entertainment-related activities, use of social networking sites such as Facebook is increasing on an annual basis. A similar picture can be seen in Australia, where a significant number of students frequently use the university learning management system to access course/related materials (81%; Kennedy et al., 2006).

The conviction that Web 2.0 applications would transform Internet users increasingly into content producers (OECD, 2007) is also confirmed on the basis of this data. For example, more than one-fifth of US higher education students are actively contributing content to blogs, wikis, photo or video websites and 18% contribute regularly to at least three of these. However, 39% declare not to have contributed to any of these (OECD, 2009: 15). The pattern of Australian and British students seems to be similar to the one in the United States (Kennedy, et al., 2006, Jones and Cross, 2009). A study from Pew Internet and American Life found that in the United States more than half of the 12 million teens online create original material for the web, with original artwork, photos or video (Lenhart, Madden, Rankin Macgill, and Smith, 2007 cited in OECD, 2009: p. 21).

Although students in the OECD countries appear to be heavy users of social media and new technologies in general, the profile of students is not uniform; the intensity of attachment with technologies as well as the patterns of uses bears socio-demographic and gender variation. The figures for participation in role-playing games (MMORPGs) is lower than might be expected and gendered uses are evident: more males users than females. Similarly the use of virtual worlds, such as Second Life, is low; in the US less than 9% of students are using 3D-virtual worlds in higher education (OECD, 2009: 15). This is despite the perceived benefits these environments offer pedagogically and the high expectations in terms of their value for higher education (Chittaro and Ranon, 2007; De Lucia, Francese, Passero, and Tortora, 2009; Di Blas and Poggi, 2007).

The previous section reviewed the ways in which new technologies *might* support more Web 2.0-orientated forms of learning; emphasising their user-generated, participatory and situative nature in particular. A body of research has emerged in recent years, which has been focusing specifically on collating evidence of the extent this is true. The initial discourse around learners tended to foreground the positives; a picture was painted of a new generation of learners who were digitally savvy and technological immersed, terms such as 'digital natives', 'millennium kids' and the 'net generation' peppered this discourse. However as the sub-field has matured and a larger body of evidence has been gathered, the general consensus has become more considered and realistic. So, although it is true that many younger learners have grown up in a technology-mediated environment, this does not mean they have the necessary skills to be able to harness these for academic and learning purposes. It is also true that there is a wide spectrum of learners, with different

preferences in the ways they like to learn, the degree to which they wish to engage with technologies and the standard of their general study skills and academic performance.

Some of the original rhetoric around technologies being associated with significant shifts in the nature of contemporary learners can be traced back to the work of researchers like Oblinger and Prensky. Prensky coined the phrase 'digital natives' (Prensky, 2001) to describe a generation of learners who have grown up in a world of computers, mobile phones and the web; i.e. a generation reliant upon digital media and tools. Prensky and others argued that these digital natives are seen to stand in stark contrast to older generations of 'digital immigrants', who adopted digital media later on in their lives. Terms such as 'Internet generation', 'generation M' (media), 'generation V' (virtual), 'google generation' (Brabazon, 2007), 'generation C', 'Nintendo kids', 'Millennials' (OECD, 2008) typify this movement (see, for example, Oblinger and Oblinger, 2005; Tapscott, 1998; and Kennedy et al., 2008 among others, for an empirically grounded critique of such rhetoric).

Certainly Oblinger and Oblinger's (2005) book, 'Educating the Net Generation', provides a useful starting point for recent research exploring students' use of technologies. It provides a kind of watershed in terms of tuning into the increasing research interest in studying how learners are interacting with new tools, and how this might be changing the ways in which they are learning. In their introduction, Oblinger and Oblinger note, 'we hope this book will help educators make sense of the many patterns and behaviors that we see in the Net Generation but don't quite understand' (2005:7).

Constantly evolving technology lies at the heart of mobile, connected, and as Bauman (2005) and Urry (2007) have called it 'liquid lifestyles'. These digital natives are thought to expect technology to assist fluidity in all aspects of their lives, including the ways in which they learn and are educated. They are thought to have distinct expectations of education that involve learning which is personalised, accessible on-demand, and available at any time, any place, or any pace and are often contrasted with teachers and parents, who are labelled as being 'digital immigrants' or 'visitors' (White, 2009).

The uniformity of such learners, and indeed the rhetorical articulation of the technologically deterministic, generational, regional or temporal definitions have been widely contested (Davis and Good, 2009; Jones and Cross, 2009; White, 2009; Buckingham, 2006), and the multiple dimensions of the digital divide have repeatedly been addressed. Increased connectedness, immediacy, multitasking, media and critical literacy, networked skills, but also, emotionality, time management and indeed learner differences and tutor influences are some of the themes which have been considered across a range of in-depth case studies and surveys (Richardson, 2008; Sharpe et al., 2008; Thorpe et al., 2008).

One of the main reasons cited by students for using technologies in their courses is convenience. Technologies are seen as adding value to courses, not as mechanisms for radical transformation. For example, Caruso and Kvavik (2006) found that the most commonly cited reason given for using technology in courses was convenience (51% of students), followed by the ability to manage course activities easily (19%), and to a much lesser extent the opportunities to enhance learning (15%) or to communicate with peers and teachers (11%). This is supported by a comparative analysis on existing studies as part

of the JISC's learners' experiences programme (JISC, 2009, see also, Sharpe and Beetham, 2010). From the student perspective, technology is not necessarily a substitute, but a tool for added convenience and control (OECD, 2009). As the authors of the JISC (2009) report note, 'imagining Web 2.0 for social purposes in a study context, presents conceptual difficulties to learners as well as a challenge to their notions of space. They need demonstration, persuasion and room to experiment in this context'. Sharpe and Beetham (2010) capture the essence of findings emerging from learner experience research in their introduction to a recent edited collection on research in the field:

What becomes clear is the extent to which learners are becoming active participants in their learning experiences and are shaping their own educational environments [...] Learners are creating their own blends of physical and virtual environments and of informal and formal learning contexts.

The changing role of teaching and teachers

Having discussed the changing nature of learning and learners in the previous section, this section considers the implications for teaching. As the OECD report on New Millennium Learning in Higher Education (2009: 28) notes, the assumption that most teachers in higher education are digital immigrants might be true on the basis of their age, but is certainly not true with respect to their technology skills and competences. As early as 2003, a Europaeum survey identified high adoption rates of technology in terms of communicating research findings and networking (Flather and Huggins, 2004, cited in OECD, 2009: 28). An Australian survey (Education Network Australia, 2008) found out that 90% of higher education teachers considered the Internet very important for their work. Interestingly they stated that this was not only for research purposes, but also, for improving teaching and learning opportunities and resources for students. Over 10% of teaching staff made a clear reference to the use and integration of digital learning objects. Just over one third of Australian higher education teachers who responded to the survey are convinced that they already possess the ICT capabilities required to transform practice, especially by means of introducing new ways of engaging students (29%), or are proficient and confident in the use of ICT to support learning (37%). Yet, there appears to be a gap between the expertise of teachers in continental Europe and in Anglo-Saxon countries. Mastery of digital libraries and databases are core competences for academic researchers; most use word processors and presentation software for writing papers and presenting findings, many use reference management tools and tools for data analysis. Blogs and wikis are also used to some extent – as a means of disseminating research and collective writing. For collaborative research projects there are a range of Web 2.0 environments enabling the sharing and discussion of research findings.

Downes offers an early review of the potential of these technologies for learning (Downes 2005) and Alexander provides one of the first textbooks exploring the use of these tools for teaching and learning (Alexander 2006). Both outline more open, participatory and heterarchical structures in teaching methods. Reviewing the use of social media like blogs and wikis, Bruns and Humphreys (2007) also argue that the (co-)production of content by the user ('produsage') requires a shift in changing teaching methods towards approaches that support community building through collaboration, heterarchical structures of engagement, mentoring, fostering creativity and critical literacy capacities. Siemens (2009), considering this from the perspective of networked learning and connectivism, reflects on role of the academic teaching methods:

Given that coherence and lucidity are key to understanding our world, how do educators teach in networks? For educators, control is being replaced with influence. Instead of controlling a classroom, a teacher now influences or shapes a network.

Siemens suggests the follow as a list of the new roles that teachers need to adopt in networked learning environments:

- Amplifying
- Curating
- Way-finding and socially-driven sensemaking
- Aggregating
- Filtering
- Modelling
- Persistent presence (Siemens, 2009: np)

Scaling up to the majority will require different approaches, more strategic coordination and staff development and support. To date, on the whole, only a minority of enthusiastic teachers and those with a research interest in the learning sciences, educational technology or new media, have undertaken experimentation with new innovations in pedagogy and exploration of the use of new technologies. Embracing Web 2.0 approaches will require radically different strategies in terms of designing, supporting and assessing learning.

Essentially, the creative change in the practices may lead to deliberate and systemic innovation – both paramount to knowledge-creating organizations (Bereiter, 2002), such as higher education institutions. The learning potential of Web 2.0 is seen to derive from the co-construction of knowledge and the collaborative ethos in self-organised networked and virtual spaces. It is necessary to acknowledge the webs of knowledge created in the social process of teaching and learning (Rudd et al., 2006b). Though it seems unlikely that Web 2.0 will fundamentally displace ‘teaching’ *per se*, it is clear that embracing Web 2.0 practices will mean that more emphasis is placed on teaching processes being situated as active ‘co-learning’ experiences. Adoption of a more scholarly and reflective approach to teaching practice is clearly a logical strategy to help achieve this shift.

Despite the relatively sophisticated technological infrastructure that is now in place in the UK and other Anglo-saxon or OECD countries, deployment of social media at the core of the curriculum within further and the higher education is mostly at an experimental stage (see OECD, 2009). Educators’ confidence in and experience with social media is still perceived as a barrier for successful implementation within teaching and learning in Higher education contexts. Although studies in OECD countries show that teachers may indeed be amongst the most skilled technology users, it appears that they are unable to take advantage of their competence and apply it to the way they teach (OECD, 2008: see also Blin and Munro, 2008; Zang, 2009). According to the OECD (2008) three reasons emerge as the most salient for explaining this paradox:

- The absence of appropriate incentives to use technology in the classroom and, more generally, getting involved in any innovation regarding teaching.

- The dominant culture in the teaching profession is one of applied practice, which does not rely very much on research-based evidence to identify good teaching methodologies and strategies.
- The observation that academic teachers lack the vision and the personal experience of what a technology-enhanced teaching could look like.

The last two reasons suggest that initial teacher training has to be revised and that there needs to be an overall change in the social and cultural context surrounding teaching practices.

Strategies for supporting the use of technologies

The previous sections paint a picture of a vibrant landscape of research activities and developments, of clusters of communities aggregating around common interests and themes. One would assume that collectively these activities should have a significant impact on practice, but they do not. These communities sit alongside actual teaching practices and rarely inform them to any great extent. There does not yet appear to be an evidence-based ethos to learning and teaching practice. However, initiatives such as the Higher Education Academy-funded EvidenceNet⁵ are attempting to change this and sites like Cloudworks, which are specifically harnessing Web 2.0 approaches to encourage educational debate, are indicators that things are beginning to change.

Barriers to uptake and lack of impact

Despite the potential application of technologies in an educational context, their use also raises some fundamental paradoxes (See Appendix 4 'Paradoxes created by the networked and digital' for a more detailed discussion). Surveys on the use of Web 2.0 within education give an indication of the level of uptake (see for example the JISC Ipsos MORI polls, 2008; the annual ECAR surveys; also Education Network Australia, 2008; Lam and Ritzen, 2008). Collectively they suggest that uptake is occurring, but that it is not yet extensive across all aspects of learning and teaching provision. It is important to caution against over-generalisations from these surveys in terms of extrapolating the uptake of both 'formal' and 'informal' Web 2.0 tools as it is difficult to draw comparative conclusions systematically from surveys that use different research instruments.

In a recent paper Conole considers the barriers to uptake of technologies, drawing on the broader literature on resistance to change and innovation (Conole 2010) (See Appendix 5 'Factors influencing the lack of uptake of Web 2.0 in Higher Education' and Appendix 6 'Barriers to change'). Conole identifies the following as commonly cited reasons for lack of adoption:

'I haven't got time', 'My research is more important', 'What's in it for me?', 'Where is my reward?', 'I don't have the skills to do this', and 'I don't believe in this, it won't work'. Common resistance strategies include saying yes (and doing nothing) or undermining the initiative and/or the people involved. Depressingly classic mistakes are repeated over and over again: an over emphasis on the

⁵ <http://www.heacademy.ac.uk/evidencenet>

technologies and not the people and processes; funding for the technology developments but not use and support.

In addition to this list, there are also barriers around the changing nature of privacy and ownership in technological environments. There is a lack of understanding of the implications of adopting more open approaches and indeed negative attitudes and fear of openness. Identification and understanding of the barriers to broader uptake is essential so that strategies can be devised to overcome them. Greenhow et al. (2009a) discuss three ideas that illustrate the tensions between the potential advantages of web-enabled practices and the challenges of implementation: a) developing teachers' professional scholarship and practice; b) building capacities for quality scholarship, and c) bridging disciplinary divides. Strategies to overcome these issues will need to include mechanisms for giving teachers time to experiment with new technologies, support and guidance to enable them to develop the new skills needed to embrace these new technologies and a shift in thinking towards more scholarly and reflective approaches to teaching.

To explore this in a little more depth some examples of different approaches that can be adopted to enable this shift in thinking are described in Appendix 7 ('Different approaches to shifting thinking and promoting change'). The first is around application of ideas from design-based research as a mechanism for engaging teachers in more reflective practice. The second focuses on ways in which changes in practice around the use of technologies can be achieved.

Digital, networked and multi-literacies

New technologies are both challenging existing teacher practice and requiring new skills and ways of thinking. Lankshear and Knobel provide a useful summary of the way in which the term 'digital literacies' is being used (Lankshear and Knobel, 2006). Exact definitions around the term digital literacies vary; however, Gilster's definition of digital literacies, which points to 'the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers', is inclusive of some of these definitions (Gilster, cited in Lankshear and Knobel, 2006; see also Kress, 2003).

Literacy now has to be stretched to encompass other forms of representational fluency than those associated with the printed word. 'Digital and networked literacies' are much more than simply being about understanding information available in a digital context. They are also about skills of interpretation of multiple representations, the ability to develop a holistic and interconnected perspective and to understand how to be part of and interact with a wider participatory community. As learners engage with digital artefacts through Web 2.0, so the curriculum must address the challenge of developing their confidence with new literacies and their increased potential for creativity. Goodfellow summarises the complexity of the field by arguing that literacies are multi-faceted...

...with strands and tribes like: multiliteracies, situated literacies, new literacy studies, academic literacies, digital literacies, etc. etc. (See broader discussion, of which this is part, at <http://cloudworks.ac.uk/cloud/view/2669>).

Jenkins et al. (2006) argue that there are twelve skills needed for full engagement in today's participatory culture:

- Play - the capacity to experiment with one's surroundings as a form of problem-solving
- Performance - the ability to adopt alternative identities for the purpose of improvisation and discovery
- Simulation - the ability to interpret and construct dynamic models of real-world processes
- Appropriation - the ability to meaningfully sample and remix media content
- Multitasking - the ability to scan one's environment and shift focus as needed to salient details
- Distributed Cognition - the ability to interact meaningfully with tools that expand mental capacities
- Collective Intelligence - the ability to pool knowledge and compare notes with others toward a common goal
- Judgment - the ability to evaluate the reliability and credibility of different information sources
- Transmedia Navigation - the ability to follow the flow of stories and information across multiple modalities
- Networking - the ability to search for, synthesize, and disseminate information
- Negotiation - the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms
- Visualization - the ability to interpret and create data representations for the purposes of expressing ideas, finding patterns, and identifying trends (Jenkins et al., 2006: np.)

This list shows the multifaceted nature of digital literacies. Jenkins et al. (2006) define participatory culture as being about involvement and participation, about being able to create and share work and about peer mentorship and support. They go on to suggest that this has immense potential educationally; providing opportunities for peer-to-peer learning, diverse cultural expression, skills development across different contexts and a changing attitude to the notions of openness, ownership, intellectual property.

Many factors may specifically influence the use of resources, and engagement with social media, including cultural perceptions regarding 'learning' and 'information'; perceptions regarding the value of written resources and evaluation of information, but also competences in using media and computers or to critically reflect on information resources. Uses may also be shaped by other activities conducted online – expectations regarding interactivity, hypertext, 'Internet literacy' developed across online sites and services and, possibly, conventions regarding authorship, citation and plagiarism (Livingstone, 2008, Metzger and Flanagan, 2008; Rieh and Hilligoss, 2008). Also important are the tensions associated with the blurring boundaries between production and use, ownership and authorship, expert authority and amateur creativity, openness and completeness, as well as formal and informal learning (e.g. James et al, 2008; McPherson, 2008).

Based on an extensive review of the literature, Beetham et al. (2009) provide a comprehensive framework of types of literacies relating to social and situated practices (including meaning making and situated knowledge); technological and media literacies (including multimodal skills, information and critical literacy); and scaffolded and meta-cognitive literacies (including the new pedagogies associated with mediated learning). Such

frameworks can be applied not only to young learners, but to all that are involved in the learning process and media education. As they note:

The social and economic agendas of upskilling more of the population, widening participation, and supporting lifelong learning, mean that university and college learners are more diverse than ever before, with a wider range of educational and ICT experience. Since literacy provision ideally starts with learners' existing practices and conceptions, it needs to become more wide-ranging, more flexible, and more pro-active. It also needs to recognise that the process of development will be incremental, and challenging. Learners need scaffolding, direction and modelling in the first instance, followed by practice and personalisation, giving way to unstructured tasks through which they can learn to choose strategies and technologies to suit different situations and their own preferred ways of working. (Beetham et al, 2009: 67)

Success factors and strategies for change

Strategies for encouraging greater use of technologies and sharing of resources and good practice have ranged from simply making teaching resources available (such as learning objects and Open Educational Resources, or OERs) through to more specific case studies describing practice or community-based support mechanisms and networks. In addition a number of initiatives have attempted to promoting sharing and community building amongst teachers; for example, the initiative Classroom 2.0⁶ and the International Society for Technology in Education in Education Island in Second Life. These initiatives are giving us insights into what methods work in terms of supporting better sharing of good practices and mechanisms for fostering transformation in teaching practice. However the impact of such work so far is small, and these communities are not without design flaws or challenges (see Evans et al., 2008 cited in Greehow et al., 2009b: 281). In addition, there are a number of related professional and discipline specific networks that have a role in promoting and supporting good teaching practices (and hence also effective use of technologies). These include the now well established Higher Education Academy subject centre network⁷, HEFCE's Centres of Excellence for Teaching and Learning⁸ and the more recently established Higher Education Academy EvidenceNet⁹. Despite all this, the impact on actual practice is poor. Taken collectively, the impact of the now large body of free resources and outputs and findings from projects innovating in the use of technology is low. There is still no clear evidence that there has been a substantial change in teaching methods nor is there evidence that there has been a substantial increase in the use of technologies and OER.

There is a strong collective voice that argues that social media and Web 2.0 tools could enable universities to 'reinvent' themselves. This encompasses a shift in thinking about ICT solely in terms of their representational capabilities (i.e., their ability to represent commoditised informational delivery modes of higher education) to a vision of them facilitating more discursive, relational and collaborative approaches to learning (see Pedro, 2003; Selwyn, 2007: 91; Franklin and van Harmelen, 2007; Armstrong et al., 2008; Dalsgaard, 2008; Redecker, 2009). Apart from its role in facilitating knowledge transfer and

⁶ Classroom 2.0 <http://www.classroom.2.0.com>; International Society for Technology in Education in Education Island in Second Life: www.iste.org/secondlife

⁷ <http://www.heacademy.ac.uk/subjectcentres>

⁸ <http://www.hefce.ac.uk/learning/tinits/cetl/>

⁹ <http://www.heacademy.ac.uk/evidencenet>

collaborative activities, Web 2.0 is often presented as also having the potential to facilitate innovations in professional development, teacher training and teaching practices, as well as improvements in the quality of student learning and experiences.

Evidence of a concerted effort within institutions to systematic embedding of technologies and its use for learning and teaching, can be traced back to the early to mid 2000s. Institutions began to have more explicit policies on how technologies were being used to support their core activities. Web sites were developed and used explicitly for marketing purposes and for maintaining alumni relations. VLEs were introduced to support the delivery of online teaching and presentation of materials. The popularisation of Web 2.0 technologies from 2005 began to extend the information-focused use of the technologies and enabled the emergence of informal communities and communication alongside the 'formal provision' within institutions (Franklin and van Harmelen, 2007; Ala-Mutka et al., 2009). A range of e-learning initiatives was funded which provide mechanisms to experiment with these new technologies. These ranged from small-scale projects focusing on local practice (for example exploration of a particular tool in a particular teaching practice), through more institutionally focused initiatives (for example the JISC's Managed Learning Environment programme) through to international collaborations (such as the NSF/JISC digital library programme and the Hewlett-funded OER initiatives). Collectively these can be seen as primarily bottom-up, often driven by individual interests, although funding bodies do provide a steer and vision for the overall focus and direction of innovations (e.g. JISC, 2009; OECD, 2009; see also Armstrong et al., 2008: 15). For example in the UK, several e-learning initiatives have been aligned to the HEFCE e-learning strategy (HEFCE, 2009). JISC's programme of activities has directly derived from and is closely aligned to HEFCE's e-learning strategy (see JISC, 2009b).

Table 1 provides a summary of some of the strategies for changes that have been adopted. Evidence from the literature gives an indicator of the factors for success:

- **Scaffolding and guidance to teachers.** Amongst the most important factors is the need to ensure that there is appropriate 'scaffolding' and support of how Web 2.0 tools are embedded in courses. This includes guidance and support on the design of courses, the nature of activities and the role of the teacher. It requires teachers to rethink their position from one of expert to facilitator.
- **Strategic alignment.** Another area of importance is ensuring that appropriate strategies are in place to support this shift.
- **Understanding the student experience.** Careful consideration of the student perspective is needed, particular consideration of affective issues. What are the key factors that motivate students, that will ensure their engagement?
- **Appropriate support structures.** Although closely aligned to considerations around a teacher's role and the design of the course, the need for effective support structures cannot be underestimated. This involves ensuring that access to materials is easy, that the structure and role of the online environment is clear and having in place contingency plans if there are problems.
- **Staff incentives and rewards.** The projects that have been most successful are those where careful consideration has been given to staff motivation. Ensuring that staff are aware of the vision of why these new technologies are being introduced and getting

them on board is key. They need to feel a sense of ownership and control of their own teaching practice.

- **Sharing of good practice.** Finally if we are to build collectively on experiences, mechanisms are need to share good practice and enable teachers to adopt more scholarly approaches.

Table 1: Summary of different strategies for change

National levels	<p>Broad government strategies that include the use of Web 2.0 and provide incentives to deliver integrated services (e.g. for student retention, innovation in teaching and learning such as the Australia Learning Performance Fund (DEEWR, 2008) or investment into infrastructure and training.</p> <p>HE funding agencies and policy makers who can provide drivers for institutions through specific mandates, some of which involve the adoption of social media (in the UK, JISC harnessing technology for learning programmes/ CETIS OER programme; HEA [in particular EvidenceNet and ELESIG Ning].</p> <p>Central investment in agencies that promote – often through funding – the development of innovations through research projects, delivery tools, resources and infrastructure for communities of practice (Australia/Edna; US (Library of Congress; NSF; The Learning Federation).</p>
Intergovernmental agencies and non-profit funding agencies	<p>Integrated policies and funding strategies to support research on the ways in which ICTs are changing the ways that people learn, play or participation in civic activities (e.g. UNESCO IIEP; OECD CERI; OECD's Education Management and Infrastructure Division (Directorate for Education). Also in terms of promoting innovation and collaboration for the development of digital literacy curricula and Open Education Resources (OERs). Projects focusing on understanding the impact of widespread use of digital media in youth learning (see for example, MacArthur; Carnegie, Hewlett; NSF, EDUCAUSE, National Institute for Technology and Liberal Education (NITLE) in the US; ESRC, EPSRC, AHRC, BECTA in the UK).</p>
Institutional strategies	<p>Institutional strategic plans and support: Some HE institutions are developing more integrated strategies through administrative, marketing and pedagogical mandates (for example Warwick, Edinburgh, Open University in the UK) and for more effective use of Web 2.0. Regulatory, legal, security and ethical factors are driving concerns. Positive institutional drivers appear to be more prominent in: distance learning and life-long learning contexts.</p>
Professional motivations (academic/administrator)	<p>There is now a significant body of evidence around technology interventions. These projects are providing rich data on the barriers and enablers to successful integration of technologies; as well as data on the attitudes of staff and wider patterns of technological adoption. A spectrum of users is emerging (e.g. early adopters; 'digital residents', etc.). Exploration of the opportunities for communication, sharing and collaboration across borders often fits with specific pedagogical or communication strategies. Popular patterns of motivation include: a) sustainable resources beyond course/degree duration (e.g. alumni relations; student recruitment; lifelong learning commitments); b) professional drives to enhance teaching practices; and c) extension to new forms of knowledge and e-scholarship.</p>
Curricular needs and elearning	<p>Technology uptake and use is different in different subject. For example media, computer science and information science courses appear to be more open to adopting Web 2.0 practices. The functionalities of tools employed, their suitability for</p>

	chosen tasks and the learners' familiarity and/or acceptance of these tools within the curriculum are key interrelated drivers for effective use. Students' positive attitudes to social computing is not only dependent on familiarity [though differences in types of uses are evident in countries OECD countries], but also upon perceptions surrounding the degree of autonomy and the ability to appropriate or personalize tools to specific needs. E-collaboration and open communication / publication is seen as a key skill for professional development and conduct within HE sectors.
Scaffolded pedagogical approaches and fostering pedagogical innovation	Constructivism and connectivism are the two pedagogical approaches that align most closely with Web 2.0 practice. The focus is on enhancing the student experience and maximising the potential recreational or creative uses. Networked interaction literacies and awareness of mediated learning structures and hierarchies are also important.

Contextual examples

The previous sections offered perspectives on the key theoretical and empirical dimensions that emerge from evidence. In this section we focus on specific case studies from existing practices that highlight these aspects in particular contexts. Our overall impression from the case studies is that there is relatively little reporting of actual learning processes, or indeed teaching practices. Occasionally a comparison point helps evaluate the impact of interventions relative to alternative learning structures, but this is rare. Peer-reviewed journal and conference papers offer evaluative reports and are, occasionally, rich on empirical detail, but there are many questions that need to be asked regarding the likely conditions that contributed to success in these areas. A multitude of blogs and reflexive accounts from academic teachers offer rich perspectives, but more systematic content analysis is required. The social networking site for learning and teaching, Cloudworks, has also generated a rich body of knowledge on relevant perspectives through solicitation of experiences in the field.

We include case studies that address some of the ways in which learning and teaching practices have been improved. We have looked for evidence of the extent to which learning 2.0 practices are present: participatory learning, co-creation of learning artefacts, peer critique leading to iterative individual 'improvement' and group understanding. We are also interested in seeing the extent to which this is influencing the teacher's practice: is there evidence that they are adopting different roles in the learning process, such as becoming co-learners? We also want to see where there is evidence that Web 2.0 approaches are being used to foster and promote teaching scholarship and where there are examples of teachers as learning communities, i.e. in what ways are Web 2.0 technologies being used a) for reflective practices and interaction with learners; b) as part of engagement in wider communities of practitioners engaging in scholarly practice around their teaching. The studies are grouped into three broad categories: i) blogs, wikis and social tagging, ii) social networking and microblogging and iii) immersive worlds and second life. Appendix 8 focuses on Open Educational Resources (OER). A detailed discussion is provided there with respect to OER, partly because practices around OER within the Cloudworks social networking site is the main focus of Case Study 2 for the *'Pearls in the Clouds'* project.

Finally, Appendix 9 ('Issues raised by the introduction of Web 2.0 technologies') provides a discussion of and detailed empirical insight into some of the tensions that arise as a result of the introduction of Web 2.0 technologies and in particular, their impact on organisational structures and processes, as well as on teachers' and learners' individual roles, identities and perceptions.

Blogs, wikis and social tagging

The examples from the literature provided here illustrate projects where blogs and wikis have been integrated into curricular design. They illustrate a range of pedagogic approaches and give an indication of student and teacher perceptions and attitudes towards using these types of sites.

Blogs have evolved from the concept of a 'personal homepage' and hence have been referred to as personal publishing spaces. Blogs have also been labelled reflexive diaries or learning journals; both names emphasise the personal, chronological reflective element of sharing ideas. As Downes notes: 'they now form one part in a much more diverse landscape' [of Web 2.0 content]. Allegiances to particular technologies shift over time and some people who formerly wrote blogs, now use social networking sites such as MySpace or Facebook instead. Others use 'microblogging' services such as Twitter. Textual blogs have evolved into other media forms, so that it is possible now to have both audio blogs (also known as 'podcasts') and video blogs ('vlogs'). Blogs are often linked to a range of multimedia repository services (such as [Flickr](#) for photos, Deviantart for art work, [YouTube](#) for videos and SlideShare for slide shows or document files). It is also possible to use embed functions with many of these so that they appear within the context of an individual blog posting. Blogs have been used for a variety of educational purposes, for example as platforms for course announcements, as mechanisms to gather or generate feedback and as a collective peer support vehicle among different groups (of teachers, researchers and/or students). They can be used as a motivational tool to engage discussions in blended learning contexts. Alternatively they can offer more scaffolded approaches to distributed research. Finally, they can be used as a mechanism for aggregating resources, i.e. as a form of e-portfolio for use either within formal courses or as part of professional development. In a BeCTA review of 'Web 2.0 practices in education' Crook et al. (2008) stated that the clear articulation of the purposes of blogs within educational contexts and appropriate integration within formal assessment should be seen as both a fundamental and important motivational tool.

Downes (2010) has identified nearly fifty pedagogical uses of blogs in formal learning, the majority of which can be or have been used within higher education courses. Commonly cited advantages of blogs in education emphasise the communicative, motivational and participatory benefits (Farmer et al., 2008; Kim, 2008). Some highlight the fact that blogs enable individual learners to express their unique authorial voices and identity (Burgess, 2006; Ellison and Wu, 2008) and also that they can encourage a sense of responsibility and pride (Farmer et al., 2008). Others foreground the meaningful interactions with others and argue that peer critiquing can foster both psychosocial needs and the development of critical literacy and civic engagement skills. Over 400,000 educational blogs are hosted by

edublogs¹⁰ alone. Teachers have been using them to support student learning and also as a vehicle to reflect on their own practice since about 2004 (Downes, 2004).

The integration of blogging and social networking is evident in sites such as Ning¹¹ and Elgg¹². This kind of integration, alongside with the emergence of microblogging, has shifted the role of blogs from self-publishing and representation towards sharing, peer reviewing and collaborating. The purpose and focus of educational blogs varies. Some are only open within a course cohort, whilst others may be viewable by anyone. Some form an integral part of a course, being a formal part of course activities or actually forming part of the assessable output. In other cases they are optional. Such varied practices in terms of the degree of curricular integration or assessment generate tensions regarding the representation of hybrid identities, trust and authorship (Hemmie et al., 2009). Davis (2007: np) argues that blogs:

are more than a tool for regular or irregular writing tasks, and for that reason teachers need to remember that blogging is *sui generis* [unique in its characteristics] – not online diary, nor e-portfolio, nor online newspaper, nor e-exercise book, though it can be used in any of those ways – and assert the manner in which they expect the blog to be used.

Similarly, the potential of wikis for facilitating cooperative learning in a constructivist environment and for fostering communities of practice has been argued. Wikis are considered to be ideal tools for collaborative writing and for scaffolding group projects. Examples of use include using wikis as a means of creating collective study guides and textbooks, as a mechanism for creating annotated reading lists or simply as collective, subject specific repositories. A number of studies demonstrate interesting empirical findings pointing to a number of observable benefits. For example, for a) fostering active learning (Anson and Miller-Cochran, 2009; Parker and Chao, 2007; Augar, Raitman and Zhao, 2004) b) facilitating creativity and socialization (Bruns and Humphreys, 2007) or c) as mechanisms to foster the development of higher order cognitive skills. They can enable students to become co-creators of course content and design. Social dimensions of cooperation, such as trust and consensus, governance and control are deemed important in self-organising communities, such as Wikipedia. Successful implementation of wikis in an educational context also requires a clear articulation of the purpose of the wiki and clear explanation of its proposed benefit for learners. Carefully constructed tutor moderation and guidance is also often needed, particularly at the start, before students' gain a sense of control, ownership of the space and a collective sense of community (see for example Anson et al., 2009; Augar et al., 2004; Beach et al., 2008; Bruns, 2008; Notari, 2006).

Dimensions of reflexivity and collaboration are also attached to social tagging and bookmarking, collectively known as folksonomies. Folksonomies are words or meanings that users generate and then attach to particular content. They can be contrasted with more controlled pre-defined vocabularies, which underpinned many web 1.0 repositories and digital libraries. Different social bookmarking sites encourage different uses: some sites

¹⁰ www.edublogs.org

¹¹ www.ning.com

¹² <http://elgg.org/>

encourage more playful and personal tagging (for example Flickr the photographic repository site), whilst others afford a more deliberate style of tagging with a very clear idea of a specific audience (such as the bibliographic and academic sites like Connotea or CiteULike).

Evidence from formal educational uses provides examples of teachers inviting students to rate, comment, contribute and/or build up collections of resources by sharing personal collections and also examples of where student are encouraged to filter collaboratively through RSS feeds in blogs and personal e-portfolios (see Franklin and van Harmelen, 2007; Vuorikari, 2007).

Hemmi et al. (2009) offer empirical insights from student and teacher use of Web 2.0 technologies in three formal degree programmes spanning undergraduate and postgraduate levels in two large Scottish universities. These programmes included full-time undergraduate students in Divinity and Design Engineering and part-time postgraduate distance learners at Masters level. A broadly virtual ethnographic approach was taken, in which the researchers on the project were immersed in the day-to-day online and off-line interactions of learners. Data were drawn from student weblogs, wikis and course discussion boards generated through interviews with students and teachers. The Engineering Design course provided examples of visually rich wiki teaching and learning practices with undergraduate students. The Divinity course included the use of blogs to increase participatory contributions as a prompt for classroom discussion with undergraduates. The two residential courses were based on a blended learning model and the Masters programme on elearning covered a more extensive use of Web 2.0 technologies, including facebook, bibsonomies, Second Life, wikis, and blogs. The authors considered the pedagogical appropriations by both learners and teachers. They then focused on a) students' presentation of the self and identity and negotiation of self-hood through blogs and b) exploration of the issues around anonymity, etiquette and group responsibility, which arose as a result of use of blog and wiki spaces. They also raise important questions regarding assessment and privacy.

Twitter

A survey conducted by Faculty Focus (2009) in the US, revealed that less than half of the 2,000 teachers surveyed had ever used Twitter (44.6 %), and of the 30.7 % that claimed to be active users, only half have used it as classroom tool, or to communicate with students. Despite this low uptake a number of commentators in the blogosphere write about its potential use in HE (see Gordon, 2009; Hart, 2009; Wheeler, 2009). Early pilots on the use of this tool offer valuable insights into the ways in which it can be integrated into more coherent pedagogical models. Some educators have used it as an additional broadcast, announcement or distribution avenue for sharing resources. In a sense this is evidence of the use of the tool to promote a content- or teacher-centric approach, nonetheless it does provide a marker for its more extensive and broader use within courses (Ramsden, 2009).

The most common types of uses of twitter in education that have been reported thus far include:

- Use as a broadcast medium. Opinion sharing and distribution or dispersal of information, self-promotion and campaigning, public relations and marketing

- Opinion sharing about events, sharing of ideas, information and commentary
- Backchannels at conferences or events (audience channels, serendipity/types of review and reflection)
- Crowd-sourcing of news and evidence from the ground
- A mechanism for surveying and gathering opinions.

Although few empirically grounded studies have been documented so far, several small-scale evaluative studies offer interesting insights. McNeill (2009) has collated an interesting cohort of such studies:

Dr Rankin has used Twitter as a means of encouraging greater student participation in large-group classes of around 90 students. Her intention was to pull more students into a class discussion which [she] wouldn't ordinarily be able to do with that many people. (McNeil, 2009: 10).

Reflections from this case support claims that, in spite of the issue of it being an added background 'noise' and that as an interface it is not really conducive to conversational use, short, dyadic exchanges occur with multiple participants that can be surprisingly coherent (Honeycutt and Herring 2009). As McNeill (2009: 10) reports:

Tweeted comments and questions also went some way, according to the students featured, in militating against some of the factors that inhibit student participation in large-group discussion, namely 'feedback lag', or the suppression of questions due to the pace of the lecture, 'student apprehension', or the fear of speaking due to the size or climate of the class and the 'single-speaker paradigm' or assumption that only one person (usually the lecturer) speaks (Anderson et al. 2003).

Twitter has also been used to enhance social presence. A case study from the University of Colorado Denver focuses on the use of Twitter in a module on an instructional design and technology course (Dunlap and Lowenthal 2009). The authors encouraged their students to use Twitter in a variety of ways: to post questions and queries to one another or to the course team, to send student-to-student direct messages, to tweet comments on relevant news events, to share resources, to reports on conferences attended, to link to student blog postings and to exchange personal information. The authors claim that the use of Twitter can enhance students' perception of a sense of 'social presence', an important quality that helps promote student involvement, commitment and retention. They conclude that Twitter is good for sharing, collaboration, brainstorming, problem solving, and creating within the context of moment-to-moment experiences (Dunlap and Lowenthal 2009). This case study illustrates something of the flexibility of Twitter to enable a range of interactions from private messages between peers, to lightweight Twitter-based tutorials, or 'twittorials' that engage the whole cohort. The evaluation also supports the social networking dimension of Twitter, with students clearly comfortable with the varieties of information exchange and the heightened perception of belonging and of social connection to both teaching staff and fellow students.

Bradshaw reports on the use of Twitter in journalism courses (Bradshaw, 2008). He describes the difficulty of engaging students who have not used social media before. Part of his aspiration was to expose students to Twitter as a means of helping them see the implications of new technologies for the journalism profession. He argues that teaching students about the tools, through the tools, will help them have a better understanding of the broader implications of these technologies for journalism.

Whilst there are evident challenges surrounding the use of Twitter, there is also broad consensus in the literature that it can facilitate new forms of engagement and give students access to a wider audience of participation. There is anecdotal evidence where use of Twitter has led to increased motivation amongst students and there is a genuine excitement for many of its increasing potential in education. However, one important question to consider is whether the interest in and rhetoric around Twitter is just a passing fad. What happens when the novelty has worn off? Discussions on Cloudworks suggest that this is not the case. In fact, discussions surrounding its use in academic contexts and within the HE curricula sparked off several times, and comments were rather insightful. The 'Using twitter with students' cloud in Cloudworks ¹³ aggregated a variety of comments and references around the use of Twitter in courses and to support different forms of learning. Some examples were given of embryonic experimentation with the tool. A number of positive effects for learning were cited, but low levels of engagement were also raised as an issue. There also appear to be a number of challenges in getting a whole class of active users. One participant in the discussions has mixed views on its value:

'Whilst twitter usage is high amongst the 'converted', I wonder how many actually use it within learning and teaching. My use has varied quite a bit (see blog post <http://bit.ly/37ASy2>), and I think there could be considerable challenges in getting a whole class of active users - anything else would surely raise questions around equality of experiences'.

Other challenges raised include what constitutes an appropriate 'style of communication' in Twitter; issues around how it can be integrated within an institutional VLE, the extent to which it forms part of the student's PLE, and to what degree it is formally integrated into learning intentions. One participant remarks on the ways in which Twitter was being used to build communities and as an alternative social space:

'I think about half took to it, those that didn't had the usual reservations. What I think has been interesting is that a few have stayed active beyond the course and twitter is a much better way of maintaining this network than having to commit to using forums say. It's also a very democratising space - I often forget who are students and who are peers, which I think is great. For students I think if we encouraged them to get going at the start of their undergrad studies, think of the network they would have established by the end of their studies. This in itself is a valuable outcome of a degree'.

One participant reflects upon engagement in relation to recording reflections and its impact on teaching practice (monitoring and encouraging individual students) and on learning practices:

'I think the benefits are two-fold. Firstly, recorded, short bursts of reflection are better than no reflection at all. It is my intention that the students will utilise the aggregated Treflections as the basis of a longer reflective essay at the end of the unit. Secondly, I can monitor individual students and encourage those who are not participating. I can also provide summative feedback where appropriate.'

Another participant trialled the use of Twitter in media, cultural studies and English literature courses. He aimed at experimenting with re-enactments of Shakespearean

¹³ <http://cloudworks.ac.uk/cloud/view/2398>

dialogues and at engaging students in identifying links with popular culture. He experienced reluctance and extremely low levels of uptake or enthusiasm by students:

'This may change but it's clear that the students - media and cultural studies and Eng. Lit and Popular culture - aren't perceiving the relevance of the activities and technology to their learning in the same way as their tutors do.'

Other comments in this cloud and related clouds (e.g. 'Twitter in academia' 'is Twitter killing blogging', 'Twitter for teaching and learning') revolve around tools to archive Twitter conversations, and mechanisms for linking Twitter threads into specific courses. Also there are reflections about effective teaching practices, and alternative means of encouraging use without resorting to coercion. Several participants comment that aggregating short bursts of text and capturing the serendipity of the moment is a powerful feature of blogging. Others cited the value of micro-blogging as a mechanism for sharing interesting links and references.

The way in which uncertainties on the use of such tools is dealt with depends largely on the ways in which the teacher introduces and promotes the tool. Teachers who have been successful with the use of these tools tend to be those that are actively using Twitter more broadly as part of their professional practice. This is a common pattern of Web 2.0 tools, i.e. that really these tools need to be appropriated and used pro-actively before they can be incorporated into a course design and used in a learning context. This is a distinct shift from earlier technologies, where how the tools could be used was more self-evident. For example, personal use of an interactive computer package was not necessary before a teacher could make a judgment about its use in their teaching. The difference lies in the extent to which Web 2.0 tools are indeed used for networking, sharing and socialising; hence understanding what constitutes productive behaviour in these spaces is something one learns by doing.

Parry describes the use of Twitter in his class and identifies the following as key factors to consider at the learning design stage (see Briggs, 2008):

- Create a sense of classroom community.
- Familiarise students with both disciplinary and professional discourses.
- Conduct just-in-time case studies and encourage them to be reflexive about their own communicative practices, through the sharing of ideas and negotiation.
- Develop a social and ubiquitous presence: As Parry notes, 'I think people end up being a lot more comfortable with classroom discourse and get a sense that [the instructor] isn't just someone who comes in and talks for an hour and 30 minutes twice a week. It has the very positive effect of altering the classroom state to not just be contained by the four walls, and by meeting twice a week.' (cited in Briggs, 2008: n.p.).
- Using backchannels to generate instant feedback within lectures is another factor for potential success. This is consistent with Yardi (2008: 145) who notes that:

Online backchannel chat rooms offer the potential to transform classroom learning in unexpected and powerful ways. However, the specific ways in which they can influence teaching pedagogy and learning opportunities are less well understood. Activities in a backchannel may include the dissemination of ideas, knowledge building, asking and answering questions, engaging in critical discourse, and sharing information and resources.

- In both classroom situations and research-led teaching, using social networking and microblogging to connect to the epistemology of disciplines such as new media with writing or critical literacy skills can be fruitful:

We're always trying to teach students, especially in writing, that context determines meaning. And because Twitter has very refined rules about what you can do--only 140 characters, for example--it's developed its own sort of discursive grammar set; that can serve as an example of how rules can be productive for communication and can limit communication. (Parry cited in Briggs, 2008: n.p.).

Another interesting example of the use of Twitter as a conversation medium for in-classroom and post-lecture interaction is describe by Dr Monica Rankin, a history lecturer at the University of Texas at Dallas. Her pilot use of Twitter is documented in a short video, 'The Twitter Experiment', created by a student¹⁴.

Social networking

There is a growing body of evidence on the use of social networking within higher education curricula (see for example, Ebner and Maurer, 2008; Grosseck and Holotescu, 2008; Ebner et al., 2010; Ramsden, 2009). These include studies looking at a range of learning contexts, including informal and process oriented learning.

The conversational and communal qualities of social networking services are considered by some to 'mirror much of what we know to be good models of learning, in that they are collaborative and encourage active participatory role for users' (Maloney, 2007: B26). One of the core promises of social networking and its application in formal educational contexts lies in its support for interaction between learners, for peer support in terms of the development of shared understandings and mutual support and discussion spaces to address dilemmas about their studies (Madge et al., 2009; Selwyn, 2009). Another is its potential use to support the development of teacher practice, to help them develop strategies for using new technologies to augment 'conventional' interactions and dialogue with their students. The use of SNS by educators in their pedagogic practice has been reported by Mason (2006), and Mazer, Murphy, and Simonds (2007; 2009). More generally it is about transferring the practices that are evident in what is commonly known as 'socialising' (informal knowledge building, mutual peer support, discussions on shared interests) to formal educational contexts.

Selwyn (2009) explored students' use of Facebook to support their formal studies. He used a non-participant virtual ethnography approach, drawing on Goffman's notions of self-representation and 'faceworking' to analyse the comments from a number of university students and counsels:

Facebook appears to provide a ready space where the 'role conflict' that students often experience in their relationships with university work, teaching staff, academic conventions and expectations can be worked through in a relatively closed 'backstage' area'. [...] It was acting as a ready space for resistance and the contestation of the asymmetrical power relationship built into the established offline positions of university, student and lecturer (Bourdieu and Passeron 1977). This was perhaps most clearly evident in the playful and often ironic rejection of dominant university discourses throughout the posts,

¹⁴ The Twitter Experiment: <http://www.youtube.com/watch?v=6WPVWDkF7U8>

with the students certainly not confirming to the passive and silenced undergraduate roles of the seminar room or lecture theatre. (2009: 170-1)

Fitzgerald, Steele et al. (2009) report on the *Digital Learning Communities* project funded by the Australian Learning and Teaching Council. They focused on the role of social software and networking in three universities. A set of seven pilot courses using reflexive blogging, wikis, folksonomies, collective tagging and media sharing and a specialized social networking site for animation (MyToons) were evaluated. Two interim surveys were conducted to correlate results from the evaluative pilots to wider attitudes and values towards and comparative cultures on sharing and networking. The studies revealed that staff motivation for experimentation with Web 2.0 was higher in these projects than is normally found, because it was more closely tied to research and scholarly agendas. The pilots included a cohort of courses in New media and Information systems, and a course in Applied Ecology. The integration of social media within the curriculum was deployed in order to advance future professional practice, and more specifically, to equip students with industry-ready, creative and critical literacy skills. Educators in the information systems and media-related courses designed the curriculum purposefully and with a range of activities using particular Web 2.0 technologies so that they would introducing students to authentic and hands-on issues of copyright and media practice while inviting self-representation and creativity as writers and media practitioners.

The iCamp project is an example of a project that is attempting to use Web 2.0 technologies in a cross-border collaborative problem-based learning project. In the first trial graduate and post-graduate students from four different partner universities in Turkey, Poland, Estonia and Lithuania participated. Eight cross-cultural groups of four or five students were formed. The iCamp educational intervention model is designed to support competence development in self-organised intentional learning projects in digitally mediated environments. The projects used a rich set of tools including shared workspaces, Instant Messaging, videoconferencing, a content repository and an e-portfolio tool (for a full set of interventions and see Kieslinger, 2009). The research team adopted a design-based research approach, with a strong focus on designing courses for real life trials, getting feedback from practitioners and feeding this knowledge into advanced pedagogical concepts and new technological developments. Although a number of challenges were cited regarding cultural variation in teaching and learning styles, the benefits the environment provided in terms of facilitating engagement across cultural contexts was deemed to enhance innovative teaching and learning practices. The findings from the project highlighted the benefits of experiential approaches and peer learning and the ways in which technologies could be used to support these.

Väljataga (2009), describing an online course from an Estonian university that participated in the iCamp project, reported that the facilitators gained a lot by being involved, including an understanding of the benefits of social media tools and services within their teaching practices. The experience highlighted the recognition that there was a need for a different type of role in these environments, one that simulates mentoring rather than top-down teaching approaches. In the second iCamp trial (involving faculty and students in the four institutions), Law and Nguyen-Ngoc (2008) demonstrate that although the collaborative learning environment can support self-directed learning for some students, other students

may actually become marginalised. Critical success factors include paying attention to the students' intrinsic motivation and putting in place mechanisms to lower their initial anxiety about the learning situations. Such clear pedagogical profiles and representational learning designs are needed at the outset.

Immersive environments and virtual worlds

Although still a peripheral activity, virtual worlds are increasingly being used in higher education. Over 250 HE institutions worldwide are now teaching using Second Life, one of the most popular Virtual Worlds. Such 3-D worlds are suited to mirroring real practice and enable the setting up of authentic and scenario-based learning contexts. Environments that mimic real-life settings can be created, such as an Archaeological dig or a Medical ward. These environments can be used as the basis for problem-based learning activities (for example getting learners to investigate archaeological artefacts found on a dig site or getting them to participate in a role play activity dealing with a medical emergency on a ward). The avatars within these worlds can assume different identities and roles. They have also been used in Arts, to present virtual Art exhibitions or poetry readings. Running these kinds of events in Second Life means that the invitation to participate or observe can go beyond the classroom students, enabling international experts in the field to critique the students' work. These environments have also been used to support professional development activities, through the establishment of specialised islands and the running of virtual events to foster discussion and sharing.

One of the reasons why Second Life is so popular is that it is a relatively stable, accessible and inexpensive. In addition, the fact that a significant number of institutions have now set up spaces in Second Life means there is a critical mass of other educators and learners to interact with. The space can be used in a variety of ways, so that it is possible to build both simulations or mimic specific real-life processes (for example geographical, biological, health, legal) or a habitat (see Carr, 2009; JISC, 2009a). A comprehensive collection of comments and insights from different UK educators is presented in series of 'snapshots' prepared by Kirriemuir (2008). Second Life is not without its challenges. There are technical problems and issues around developing the appropriate set of skills needed to interact in the space. Also despite some good examples of use of the space for learning, which harness the unique affordances of the technological environment, there are many examples of bad teaching practice; for example the mechanistic replication of Powerpoint presentations in these rich 3D-spaces is, arguably, not using them to their full potential. Learners have mixed views about the value such spaces offer, many in particular are concerned about how time consuming interacting in virtual worlds can be. Institutions are also concerned about what policies need to be in place around the use of such environments. To what degree should institutionally owned spaces be policed or protected? Kirriemuir's report however does also indicate a number of positive reflections from teachers about using Second Life (see also White, 2009):

- The importance of being creative and thinking differently. Using the space to promote discussion, demonstration and active co-creation of artefacts, rather than replicating face-to-face lecturing.

- The need to take advantage of the unique properties of the space, enabling people to have experiences that they might not otherwise be able to have or providing a mechanism for them to connect with and interact with people they might not otherwise have met.
- Teachers need to adjust their thinking within these environments. The locus of control is no longer with them and there is an evident blurring of boundaries. Teachers need to be comfortable with this shift and think about how to use it to best effect.
- The best use of Second Life is not to replicate the dynamics of the classroom, but rather to innovate with new ways of teaching and attempt to pass over the activity of learning to our students.
- Second Life appears to be particularly good for a number of constructivist pedagogies – such as discovery learning, learning through trial and error, problem-based learning, scenario-based learning and authentic learning.
- Second Life is also ideally suited to supporting playful learning

A pioneering example of Second Life being used in legal education is 'CyberOne: Law in the court of public opinion', a module offered at Harvard Law School during 2006.¹⁵ As part of the module a mock trial was held on Berkman Island, the Second Life presence of Harvard's Berkman Center for Internet and Society. Similarly, the Glasgow Graduate School of Law (GGSL) at the University of Strathclyde set up the virtual town of Ardcalloch, with the objective to facilitate the transition from academic law studies to vocational legal practice in Scotland. It allows learners to take up the role of legal practitioners operating in Ardcalloch, supported by databases of legal documents and templates, forums for discussion with practitioners as tutors, video course lectures and other additional multimedia tools. Initially students had some concerns with the departure from the conventional methods of teaching and learning. However, student feedback is mostly positive, indicating that students appreciate the tools' value in supporting 'transactional learning' or action learning. Thus, immersion can be used as a basis for 3D-real world simulations that assist in integrating scientific practice into theoretical and vocational training (Chittaro and Ranon, 2007).

Bromby and Jones (2009) describe their experience of using Second Life in legal education. One issue for them was how students would react to the immersive environment in Second Life and how this might impact on learning. McCallum et al. (2009) designed a module for the development of non-technical skills such as decision-making in nursing education at Glasgow Caledonian School of Health, using a scenario-based learning activity. Although only a small number of students completed the study, it reveals that both students and staff were reflective about outcomes and simulatory experience of participating in Second Life. The extent to which learners and teachers are already familiar with these kind of game playing and decision-making activities through real situations and gaming worlds is important and has an impact on their perceptions and the perceived value of these kinds of scenarios. Teaching styles and the kinds of support offered need to be different in these context, so support for participation is important, as is understanding the immediacy and

¹⁵ <http://blogs.law.harvard.edu/cyberone/>

immersive nature of the environment. Both teachers and learners need support in developing confidence in terms of participating within these worlds and in terms of establishing patterns of peer support.

Researchers at the London Knowledge Lab have taught classes in Second Life on various topics, including Internet research ethics and virtual world research. Distance learners were found to be very positive about the real-time, social aspects of the sessions. The facilitators also found that the obviously constructed nature of Second Life rendered session design visible to students, who proceeded to question and reflect on teaching practices. The move to a virtual world was found to upset some participants' preconceptions of online populations, as well as their assumptions about the relationship between a 'researcher' and the 'researched'. As Carr (2009) reports these kinds of ambiguities and disruptions can be highly productive. However, judging any affective aspects of the student experience in real time in Second Life can be difficult:

Second Life sessions can be intense and potentially confusing experiences for participants who are unfamiliar with online worlds. Some students may struggle with the interface or with communications, whether by text or voice. Students who have played online games may be disappointed by the graphics and the relative emptiness of Second Life. While virtual worlds may invite experimental pedagogy, students' familiarity with the interface and in-world social practices still need to be considered, as do their expectations of what constitutes learning and teaching (Carr, 2009: 15).

There is a paradox around these environments. On the one hand, such immersive environments can be highly motivating, offering alternative, authentic learning contexts. On the other hand there are a number of significant cultural and perceptual barriers: issues around identities and roles in these spaces, the lack of control or structure, and a danger of replicating real world stereotypes and prejudices in the virtual space. There are also for some negative perceptions around the blurring of boundaries within these spaces. Some find such interactions infantile, superficial or indeed dismissive (Childs, 2008) resulting in a danger of creating a digital disconnect.

Clearly a lot more empirical research is needed to understand fully how these spaces can be used for learning purposes, and what kinds of learning designs are needed to ensure effective use. Research on the patterns of social interaction within these spaces is slowly emerging, giving us a better understanding of how individuals are behaving and interacting in these spaces. There are a number of active wikis, mailing lists and blogs discussing the use of virtual worlds in education, however much reporting remains exploratory in relation to teaching and the changing of teaching experience.

A specific example that is worth mentioning is the resource for teachers using Second Life set up by the New Media Consortium¹⁶. As described above, Second Life lends itself to constructivist pedagogies and there is a need to appropriate the extensive body of literature that exists on social learning, playful learning, the use of drama, role plays and simulations, learning by doing and practical experimentation and work on the formation of communities of practice. Virtual worlds also present educators with an opportunity to revisit questions of 'presence', 'identity' and 'immersion'. Again much could be gained by revisiting earlier

¹⁶ <http://sl.nmc.org/category/teachers-buzz/>

research on ‘virtual reality’ studies. Although drawing on this older and broader educational research work is important, it is also important to recognise that these new environments also challenge existing concepts and theories and indeed these might need to be altered when applied to virtual worlds. As Carr (2009) notes it is already possible to point to gaps in the literature and suggest the following as areas for future research in this field: i) exploration of new approaches to pedagogy and curricular design, ii) better understanding of the factors involved in supporting social learning in these spaces, iii) identification of viable alternatives to Second Life, iv) addressing quality and access issues in relation to disability or broadband, for example, and v) identification of what institutional policy will need to be put in place.

Summing up

The contextual examples described in the previous section illustrate the ways in which Web 2.0 tools are being used in specific contexts. These reinforce the general consensus that these technologies provide new and exciting opportunities for education, providing students with new ways to interact with materials and with others. In particular there appears to be a good match between what is considered to be ‘good pedagogy’ and the general properties of these various tools. Table 2 demonstrates how some of the examples discussed here map to different types of learning and teaching approaches. The table shows how there is also a match in terms of mechanism for supporting teacher practice, in terms of facilitating a scholarly, reflective approach and mechanisms for sharing and critiquing practice

Table 2: Examples of the use of Web 2.0 tools in different contexts

Types of learning and teaching practices	Web 2.0 tool and approaches	Examples
Personal learning	The ability to adapt, customise and personalise, use of RSS feeds, mash ups and APIs.	The Digital Learning Communities project
Situated learning, experiential learning, problem-based learning, scenario-based learning, role play	Use of location aware functionality, immersive 3D-worlds. Use of search engines and other online resources as sources of evidence, connection with peers and experts via social networking tools. Scenario-based and authentic tasks in virtual worlds, application of gaming technologies for educational purposes	The iCamp project, Use of Second Life to support different disciplines (Kirriemuir). Cyberone law role-play.
Inquiry learning, Resource-based learning	Tools to support user-generated content and facilitating easily sharing and discussing these. These include media repositories (Flickr, YouTube, SlideShare), social bookmarking sites (Delicious), digital repositories and tools for content creation. Use of search engines, participation in distributed, virtual communities, Use of folksonomies and	The Open Educational Resource movement and associated tools and repositories. Wikiversity and Wikieducator.

	social bookmarking as mechanisms for finding and organizing resources.	
Reflective and dialogic learning, peer learning	Tools for fostering peer reflection such as blogs and e-portfolios. Commenting on other students' blog posts, co-creation of learning artefacts in wikis.	Digital learning communities, Peer-to-peer mentoring framework (McLoughlin et al.)
Communities of Practice	Use of social networking tools to participate in communities of learning and/or educators.	Application of tools such as Facebook, Ning and Elgg to support informal social interactions between students or as spaces for reflection on professional practice around a shared interest (eg. The Elesig community in Ning)
Scholarly practice and the sharing of designs and good practice	Use of Web 2.0 tools to participate in a distributed network of educators and researchers. Use of blogs and wikis to co-create knowledge and understanding and to critique practice. The use of blogs and Twitter to share professional practice	Edublogs, LeMills

Conclusions

As this report has indicated, Web 2.0 tools offer characteristics that have clear potential in an educational context to support a range of pedagogical approaches. The report describes illustrative empirical accounts that demonstrate the ways in which Web 2.0 technologies have indeed been used to support innovative approaches to supporting and facilitating learning. However, a number of challenges remain in terms of getting greater adoption of these tools in education. Although national variations regarding the deployment and pervasiveness of Web 2.0 exist, several common themes emerge:

- The key theoretical and policy underpinnings for using Web 2.0 methods and tools in higher education.** Technological innovation and participatory learning cultures can only be implemented effectively in higher education if they are supported by appropriate national policies. These need to ensure that institutional structures are in place to take advantage of these new technologies, but also link to a wider vision of innovation in academic institutions. While adoption of Web 2.0 in teaching and learning is growing in the HE sector, the need to address these issues in a systematic way is paramount (e.g. JISC, 2009; OECD, 2009). Web 2.0 tools provide new opportunities for learning, which complements the general shift away from didactic to constructivist approaches that dominates current discourse on education. Firstly, they have the potential to provide new forms of immersion through for example 3D-environments like Second Life. Secondly, they offer a range of new ways in which knowledge can be represented, discussed and shared. Thirdly, they offer a range of ways in which collaborative learning activities can be supported. Fourthly, they support reflective practice and mechanisms for peer critiquing. However, there is also a host of associated

challenges with trying to embed such practices in institutional systems. Promoting Web 2.0 approaches challenges traditional forms of assessment and current validation mechanisms. We address these questions in relation to existing evidence regarding drivers for adoption in higher education at international and institutional levels.

- **Teachers and learners; teaching versus learning.** There is now a significant body of research on learner experiences and their use of technologies. What is evident is that learners and teachers are not homogeneous. In addition, there is a gap between the expectations/promise of the use of technologies and the actual experiences and uses. The digital divide is still evident; within the student body, but also between tutors and learners. As we noted earlier, the expansive learning domain challenges traditional teaching practices, yet evidence also suggests that expert guidance is required (JISC, 2009; Ipsos Mori, 2008; OECD, 2009) and that a more explicit, learning design based approach to the creation of courses is needed. This raises a set of fundamental questions. What are the implications of shifting from the notion of teacher as instructor to teacher as facilitator? What are the barriers for low levels of experimentation? What institutional infrastructures and support mechanisms will be required to shift to greater use of technology? More importantly, what are the ways in which new technologies can enhance the process of research into teaching and as result, teaching methodologies and strategies?
- **Skills, media, information and networked literacies.** New literacies are needed to make sense of and to participate with these new technologies. Yet, despite widespread agreement about the importance of digital literacies, integration of training programmes in the field of higher education remains scant. While academic tutors need to ensure technical proficiency, reflection on approaches to teaching and learning, e-pedagogy (learning with and/or through technology) is also paramount. Multi-located/fragmented content and the potential for multiple pathways through content have an impact on how educational interventions are designed. And although such multiplicity offers increased choice in an educational context, this also has the potential to lead to confusion. How familiar are learners and education practitioners with the tools of editing and blending digital material? What are the novel perceptions of creativity and originality? What is the scale of the responsibilities that the nuances of literacy brings to educators? Is there a representation of the wider literacies in institutions and in the projects they pursue?
- **The need for a better connection between research, policy and practice.** There is now a significant body of research exploring technologies and how they can be used to support all aspects of Higher Education practice – learning and teaching, research, and administration. E-science and e-social science research is giving fascinating insights into exploitation of large, distributed research datasets and more recently into the use of cloud computing. Openness is becoming a trend, both in terms of the production and sharing of educational materials, as well as making research publications (and even research data) freely available. However, as Conole (forthcoming) has argued, this research is neither feeding properly into policies on the use of technology, nor is it impacting on actual teaching practice.
- **The challenges of trying to change embedded practice and culture.** Despite increasing evidence on the benefits of Web 2.0 in supporting constructivist and situative learning approaches, as this report reviews, the challenge of translating this

across the higher education sector remains. The reasons are complex and multifold: educational rules and restrictions in different countries, access, technical resources, ICT literacy, teaching capacity, and teaching cultures are widely cited (e.g. OECD/Pedro, 2009; Redecker, 2009). One key issue is concerned with cultural issues, teachers' belief systems and their day to day practice. Teacher practice is still predominately built around a notion of teacher as expert and student as recipient. Despite the shift in educational thinking towards more constructivist and situative learning approaches, behaviourist and didactic discourses are still evident. Teachers draw on past experience rather than actual empirical evidence and research literature. Despite the benefits and need for more scholarly activities, there is little evidence that this actually occurs. Arguably there is a need to shift to more scholarly approaches if the potential of technologies is to be realised. The vision is one in which educators are co-innovators in understanding the key possibilities in the relationship between technology and pedagogy, leading towards a co-evolved professional knowledge base that stems from reflective practices that are mediated and shared; a practice that feeds into the development of curricular designs that can actualise educational visions (see Zhang, 2009: 278).

While there is significant rhetoric about the potential of Web 2.0 technologies for higher education, the evidence of actual and situated practices on the effective use of Web 2.0 in the sector is fragmented. Empirical evidence is slowly emerging to support the notion that students' use of technology and digital media has implications for the way they learn, as well as their broader social values and lifestyles. This also links to their perception of how they will learn in a higher education context and how technologies will be used to facilitate this. Benefits are often viewed in relation to added convenience, perceived autonomy and increased productivity gains in academic work. Although networking and the espousal of diversity are seen as key components for organizational and pedagogical innovation, less evidence exists of the ways in which digital networked technologies are socially shaped. However, the landscape of learning emerging from ideas about social production (see Engeström, 2007) has affected teaching scholarship and methodologies. Despite the increasing levels of uptake in the UK and OECD countries, the disjuncture between Web 2.0 technologies and current educational systems or teaching practices persists; this leads to people replicating – to a large extent – face-to-face practices in an online context. The question then remains: how can advances in the learning sciences and emerging research in educational technology be incorporated when authoring curriculum, assessment and resources to appropriately scaffold learning processes?

To conclude, effective use of new technologies requires a radical rethink of the core learning and teaching design process; a shift from design as an internalised, implicit and individually crafted process to one that is externalised, explicit and shareable with others. Change in practice may indeed involve the use of revised materials, new teaching strategies and beliefs – all in relation to 'educational innovation' (Conole, 2010). Zhang (2009: 277) also underscores this point. He notes that sustained innovation and deep reform in education requires the development of innovative communities of educators, while developing in parallel an educational research cyberinfrastructure that can be harnessed to support professional scholarship and practice. He considers this as facilitating three

aspects: a) the sharing of experiences and continual learning; b) deliberate investigation and reflection; c) collaborating in the development of research-based scholarship and co-created designs, instructional approaches or learning opportunities for students (see also Greenhow et al., 2009b).

Our aim in this review was to draw on the existing body of literature from the international terrain; it synthesises some empirical evidence on the patterns of use of Web 2.0 tools and social media in higher education and structures findings in themes relevant to communities of educators. Although evidence exists regarding the benefits in informal learning environments, and within administrative contexts, results from longitudinal studies showing the depth of change in pedagogical practice in either tertiary or post-tertiary education are either scarce or far from consensual. And while an emerging body of literature focuses on experiences of learners, structured evidence regarding the issues surrounding integration in formal education, such as those outlined above is slowly emerging.

The focus of the *'Pearls in the Clouds'* project is to explore to what extent Web 2.0 tools might be used to promote and support evidence-based approaches in learning and teaching. This review has provided a detailed account of the nature of Web 2.0 tools and examples of how they are being to support learning and teaching. As discussed elsewhere in this report the boundaries between traditional roles (teacher and learner) and functions (teaching and learning) are blurring. 'Teachers' need to be learners in order to make sense of and take account of new technologies in their practices. Adopting an evidence-based approach, through scholarly practice and reflection harnessing the powerful affordances of the technologies themselves seems a logical means of achieving this. The in-depth case studies that follow within this project will provide more specific evidence of the extent to which this is true.

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**Appendices: Further issues relating to the adoption of Web 2.0 in HE:
details from the research field**

Appendix 1: An open approach to literature reviews using Cloudworks

In addition to the standard strategies for doing a literature review, we opted to take an 'open' approach to the review. This involved posting our research questions on the Cloudworks site and using it as a basis to aggregate relevant resources and act as a space to promote wider discussion.

We also saw evidence of cross-communication between Cloudworks and other tools. In particular, there seems to be a complementary use of Twitter as a means of short dissemination or communication, with this then spilling over into Cloudworks as a collective space for discussion and aggregation and then onto individual spaces for personal reflection on the topics being considered. A number of types of participation were evident. The research team played a number of roles, primarily pointing to initiation of topics, facilitation of discussion, and summarising at key points. Some Cloudworks users concentrated mainly on participating in the discussions associated with each cloud, whereas others focused on adding relevant links and references. Some were clearly interested in following as they were doing related activities and could therefore point to this other work or copy aspects of the cloudscape into their own spaces. In addition to active participants the statistics show that the Clouds in the Cloudscape were actively being viewed by a significant number of people. As of 20 May 2010 the literature review Cloud alone has generated 1050 unique views; Many of the Clouds within the Cloudscape have appeared consistently within the top ten most active Clouds list on the home page. There has been a sense in these comments of shared ownership within the review. Participants described how this work related to their own interests and experiences and added relevant links to support this.

There is some evidence that – over time - this space enabled a spectrum of dialogical practices to be harnessed; sharing reflections, practices and scholarly resources. Cloudworks offered a specialised social networking space, to enable scholarly discourse around learning and teaching practices to occur.

Appendix 2: A typology of Web 2.0 tools

Media sharing

Media sharing has become an important example of Web 2.0 practice that has emerged in the last five years or so. Users can download and upload a variety of different types of media objects to the Internet. For example music fans have been quick to use centralised websites as a means of swapping digital files of their music collections. The practice of music-sharing has tended on the whole to be on users' copying commercial material (often illegally). In contrast photo-sharing (via sites such as Flickr) and artwork (for example deviant art) tends to involve user-generated content. Video-sharing (via sites like YouTube) tends to be a combination of both, i.e. a mixture of original or re-appropriated film/TV and homemade clips. A specific learning and teaching example is the education group on YouTube 'Reteachers' and 'TeacherTube'. Educational media of video and presentations are also shared in Zentation. Academic lectures and conference presentations are often hosted in specialised sites such as Academic Earth and VideoLectures.net. These provide access to video OER and aim to engage users using social networking and rating tools. Personalised versions also exist for individual broadcasting (Castpost). Other visual media that are popular for sharing include slideshow presentations (via Slideshare) and sketches (via Sketchfu). Sites also exist to package and present the various shareable media creations of individuals (for example Loudblog). Many of these sites now incorporate mechanisms for peer rating and commentary from users.

<http://www.flickr.com>

<http://academicearth.org/>

<http://www.youtube.com>

<http://www.castpost.com>

<http://youtube.com/group/reteachers>

<http://www.slideshare.net>

<http://www.teachertube.com/>

<http://sketchfu.com>

<http://videlectures.net/>

<http://www.loudblog.com>

Media manipulation and mash-ups

Media enabled web-based tools to produce and refine the files to be shared. For example, web tools are available for editing photographs (Splashup, Fotoflexer). Other tools facilitate the creation and sharing of comic strips (Toondoo), simple animation of images for webpages (Gifup) or the creation of personal web pages (Protopage). Similar editing can be applied to sound files (Soundjunction). Images and videoclips can be annotated with sound or with visual notes (Voicethread). Collections of images can be constructed into sequential video clips with music (Animoto) or broadcast as TV-style video (MakeInternetTV). More elaborate mixing of visual digital material into montages or 'mashups' is also possible (Popfly). Sections of web pages themselves can be selected and pasted into such montages (Kwout).

Services exist for creating and sharing diagrams (Gliffy) and presentation tools that allow integration and interoperability within a browser (Thumbstacks). Sections of

web pages can be extracted and fashioned into a new web representation (Yoono). Such cloning of resources enables the creation of educational mashups. Locations can also be indicated so, for example, it is possible to link literature to locations (Googletittrips). Data can also be added to maps to give coordinate position (Frappr).

Typically mashups have been about data visualisation, such as overlaying geo-tagged photos on online maps. However, the mashup concept may move into the business application space, allowing rapid development and integration of applications. Mashups need some technical skill to create and tend to rely on open application programming interfaces (APIs). Tools such as Microsoft's Popfly, Google's mashup engine and Yahoo Pipes have made the process more straightforward.

<http://www.splashup.com>

<http://makeInternettv.org>

<http://fotoflexer.com>

<http://www.gliffy.com>

<http://www.toondoo.com>

<http://www.thumbstacks.com>

<http://gifup.com>

<http://www.yoono.com>

<http://protopage.com>

<http://www.googlelittrips.com>

<http://www.soundjunction.org>

<http://www.frappr.com>

<http://www.ccmixer.org>

<http://www.popfly.com>

<http://voicethread.com>

<http://code.google.com/gme>

<http://animoto.com>

<http://pipes.yahoo.com/pipes>

Instant Messaging, chat and conversational arenas

New services have built on the original concept of the discussion forum, enabling users to 'post' their contributions to a topic-centred exchange (livingwithstyle.com). With large numbers of users online and with faster networks, there is now a critical mass to make real-time conversation possible and worthwhile. Tools for text exchange (instant messaging and chat rooms), make it easier to create distinctive spaces for Internet, text-based conversation. Some services extend text chat into higher fidelity experiences that include video links between users (Paltalk, Oovoo). Other services create a more game-like atmosphere, whereby exchanges are through screen-based avatar characters that users can design and control (Imvu). Others focus on deliberation and debating around specific topics – often combining concept mapping and sense making activities (Deliberatorium, Argumentum). Teachers also can link through discussion forums around specific disciplines (e.g. Schoolhistory).

<http://livingwithstyle.com>

<http://www.oovoo.com>

<http://www.msn.com>

<http://www.imvu.com>

<http://www.paltalk.com>

<http://franc2.mit.edu:8000/ci/>
[Deliberatorium]

<http://arg.umentum.com/>

<http://www.schoolhistory.co.uk/forum>

Online games and virtual worlds

Being able to interact with other users is also possible in online games. Often users are strangers and so the game rules need to avoid assuming mutual familiarity. A simple example is a game based around naming a sketch drawn by someone else (Isketech). A similar idea is a game based on having an invisible user/partner suggest labels for random photographs. This has a dual purpose in that it enables automatic metadata tagging that can then be used by search engines (Imagelabeler). More traditional partner-based electronic games are possible with Internet connections between players (World of Warcraft). 'Virtual worlds' create screen environments that allow users to navigate around the virtual space and interact with others through avatars. The best known of these is Second Life, an educational example is the University of Edinburgh's Vue. They do not demand game-like rules but promote the opportunity for simulatory experiences. These have clear potential for learning and have been used to good effect to simulate medical environments for example or to set up simulations around the economies for trading goods or services. Although basic use of these sites is often free, many have an economic model as well, enabling the buying and selling of objects (such as clothes, islands or buildings) in the virtual space. A new Open Source project, "Sloddle" aims to integrate the Second Life multi-user virtual environment with the popular Moodle Virtual Learning Environment (VLE). Second Life Grid is another example of an umbrella group for supporting educators using Web 2.0 tools in the curriculum. Other examples take ecology, climate or human rights as topics (Powerupthegame, Gamesforchange).

<http://www.isketech.net>

<http://vue.ed.ac.uk/>

<http://images.google.com/imagelabeler>

<http://www.sloddle.org>

<http://www.worldofwarcraftWorld of Warcraft.com>

<http://secondlifeSecond Lifegrid.net/programs/education>

<http://secondlifeSecond Life.com>

<http://www.powerupthegame.org>

<http://www.habbo.com>

<http://www.gamesforchange.org/>

<http://www.virtualibiza.com>

Social networking

An early form of Internet social interaction was based on the dating agency principle (Match). Recent sites organise real world meetings between members, such as meeting for Saturday breakfasts (Fruehstueckstreff) or by tracking mobile phone location (Dodgeball). Other sites convened members online based on alumni relations (Friendsreunited) or around business profiles (Linkedin). However, the greatest success has been in sites that allow users to create digital spaces into which they can invite 'friends' to share messages, texts, videos or to play games. Some have a strong student base (Facebook), others are more media-oriented (Myspace), and some are aimed at teenagers (Bebo). Some specifically create social links based on

users tagging their personal goals (43things), or declaring themed interests, such as green politics (Care2) or clubbing (Dontstayin). Finally, tools exist for special interest groups to design their own social network sites (Ning, Elgg). A specific example of relevance to learning and teaching is the ning-site for supporting researchers interested in looking at students' use of technologies (Elesig). The social networking site, Cloudworks, which is the focus of the Pearls in the Clouds case studies is specifically designed to foster the sharing and discussion of learning and teaching ideas and designs. It is object-centred rather than ego-centered. Most of the mainstream social networking sites typically include education-oriented friendship groups. There are also sites focusing on teachers (Learnhub). Several applications within these sites exist to enable institutional hosting or the establishment of their own college-based communities or course profiles (Mynewport, OUCourse profiles). Others (such as Elgg and Cloudworks) are specifically focused on knowledge accretion around learning and teaching topics. Other sites provide a more explicitly child-oriented design and security service for cross-site collaboration (Schoolnetglobal) or simply casual exchange around school interests (Goldstarcafe).

<http://match.com>

<http://www.ning.com>

<http://www.fruehstueckstreff.org>

<http://elgg.com>

<http://www.dodgeball.com>

<http://apps.facebook.com/mynewport>

<http://www.friendsreunited.com>

<http://ouseful.open.ac.uk/blogarchive/010855.html>

<http://www.linkedin.com>

<http://elgg.net>

<http://www.facebook.com>

<http://www.cloudworks.ac.uk>

<http://www.myspace.com>

<http://www.schoolnetglobal.com>

<http://www.bebo.com>

<http://www.goldstarcafe.net>

<http://www.43things.com>

<http://learnhub.com>

<http://www.care2.com>

<http://elesig.ning.com>

<http://www.dontstayin.com>

Blogging

There are now a variety of web services that offer users space and tools to launch their own 'blog' (blogger). Blogs can be used for a range of purposes. Some act as personal, reflective journals, others as promotional sites or as a conduit for disseminating information. Some encourage interaction around themed concerns and thus resemble social networking sites (Livejournal). Search engines exist for the 'blogosphere' of blog postings and include indicators of the perceived 'value' of the site based on the number of connections and cross-referencing (Technorati). Shorter, more whimsical and multimedia postings are also possible (Tumblr). There are some dedicated blog hosting sites for students and teachers (Edublogs). In some

cases, student blog collections are publically readable, in other instances they are only available to those also enrolled on the course. Micro-blogging sites (such as Twitter) only allow very short entries, but have become very popular in the last couple of years. The messages (Tweets) can be sent either from a web page or from mobile devices. Combining these short Tweets with longer, more reflective blog posts is now common practice. A number of conventions have developed around these tools, such as the use of hash-tags to align with and aggregate around a particular topic or use of @name to indicate a message is directed to someone specifically. Twitter has gained enormous uptake for crowdsourced journalism, as a backchannel for conferences, and has been used successfully as a tool for engaging discussions in educational contexts, especially in disciplines such as journalism and language learning. These sites tend to thrive on building a community of signed-up 'followers' for their authors.

<https://www.blogger.com/start>

<http://www.tumblr.com>

<http://www.livejournal.com>

<http://twitter.com>

<http://technorati.com>

<http://edublogs.org>

Social bookmarking

Some sites collect and aggregate tags on bookmarks that users have shared (Del.icio.us). This enables organised searching based on personal tags or a 'folksonomy' (often designed specifically for education like bibsonomy). Others incorporate user annotations with the tagging (Diigo). Services exist to extend this beyond web pages, for instance allowing users to share, tag and search on books that they are reading (Librarything). Such activity encourages folksonomies or private or user-defined categorisation schemes rather than the more traditional hierarchical and constrained taxonomies (Zotero).

<http://del.icio.us>

<http://www.bibsonomy.org>

<http://www.diigo.com>

<http://www.citeulike.org>

<http://www.librarything.com>

<http://www.zotero.org>

Recommender systems

Recommender systems enable users to vote on items to determine which get prioritised in publications or news stories (Digg). In such systems, 'social filtering' encourages individuals to find 'friends' with reliable selections. Or users can submit their own collections of favourites based on places or regions (Backofmyhand). Sites that calculate recommendations based on looking at collections that users have made visible have been particularly successful. For example the site Last.fm, which is based around music collections. This process may be based upon collaborative filtering whereby complementary overlaps in the tagging choices of individual users form the basis of recommendations (Stumbleupon)

<http://www.backofmyhand.com>

<http://www.last.fm>

<http://digg.com>

<http://www.stumbleupon.com>

Wikis and collaborative editing tools

Wikis enable the co-construction of content. The wiki construction process is best known through the public, collaborative encyclopaedia Wikipedia. Similar ventures exist for more focused interests such as travel (Wikitravel.org/en) or television knowledge (Tviv). Users can also use the wiki concept to design and maintain a personal organiser (Tiddlywiki). Other web tools are used collaboratively to design, construct and distribute digital products. For example there are sites that allow users scattered across large distances to collaborate in making a single entity such as a film (Aswarmofangels). By centralising documents on a shared web server, a group of users may edit those documents rather than hold many individual copies (Docs.google). More structured sites allow the production of collaborative artefacts such as novels (Glypho). Other websites incorporate more visual tools for collaborators (Thinkature), and some emphasise collective mindmaps for brainstorming (Bubbl.us) or whiteboard simulations (Virtualwhiteboard). These tools can also be used foster international connections, for example by linking classrooms from different countries together (Etwinning, Skoolaborate). Popular wikis are well established that have an educational emphasis (Wikiversity, Wikieducator) or with material for more specialist interests (Knowhomeschooling).

<http://www.wikipedia.org>

<http://wikitravel.org/en/>

<http://tviv.org>

<http://www.tiddlywiki.com>

<http://aswarmofangels.com>

<http://docs.google.com>

<http://www.glypho.com>

<http://thinkature.com>

<http://www.bubbl.us>

<http://www.virtual-whiteboard.co.uk>

<http://www.britishcouncil.org/etwinning.htm>

<http://www.skoolaborate.com>

<http://en.wikiversity.org/wiki>

<http://www.wikieducator.org>

Syndication

RSS feeds (or syndication) enable users to tailor the information they receive from a site and mean that the information can be delivered to them in the format they want rather than having to go to the original site. RSS buttons are a common feature on most sites nowadays, allowing users to subscribe to and thus be posted updated material. Other sites exist to ease the subscription process and allow users to select a profile of feeds (Bloglines). However, the best known and perhaps used form of this type of feeding is the use of podcasts: audio or video files that can be delivered to subscribed sites. Websites act as portals to finding these podcasting sources (Podcast.net). <http://www.bloglines.com> <http://www.podcast.net>

Appendix 3: A review of e-learning models and frameworks

Learning theories are frequently captured in pedagogical models or frameworks that emphasise a particular approach. A recent review of the key models or frameworks that have been used in e-learning described twenty common models or frameworks across the different theoretical perspectives (Conole, 2010). In the review the terms ‘models’ and ‘frameworks’ were considered together, because these terms are contested and appear to be used fairly interchangeably in an educational context. The table below comes from the review. It articulates the relationship between learning theories and practice. Perspectives relate to the fundamental assumptions about the processes and outcomes that constitute learning. Mayes and de Freitas’ three perspectives described earlier: associative (learning as activity), cognitive (learning through understanding) and situative (learning as social practice), can be sub-divided into a number of different approaches, each emphasising different aspects of learning. At a finer level of detail it is possible to identify a number of approaches within the three perspectives. For example the cognitive perspective includes a range of approaches to learning such as Problem-Based Learning, Inquiry-Based Learning and Dialogic Learning. The characteristics of each of these approaches is described, along with examples of how these are reflected in an e-learning context. Finally individual approaches can then be translated into specific frameworks or models.

Table: Learning theories, models and frameworks (derived from Conole, 2010)

Perspective	Approach	Characteristics	E-learning application	Models and frameworks
Associative	Behaviourism Instructional design Intelligent tutoring Didactic E-training	Focuses on behaviour modification, via stimulus-response pairs; Controlled and adaptive response and observable outcomes; Learning through association and reinforcement	Content delivery plus interactivity linked directly to assessment and feedback	1. Merrill’s instructional design principles 2. A general model of direct instruction

Cognitive	Constructivism	Learning as transformations in internal cognitive structures;	Development of intelligent learning systems & personalised agents;	3. Kolb's learning cycle
	Constructionism			4. Laurillard's conversational framework
	Reflective		Structured learning environments (simulated worlds);	5. Community of Inquiry framework
	Problem-based learning	Learners build own mental structures; Task-orientated, self-directed activities;	Support systems that guide users;	6. Jonassen's et al. constructivist model
	Inquiry-learning			7. N-Quire model
	Dialogic-learning	Language as a tool for joint construction of knowledge;	Access to resources and expertise to develop more engaging active, authentic learning environments;	
	Experiential learning	Learning as the transformation of experience into knowledge, skill, attitudes, and values emotions.	Asynchronous and synchronous tools offer potential for richer forms of dialogue/interaction; Use of archive resources for vicarious learning;	
Situative	Cognitive apprenticeship	Take social interactions into account;	New forms of distribution archiving and retrieval offer potential for shared knowledge banks;	8. Activity Theory
	Case-based learning	Learning as social participation;	Adaptation in response to both discursive and active feedback;	9. Wenger's Community of Practice
	Scenario-based learning	Within a wider socio-cultural context of rules and community;	Emphasis on social learning & communication/ collaboration;	10. Salmon's 5-stage e-moderating model
	Vicarious learning		Access to expertise;	11. Connectivism
	Collaborative learning		Potential for new forms of communities of practice or enhancing existing communities	12. Preece's framework for online community
	Social constructionism			
Assessment		Focus is on feedback and assessment (internal reflection on learning, and also diagnostic, formative and summative assessment)	E-learning applications range from in-text interactive questions, through multiple choice questions up to sophisticated automatic text marking systems	13. Gibbs and Boud models 14. Nicol and the REAP framework
Generic		Do not align to any particular pedagogical perspective but provide a useful overview	Often translated into underpinning ontologies or learning systems architectures	15. The OU (SOL) model 16. The OU LD & Course Business Models 17. The 3D

			<p>pedagogy framework</p> <p>18. Bigg's constructive alignment</p> <p>19. The Hybrid Learning model</p> <p>20. Gee's affinity model</p>
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Appendix 4: Paradoxes created by the networked and digital

The enthusiasm that currently surrounds Web 2.0 and learning is tempered by a host of misgivings and real challenges. Zhang (2009), among others, reminds us as researchers, educators, and designers that the potential advantages associated with educational uses of the Web (e.g., generative social interactions and sharing, adaptability, interactivity, dynamic updating, richness of information, public accessibility) can also point to challenges for the ways in which the different properties of Web 2.0 are 'transferred' into an educational context: open and shared practices also direct to ephemeral and changing contexts, and unstructured relationships. So while some celebrate the expansion of knowledge, arguing that collective aggregation of information can lead to better decisions than those any individual might make (Surowiecki, 2004), or enable cognitive improvement (Levy, 1997; Tapscott and Williams, 2006), and others caution against the 'cult of the amateur', arguing that Web 2.0 creates a democratisation of knowledge which may unhelpfully flatten expertise, decimate, cultural gatekeepers (critics, teachers, editors, journalists), engender self-promotion, disorient researchers and encourage plagiarism (Keen 2007). Likewise the changing socio-technical spaces of the Web challenge interpretation, synthesis, and explicit evolution of ideas or the structured nature of formal education. These factors underscore the tension between control and freedom that characterises much of the debate surrounding the use of Web 2.0 in society (including debates about copyright and intellectual property (Lessig, 2004), autonomy, and privacy).

The following is adapted from a Keynote presentation and paper at the Ascilite conference, 2009¹⁷, the table below lists five common effects associated with digital networked media and suggests some of the consequences or paradoxes that arise as a result.

Table: Cause and effect in digital and networked spaces

Cause	Effect
Expansive knowledge domain	Death of expertise/everyone an expert
Hierarchy & control less meaningful, content can be distributed and located in different ways	Multiple (co-)locations/loss of content integrity
Increasingly complex digital landscape	Beyond 'digital space'/New metaphors needed
Power of the collective, collective intelligence	Social collective/digital individualism
Free content & tools, open APIs and mash ups	Issues re: ownership, value, business models

¹⁷ <http://cloudworks.ac.uk/cloud/view/2735>

Knowledge expansion.

As we mentioned before, digital technologies have an amplification effect in terms of knowledge expansion in a number of respects i) they provide easy access to information, ii) new ways of aggregating resources and iii) enable multiple ways of disassembling and recombining information. In a world of increasing complexity and knowledge, it is no longer possible to know everything about a domain. Whereas a century ago a professional Chemist could have a pretty good grasp across all the main sub-domains of Chemistry, today, a chemist struggles to keep up with their own specialism. Some celebrate this expansion, pointing to the wisdom of the crowds where everyone had the potential to be an expert, to access and use knowledge. Surowiecki coined the term 'wisdom of the crowds' (Surowiecki 2004) arguing that collective aggregation of information can lead to better decisions than those any individual might make. Others caution against this, lamenting the death of expertise. Keen in particular cautions against the 'cult of the amateur' (Keen 2007: 17):

I call it the great seduction. The Web 2.0 revolution has peddled the promise of bringing more truth to more people, more depth of information, more global perspective, more unbiased opinion from dispassionate observers. But this is all a smokescreen. What the Web 2.0 revolution is really delivering is superficial observations of the world around us rather than deep analysis, shrill opinion rather than considered judgement.

No hierarchy or control

It is also not longer possible (or advisable) to try and categorise and control. The long held tradition of catalogues is being eroded. Some argue that rigid hierarchical categorisation no longer has meaning or value in a fragmented digital space. Weinberger's book *Everything is Miscellaneous* (Weinberger 2007) typifies some of these views and describes how we have shifted from physical objects, which require space and a unique location, to digital objects, which can be fragmented and multi-located. So for example a physical book has to be stored in one place, on one shelf at any one time, the digital equivalent can not only be located in multiple places, but can be disaggregated and indeed partially combined with other digital artefacts. Although this offers greater flexibility in how a book, can be used, tagged or located, this also brings increased complexity: content may lose its integrity, it may become de-contextualised and may lead to mis-interpretations.

Networked versus bounded spaces?

The increasingly complex digital landscape is challenging our existing vocabularies and means of description. The very terms digital spaces and networked landscapes hark back to a time when the digital was considered as a mere extension of the real world. Terms such as 'virtual universities' and 'virtual cafes' give the impression of the digital as a 'bounded place', whereas the kinds of patterns of behaviour we are now seeing in the digital realm, the distribution of content and tools, the multi-faceted and inter-connected nature of the digital means that the vocabulary of 'time' and 'space' may no longer adequate. We need new vocabularies and metaphors to describe what is happening.

New forms of sense making and communities of interest are emerging in Web 2.0 environments. Boundaries are blurring, with different technologies offering overlapping functionality and transient, associated communities. For example, 'spaces' can be categorised as follows: personal spaces (email, IM, etc.), group spaces (SNS for example), or

publishing space (blogs, and sharing spaces like youtube). Each of these require different modes of interaction and roles in terms of communicating, organising information, contributing content, developing relationships and the degree to which the individual is collaborating in public spaces. Cardon and Aquiton (2007) argue that the success of Web 2.0 services demonstrates users' hybrid motivations, where the individualisation of the user's goals meets the opportunity of sharing personal expression and the performance of creativity in a public space. Ryberg and Larsen (2008) argue that the trend towards 'networked individualism' is a contradictory trend; i.e. although personalisation and individualisation are intensified, users are increasingly mutually dependent on, and connected to, each other for forms of credit and recognition (see also, Wellman, 2001).

Collective ownership versus commodification

Finally the apparently utopian drive towards an Internet where tools and content are free, and where open source principles, Application Profile Initiatives (APIs) and mash ups appear to offer an evolving, collectively improved set of content and tools, which can be used in a multitude of ways, may not be all that clear cut. Such practices challenge existing ideas around quality and ownership and do not fit in with current business models for repurposing knowledge. This suggests there is far more to do in terms of understanding such models and redefining our ideas around ownership, quality and sustainability.

The above gives rise to a series of specific educational dilemmas. A recurrent rhetoric around the application of Web 2.0 technologies in an educational context is the notion of how these can be transformative in terms of transcending formal educational contexts; that they facilitate more informal and non-formal learning contexts and blur the boundaries between categories of learners (student, adult-learner, or those undertaking training or professional development). The arguments for this centre around the notion that these learners are empowered to be more active producers, authors, evaluators and commentators within the learning arena they are engaged with. At the same time, the boundaries of professional and personal identities are blurring and mediated performance occurs either in individualistic spaces via loosely bound and often transitory collectives through to more established and clearly defined communities (see Siemens, 2008; Dron and Anderson, 2007 for a discussion of collectives, networks and groups in social networking for e-learning; see Rudd et al., 2006a on the blurring of boundaries between teacher/expert and student/novice roles).

To take this a step further, some debates on the educational nature of Web 2.0 point to the dispensation of the central or traditional role of the teacher. The expansion of the knowledge domain and the consequential discourse on the 'death of the expert' naturally challenges the traditional role of a teacher. It can no longer be assumed that the teacher is expert or that the focus should be on transmission of knowledge. Some argue that society will be 'de-schooled' through the emergence of community learning sites (such as 43things, School of Everything, Wikiversity¹⁸; see Leadbetter, 2008). Others argue that the role of formal educational institutions will shift to providing personalised learning environments,

¹⁸ 43things: www.43things.com; School of everything: www.schoolofeverything.com; Wikiversity: www.en.wikiversity.org

which put the learner in control of their own learning. Many assumptions are hidden in such scenarios, particularly in relation to the motivation of learning. However, although it is unlikely that Web 2.0 will fundamentally displace that important relationship, the scaffolding perspective on learning draws attention to the special force that arises from joint activities.

Multi-located/fragmented content and the potential for multiple pathways through content have an impact on how educational interventions are designed. And although such multiplicity offers increased choice, in an educational context this also has the potential to lead to confusion. Hence there is an opportunity for teachers to play an important new role in terms of providing pedagogically grounded learning pathways, to help learners navigate their way through this complexity. The digital divide (Norris, 2001) has long been a prominent topic of debate in educational technology research (Seale and Bishop, 2009; Kennedy et al, 2007; Warschauer 2004; Norris et al. 2003). However with the increasingly complexity of the digital landscape the gap between the 'tech savvy' teachers and students, 'non-users' or those who are not engaged may become deeper. The table below reconsiders the five factors considers here and lists the educational dilemmas that arise as a result.

Table: Educational dilemmas arising as a consequence of new technologies

Cause	Educational dilemma
Expansive knowledge domain	Challenges the role of the teacher
Hierarchy and control less meaningful, content can be distributed and located in different ways	Need to rethink the design process, offers the potential for new learner pathways
Increasingly complex digital landscape	Widening skills gap between 'tech savvy'/others
Power of the collective, collective intelligence	Potential for new forms of learning; digital and networked literacies

Appendix 5: Factors influencing the lack of uptake of Web 2.0 tools in Higher Education

There are four main reasons according to the OCED report (2009) for gaps regarding positive perceptions or capacities for adopting novel ICTs for teaching and learning and actual implementation: i) the state of readiness of the technological infrastructure, ii) the investing capacity of institutions, iii) competence and iv) predominant approaches to teaching and learning.

Levels of maturity

Firstly, there is a correlation between the maturity of the technological infrastructure to levels of adoption and population digital literacy skills. E-learning-readiness (see Sibis, 2002) positions the US at the top, followed by the UK, Denmark and Finland in Europe. Similar patterns are evident from related research (The Economist Intelligence Unit, 2003 cited in OECD, 2009: 32).

National strategies

Secondly, the nature and scale of national strategies regarding investments in infrastructure, the use of technology and the promotion of e-learning in the education is recognised as an important driver. National institutions like the JISC in the UK and the SURF Foundation in the Netherlands act as contextual drivers and catalysts. Similarly the role of strategy documents is important, such as the HEFCE's Strategy for e-learning in the UK (HEFCE, 2009), the NSF's Cyberlearning report in the US (Borgeman et al., 2008), Australia's Learning Performance Fund and the Campus Numérique in France. These national directives have played a very important role in coordinating and initiating large-scale projects that promote innovation, but also provide mechanisms for training and support and for facilitating the sharing of good practice. A more local example was the establishment of 'The Evaluation of Learners' Experience of E-learning Special Interest Group' (ELESIG). This was funded by the UK's Higher Education Academy, to bring together those working on pathfinder projects regarding learners' experience. Since its inception in 2008, it has evolved as an international community of over 800 members, 'working together to share knowledge and practice and to develop a shared repertoire of resources, which will of benefit to the sector' (ELESIG, 2009). A review of the projects under the ELESIG umbrella (Sharpe, 2009) shows that learner experience research is aiming to have a transformative impact regarding a) the evaluation of influence of new tools and environments, including Web 2.0, on student experience (e.g. projects such as the UCL Pathfinder project and ELP2); and b) producing strategic guidelines (e.g. e-learning strategies in international environments). Likewise, broader strategies supported by funding agencies at national levels and international organizations that promote research, innovation and widening participation through open education have also played an important role.

Marketing and student recruitment

Thirdly, Anglo-Saxon universities seem to compete more for attracting students than those in continental Europe and thus deploy more innovative strategies for both marketing, pre-entry orientation, as well as experimentation with regards to teaching and learning. Examples include early adopters experimenting with the use of Web 2.0 technologies to provide a social space for staff and students, such as Warwick, Leeds, Edinburgh and the Open University in the UK. Some of the perceived advantages included: the flexibility of the tools, their ease of use and their compatibility with other services offered by the University.

As Armstrong and Franklin (2008) have noted, positive institutional drivers are more prominent in HEIs where ubiquitous, distance learning and life-long learning contexts are prominent and in institutions that recognise that opportunities for collaboration and communication align with both pedagogic and marketing strategies. While regulatory, legal, security and ethical factors continue to be key concerns, factors that are considered to transcend traditional HE boundaries include: a) pre-service and continuity of resources; b) lifelong learning and professional networking in under- and post-graduate courses; c) extending the ways in which new forms of knowledge are produced, published and assessed. Many higher education institutions in Europe now provide social networking tools alongside their virtual learning environment, with the aim of fostering more information communities and networks alongside the formal teaching provision. The

University of Brighton, for example, set up 'Community@Brighton', networking system for students and staff, as a place to share academic interest, personal development planning, and create e-Portfolios. Similarly, the University of Leeds uses Elgg to build a community of staff and students based on the creation of personal and community blogs. 'My OU story' is a facebook application developed by teams at the Open University, enabling prospective students to connect and exchange knowledge and experience surrounding specific courses. 'Connect', a recent initiative at the University of Westminster provides a social networking space for students and staff. Redecker lists a number of similar initiatives within continental Europe (Redecker, 2009: 55-58 and 89-93).

Yet, despite the rhetoric about the ways in which these initiatives can be beneficial in terms of enhancing student enrolment or maintenance of alumni relations (Franklin and van Harmelen, 2007), obstacles and challenges to their use and uptake remain. The University of Brighton's experiences underline some of the main challenges for the deployment of social networking applications as platforms for institutional networks in education. One of the main obstacles is a lack of interest. While all staff and students have accounts, only a small proportion are active. Evaluation staff at the University of Warwick noticed that its blogging system has positively changed social interaction, but uptake for teaching has not followed. This is, in part, because teaching staff have not integrated these tools into their teaching and hence their use remains a peripheral activity. In the case of the University of Leeds the introduction of such tools was staff-led, and so students did not perceive them as part of their learning and teaching environment. As Redecker notes, take-up and use seem to be influenced by many different factors (2009: 57). Drawing on ethnographic observations of students' from a UK Russell group university, Selwyn (2009) reports on negative student perceptions of the blurring of boundaries between formal relations to tutors and informal learning spaces on facebook (see also Madge et al., 2009 and Boon and Sinclair, 2009 on undesired blurring of identities, ownership and in general codes of practice).

Surveying the findings from across projects and initiatives, it is clear that the relationship between the use of technology and current teaching cultures remains unbalanced. Use of technologies needs to be carefully integrated into the existing curricular practices. Staff need convincing of the benefits of these new approaches and evidence regarding enhancement of the student experience needs to be clearly demonstrated. Similarly the pattern of uptake is likely to be different across disciplines. For example some courses such as media studies, journalism, information systems, e-learning and computer science or those that are primarily distance-based learning are more amenable to successful integration (see Armstrong and Franklin, 2008; Fitzgerald, Steele et al., 2009). In other instances, individuals can drive uptake and use, for example educators who see the use of Web 2.0 tools as a means of promoting constructivist beliefs or enabling more personalised and student-centered learning. Similarly many are driven by the view that such technologies can foster creativity, providing a valuable opportunity to equip students with digital and critical information skills for use in future employment and professional practice (see Armstrong and Franklin, 2008, Fitzgerald, Steele et al., 2009, 2008; Minocha, 2009).

Minocha (2009) conducted studies with 21 initiatives in 18 institutions in the UK higher and further education sectors and collected evidence regarding the use of social software in

supporting and enhancing student learning and engagement in the educational process. The study examines a variety of social software tools and inscribed pedagogies and examines the ways in which these were embedded in curriculum design. Although the findings mainly point to several benefits and positive projections regarding enhanced student experiences (e.g. personalisation and control; peer support, team building and community skills, development of digital literacy skills), high levels of staff motivation and improvement of teaching methods is correlated with institutional provision and technical facilitation (e.g. ease of integration of open source tools with VLEs) as well as personal technical proficiency. Many students across the case studies report positively on the interrelation of the public visibility of artefacts and the scaffolded learning process of working with social media: structuring the content with multimedia assets 'mirrors the process of learning' (Minocha, 2009: 31). Blended learning and interaction initiatives and the ability to enhance intra- and cross- institutional collaboration in teaching and learning were also considered very useful by academic staff who were otherwise sceptical about Web 2.0 learning initiatives.

This connects to the final point raised by the OECD report, regarding teaching cultures. According to the report (2009: 33), despite the efforts made so far under the framework of the Bologna process to harmonise a more integrative teaching culture among European universities, the predominant approach is still more about lecturing than interaction. This didactic-perspective is seen as not only being as a result of teachers' preferred style of 'teaching', but is also a factor of institutional structures (for example timetable sessions in large lecture rooms) and assessment drivers (knowledge recall to a predefined subject curriculum). A number of EU-funded Projects are attempting to change this. For example: the iCamp¹⁹ (project, which is making use of new media for cross-cultural collaboration, the Enhancing Student Mobility through Online Support (ESMOS) project²⁰ and VITAE ²¹ a project dedicated to facilitating exchange and Web 2.0 Teacher Training across Europe. These projects are providing valuable insights into the promotion of knowledge building communities, emphasising mentoring support as a replacement to authoritative and hierarchical teaching approaches (see Keegan and Fox, 2009; Keegan and Lisewski, 2009; Völjätaga (2009).

¹⁹ <http://www.icamp.eu/>

²⁰ <http://www.esmos.eu/>

²¹ <http://www.vitae-project.eu/>

Appendix 6: Barriers to change

Some of the specific barriers evident from the literature include: concerns about expectations, experiences and competences with respect to using Web 2.0 technologies, the perception that engagement in using these tools has an associated time investment; a mismatch between the current social and cultural context of teaching practices and Web 2.0 approaches (see also Blin and Munro, 2008), a lack of confidence that appropriate instructional structures are in place to support these activities and an inherent scepticism as to whether or not these technologies will actually make a difference. More on these issues can be found in an online discussion around a research question we included in Cloudworks 'why has general Web 2.0 practice not translated well/extensively within a HE context?'²². Finally, there are issues around the workload implications of these new approaches; both for teachers and students.

Access, accessibility, and concerns on authority and trivialisation

Firstly, there are a range of issues around notions of access and accessibility. Accessibility remains a major obstacle to equal opportunities and a key problem for inclusion (see for example Davies and Cranston, 2008). Furthermore, there are differences in the familiarity with ICT in general, and in social computing in particular among different learners and learner groups, giving rise to a 'participation divide' (Hargittai and Walejko, 2008). Similarly a recent report by JISC suggests that information literacies represent a growing deficit area among HE learners (JISC, 2009). There are also negative perceptions about the blurring of boundaries that arise through interaction with these technologies and in particular the blurring of work and social spheres of interaction, as well as invasion of personal or private spaces. Many are concerned about shifting to more open approaches and making content freely available, fearing it will lead to an erosion in their competitiveness (OECD, 2007; Minocha, 2009), while issues of authority, authorship and trivialisation are evident too. A specific example helps to illustrate some of these issues. A recent survey conducted by Faculty Focus (2009) aggregated 2000 responses from educators in the US, and is a significant source of data regarding practitioners' attitudes to the use of Twitter in undergraduate and postgraduate education. What was significant about the findings were the reservations many expressed about Twitter's suitability in higher education. The perception of triviality persists in relation to time consumption and real engagement, leaving to one side questions about privacy, security and faddism. More specifically pedagogic or intellectual concerns emerged from the data that focused on the perceived deleterious influence of Twitter on students' academic literacy practices, with quotes like 'logical arguments cannot be delivered well in short bursts' or '[It] perpetuates poor written and oral communication skills'. There were also concerns that Twitter can encourage comment without thought and that this does not encourage or enable the students to adequately reflect on the content and concepts they are being presented with; i.e. arguably the antithesis of learning, (Focus Faculty: 2009: 13). There is a similarity between some of these comments and earlier anxieties about the negative influence of

²² <http://cloudworks.ac.uk/cloud/view/2394>

'txtspk', that researchers have since proven to be unfounded (Carrington 2005; Crystal 2008; see Jenkins et al., 2006).

Literacy issues

Secondly, there are literacy issues in terms of whether students and teachers have the necessary skills to make most effective use of new technologies. Training and support to enable teachers and students to develop the right sorts of literacy skills presents real challenges. You don't just 'get' Web 2.0 by attending a workshop or reading a support guide. You need to actively engage with it to find a reason for appropriating the technologies to your working practice and integrate them with your professional or teaching practice. Furthermore the majority of Web 2.0 technologies are about connectivity and networks, and hence engagement requires individuals to be actively participating in appropriate communities of practice. Web 2.0 approaches have infiltrated the teaching and the research practices of academics to different extents. Likewise, although some educators' familiarity with Web 2.0 tools for personal and recreation activities generates enthusiasm regarding potential experimentation in a teaching context, this may not be matched by the profile of the students (who may not see the value of using Web 2.0 tools or may lack the necessary competences to use them).

Quality and effectiveness

Thirdly, concerns have been raised about the quality and effectiveness of Web 2.0 environments. Studies from formal education shows that there are issues around the perceived learning value in collaborative activities. Benbunan-Fich and Arbaugh (2006) found that the learning perception of students constructing knowledge with collaborative assignments was lower than students adopting a traditional knowledge acquisition model, but this was also at odds with the knowledge demonstrated in the final results. Additional challenges include the types of critical literacy needed in evaluating reliability through cross-referencing and filtering (See for example the 'Literacy in the digital university' project²³).

Legacy systems

Fourthly, Web 2.0 technologies challenge existing legacy systems and so there are a number of issues around longer-term technological cohesion. Current institutional structures present a barrier to effective uptake of Web 2.0 technologies across the sector. For example not all institutions allow Web 2.0 tools to work on their networked systems. Some institutional IT managers are sceptical or unwilling to allow linking to non-institutionally owned and maintained systems. Whilst there is evidence that these attitudes are changing and a growing interest in exploration of cloud computing within institutions, there is still a significant resistance (see also Armstrong et al., 2008, Minocha, 2009). The pace of change of technology and the investment required to adapt to institutional systems also causes problems: balancing an existing portfolio of systems with migration to new ones is an ongoing challenge. There is a growing divide between those that are supportive of continuing to invest in institutional systems and those who advocate a more open

²³ <http://lidu.open.ac.uk/>

approach. This divide is particularly prevalent in discourse around Virtual Learning Environments versus Personal Learning Environments²⁴.

Pedagogical rethinking

Fifthly Web 2.0 approaches require pedagogical rethinking. They challenge existing approaches to curriculum design, delivery and assessment. For example there is a clear clash between the participatory and collaborative nature of Web 2.0 learning and current structures of formal assessment. This raises theoretical questions about what constitutes a good or innovative pedagogy. Minocha argues that use of Web 2.0 technologies needs thoughtful integration and alignment with both learning outcomes and assessment strategies (2009: 34-7). She points to issues about privacy in these open spaces, but also raises concerns about unequal participation, distrust in peer feedback and issues of ownership. She cites an example of where students were uncomfortable about uploading onto Flickr the photographs they were taking on the course, as they felt that they had no control about who was looking at the photographs and using them. The concern about sharing resources was raised particularly where students were asked to share reflections with a group of people who were potentially going to comment on what had been written; commenting on others' reflections was also considered uncomfortable by the students. Related studies (Cole, 2009) reveal that students are not prepared to participate in such activities if they see it as an additional (albeit formative) task, especially when neither the reward nor learning benefits/outcomes are clear. Minocha (2009: 44) found that most of the Web 2.0 integrated activities were used as part of formative assessment. There were issues raised about attribution and identification; performance on courses and uses of some tools was positively co-related, but no systematic evidence from the studies, nor evidence of systematic assessment of such co-relation, exist.

As discussed throughout the review, there are clear opportunities to enhance educational practice with the spirit of Web 2.0. However, as this appendix has highlighted this is not without its challenges. Fundamentally the shift is about developing ways of teaching and learning that are more aligned with a sense of play, expression, reflection and exploration, and above all, creating rather than consuming content. Introducing Web 2.0 practices has a knock on effect. If Web 2.0 supports learning through collaboration, publication, multiple literacies and inquiry, the way that learners learn and are taught will change. The content and assessment of their learning will change as well. This will require educators and educational institutions to confront the hidden challenges that Web 2.0 tools present.

Appendix 7: Different approaches to shifting thinking and promoting change

Two examples of the ways in which changes in practice and culture can be promoted are described here.

Design-based research

The first example looks at how application of different research methodologies might provide new ways of guiding teacher practice. Action-based research has a strong following

²⁴ See for example a recent debate and associated links on this topic
<http://cloudworks.ac.uk/index.php/cloud/view/2162>

in education, and has been used extensively as an approach to trial and evaluate educational interventions on the use of technologies. Research from design science may provide an alternative mechanism for supporting scholarly approaches. Zang (2009) for example, articulates a number of challenges around the use of Web 2.0 environments to support knowledge creation and the ways in which such technologies might be used to support teacher learning and innovation. Integral to his discussion is a design science perspective that focuses on identifying challenges, envisioning new possibilities, and testing improved learning environments and interventions. The approach involves reflective practice, whereby formative research findings are fed back into ongoing cycles of innovative design (Bereiter, 2002). Zang argues that design-based research provides an approach to developing and testing learning environment design that is theoretically informed. Design-based research can put educational researchers and practitioners into proactive positions, so that they can actively contribute to evidence-informed changes in learning environments (Zang, 2009: 274). It might also provide a mechanism for guiding teachers in the use of new technologies and help develop their understanding of how these technologies can be used. Professional wisdom, as described by Dede (2009), is therefore possible with such an approach, as getting practitioners to actively engage in online spaces and explicitly reflect on their experiences, will help them acquire new knowledge and give them an understanding of how to apply it to new teaching context contexts. An evaluative approach is inherent in design-based research and provides a mechanism for teachers to formalise their understanding, alongside more informal mechanisms of sharing their knowledge-in-practice.

Promoting change through the technologies

The second example explores how practice can be changed *through* the new technologies, using them to facilitate the sharing of good practice. There have been a lot of studies and projects around mechanisms for sharing practice. These include initiatives that have focussed on cross-institutional sharing, those that explore how to adopt more evidence-based approaches and collaboration on educational research activities and subject-specific initiatives. Some examples will be given around the following approaches:

- Professional networks and support centres
- Promotion of learning design as a mechanism for articulating and representing practice
- Use of pedagogical patterns
- The development and fostering of OER communities
- Emergent communities around educational tools such as Learner Management Systems
- Research-based communities

Professional networks and support centres

Over the past ten years or so a range of professional networks and support centres have emerged which have as part of their remit a role in promoting good practice. Some have a specific focus on technologies²⁵, others are either focused on educational practices²⁶ or subject disciplines (the Higher Education Academy subject centres). These networks and

²⁵ See for example, for example ALT, <http://www.alt.ac.uk/>

²⁶ See for example, SEDA, <http://www.seda.ac.uk/>

support centres provide a range of mechanisms for supporting practice – facilitation of workshops and conferences, online events and discussions spaces, repositories of resources and case studies of good practice.

Learning design

Much of the learning design research is concerned with mechanisms for articulating and sharing practice, and in particular the ways in which designs can be represented. Lockyer et al. (2008) and Beetham and Sharpe (2007) have produced edited collections on work in this area. The AUTC learning design project was one of the first major pieces of work around this²⁷. It presents a comprehensive suite of designs across different types of pedagogy. JISC has funded a number of projects in this area under its design for learning programme²⁸ and more recently the Curriculum design and delivery programmes²⁹. A slightly tangential approach has been adopted by the University of Albany Knowledge Network for Innovations in Teaching and Learning³⁰. Their goal is 'to use our knowledge of instructional design and learning technology to produce a suite of professional development resources, organized as an open Wiki site, that can help teachers of different levels to understand new learning approaches and environments and work towards innovative classroom practices'.

Pedagogical patterns

A closely related body of work to learning design is research into the development and use of pedagogical patterns. Derived from Alexander's work in Architecture, pedagogical patterns is an approach to developing structured case studies of good practice (See for example Goodyear, 2005 for an outline of the field). An example of an initiative that tried to foster a community around the creation and use of patterns is the Pedagogical Patterns project³¹.

Open Educational Resources

With the rise of the Open Educational Resources movement in recent years not surprisingly a number of support centres and community sites have emerged. OpenLearn³², alongside its repository of OER, created Labspace which provides a range of tools for fostering community engagement, such as a free tool for video conferencing (flashmeeting) and a tool for visualisation (Compendium). The aim is to provide an environment for sharing of good practice and promoting the reuse of OER. LeMill is a web-based community for finding, authoring and sharing open educational practices³³. Similarly, Connexions³⁴ provides a space for educators and learner to use and reuse OER. Carnegie Mellon, through its Open

²⁷ AUTC learning design project: <http://www.learningdesigns.uow.edu.au>

²⁸ JISC Design for Learning Programme:

<http://www.jisc.ac.uk/whatwedo/programmes/elearningpedagogy/designlearn.aspx>

²⁹ JISC Curriculum Design and Delivery Programme:

<http://www.jisc.ac.uk/whatwedo/programmes/elearning/curriculumdesign.aspx>

³⁰ University of Albany Knowledge Network for Innovations in Teaching and Learning:

<http://tccl.rit.albany.edu/knilt>

³¹ Pedagogical Patterns: <http://www.pedagogicalpatterns.org/>

³² <http://openlearn.open.ac.uk/>

³³ <http://lemill.net/>

³⁴ <http://cnx.org/>

Learning Initiative³⁵, adopts a more evidence-based approach. Carnegie Mellon and the Open University in the UK are developing a global network of support for researchers and users of OER, through Olnet³⁶. There has been a shift towards focusing on the practices around the creation, use and management of OER. The OPAL project has recently undertaken a review of over 60 case studies of OER initiatives and from these abstracted eight dimensions of Open Educational Practice³⁷. At the time of writing an online consultation and validation process around these is underway.

Learner management systems

With the emergence of Learner Management Systems (LMSs)/Virtual Learning Environments (VLEs) in the last ten years, a number of satellite communities have developed. The open source tool, Moodle³⁸, has a very active community but the focus is primarily on development issues rather than the ways in which Moodle is actually being used in teaching. The LAMS community³⁹ is arguably more successful in terms of concentrating on educational aspects and has over 500 LAMS design sequences available online. In addition, many institutions instigated staff development programmes linked to their VLE, to promote its use and uptake.

Research-based communities

In addition to the practitioner-orientated sites and communities described above it is worth touching upon a number of the more research-focused communities. As e-learning has developed as a research field, a range of professional bodies, specialised conferences and journals have arisen. In addition, communities and associated activities tend to spontaneously arise around funding initiatives in this area, for example projects supported by the JISC and Academy or more research-focussed initiatives such as the current ESRC/EPRSC TLRP Technology-enhanced learning programme⁴⁰. Similar patterns of behaviour are evident around international collaboration, although understandably this is more complex. For example in Europe the Stellar Network of Excellence⁴¹ aims to 'build upon, synergise and extend the valuable work we have started by significantly building capacity in TEL research within Europe'. One specific example, relevant to the discussion here, includes the ELESIG (Evaluation of Learners' Experiences of e-learning Special Interest Group) community⁴². This consists of over 800 members interested in looking at students' uses of, and experience with, technologies. Elesig runs a range of events and has a ning-based online site and also on Cloudworks.

³⁵ <http://oli.web.cmu.edu/openlearning/>

³⁶ <http://olnet.org>

³⁷ <http://cloudworks.ac.uk/cloudscape/view/2019>

³⁸ <http://moodle.org/community/>

³⁹ <http://www.lamscommunity.org/>

⁴⁰ ESRC/EPRSC TLRP Technology-enhanced learning programme: <http://www.tlrp.org/tel/>

⁴¹ Europe the Stellar Network of Excellence (<http://www.stellarnet.eu/>)

⁴² ELESIG: <http://elesig.ning.com/> ; ELESIG team on Cloudworks: <http://cloudworks.ac.uk/user/view/1973>

Appendix 8: Open Educational Resources

Our focus in this appendix has been on reviewing a snapshot of current issues relating to educators' motivations and experiences around sharing and teaching in an OER context.

The core notion of openness and collective benefit that are key principles associated with Web 2.0 practices align with the principles inherent in open source initiatives. In an educational context, the most prominent is the Open Educational Resource movement, which has gained scale and depth since the early 2000s. Atkins et al. (2008) articulate a shared vision that educational materials should be made freely available, so that they can be shared and reused by others. A perception that such sharing is economically viable, and will lead towards sharing of good pedagogical practices in education has also been articulated (Iiyoshi and Kumar, 2008).

Several well-known – yet distinct – initiatives within the OER world continue to purport a mission of education as a 'public good'. In addition current thinking as well as emerging policy agendas on education are shifting from the idea of simply providing access to content, towards the notion of creating 'open participatory learning ecosystems' (cf. Smith and Casserly, 2006; Seely-Brown 2007; Seely-Brown and Adler 2008). We begin this section with a brief overview of OER and definitions surrounding sharing open content and educational practices.

We begin with an overview of emerging research in the field and more specifically we focus upon evidence of open practices developed in relation to the use of OER have an impact on teaching and learning. We draw on some of the emerging literature coming from our research as part of the Olnet initiative⁴³. In particular, we focus on how these relate to the deployment of OER and to motivations and experiences of educators for accessing, sharing and reflecting in teaching. As part of a developing research portfolio we have been conducting interviews with innovators in open access and the world of OER. The framework for literature reviewed and for empirical insights outlined in the later sections has been devised by Panagiota Alevizou and has been reviewed extensively in a number of conferences (see Alevizou, 2009; Alevizou, 2009a; Alevizou, 2010; Alevizou, Wilson and McAndrew, 2010; Alevizou and Forte, 2010).

From learning objects to open educational resources

The term 'learning object', defined as 'a digital resource which has an element of intentional learning' became popular in the 1990s (Littlejohn, 2003; Wiley et al., 2002). Since the establishment of the MERLOT database⁴⁴, one of the earliest available on the web, a number of other repositories gained prominence during the 1990s, at both institutional and

⁴³ www.olnet.org. Olnet, funded by The William and Flora Hewlett Foundation, builds on the basis of work on OER initiatives at Carnegie Mellon University (the [Open Learning Initiative](http://www.olnet.org)), together with OpenLearn at the Open University.

⁴⁴ <http://www.merlot.org>

national-levels. Examples include: JORUM⁴⁵ WISC-online ⁴⁶ and GEM⁴⁷. GLOBE⁴⁸ provides a meta-search facility across other learning object repositories. The Reusable Learning Object CETL⁴⁹ has a specific focus on the development and use of learning objects.

The term Open Educational Resources (OER) emerged in the early 2000s; since then OERs have gained increased attention for their potential to obviate demographic, economic and cultural educational boundaries, through free access, redistribution and reuse. Although the origins of the movement can be traced to Richard Stallman's Free Software Foundation, it began to materialise in 2002, with a coalition formed by UNESCO, the Hewlett foundation and MIT. In 2002 Hewlett initiated an extensive OER programme, the chief aim of which was to 'catalyze universal access to and use of high-quality academic content on a global scale' (Atkins et al., 2007:1). Although the exact definition of OER has been contested, two principal definitions have gained prominence:

The open provision of educational resources, enabled by ICTs, for consultation, use and adaptation by a community of users for non-commercial purposes (UNESCO, 2002: n.p.)

Digitized materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research (OECD/ Hylén, and Schuller, 2007:133).

MIT, with their *OpenCourseWare* initiative⁵⁰ are credited with being the first to declare that they were going to make a significant amount of their content freely available, resulting in a swath of rhetoric about the importance and potential of OER (Caswell et al. 2008; Smith and Casserly 2006). In 2006 the Open University, UK followed suit with its OpenLearn initiative⁵¹.

Funding for these types of initiatives has been supported in particular by the William and Flora Hewlett foundation but also by OECD and UNESCO. More recently, in the UK, the Higher Education Academy (HEA) and the Joint Information Systems Committee (JISC) have initiated a large-scale call for the development of OER⁵², building on existing initiatives such as JORUM and OpenLearn. The programme currently contains 29 projects.

According to data from the OECD (OECD/Hylén, and Schuller, 2007) over 300 universities worldwide are engaged in the development of OER with more than 3000 open access courses. Three years on, the numbers are growing: 200 universities have signed with the Open Courseware Consortium alone, offering materials from more than 13,000 courses, available through the Consortium's site (Carson, 2010). Other similar initiatives include:

⁴⁵ <http://www.jorum.ac.uk>),

⁴⁶ <http://www.wisc-online.com/>,

⁴⁷ <http://www.thegateway.org/>.

⁴⁸ <http://www.globe-info.org/>

⁴⁹ <http://www.rlo-cetl.ac.uk/joomla/index.php>

⁵⁰ <http://ocw.mit.edu/OcwWeb/web/home/home/index.htm>

⁵¹ <http://openlearn.open.ac.uk>

⁵² <http://www.jisc.ac.uk/oer>

The China Open Resources for Education (CORE) consortium⁵³; the Japanese OCW Consortium⁵⁴, the ParisTech OCW project⁵⁵ and the Irish IREL-Open initiative⁵⁶. At the same time, Web 2.0 technologies and social media have accelerated user generated content and collaborative resources, many of which (e.g. Wikipedia, Flickr, etc) have gained legitimacy within the OER movement (see Hewlett, 2009) and a number of online collaborative community projects - beyond mainstream educational institutions - have emerged to facilitate engagement in learning with, and through, open resources (e.g. Wikieducator, Wikiversity, the Peer to Peer university, Smarthistory, etc)⁵⁷.

Open educational resources then, include learning content at different levels of granularity for students and teachers at all levels of learning. This includes videos, books, lesson plans, games, simulations, full courses and open-access content; open-source software tools that support the creation, delivery, use, and improvement of open learning content, including searching and organization of content; content and learning management systems (e.g., Moodle, Sakai); online learning communities; and intellectual property licenses (e.g., Creative Commons) to promote open materials publishing, design principles, and content localization. Open-source course management systems are being deployed widely in universities, and to some extent in K-12. While numerous repositories and aggregators exist (see for example OER Commons⁵⁸), recent endeavors have focused attention on raising awareness and developing guidelines and tutorials for finding, producing, licensing and remixing OERs (see for example Wikieducator's OER handbook⁵⁹) and UNESCO's OER toolkit⁶⁰. At the same time, a number of tools and platform repositories, licensing bodies, best practices projects and implementation projects, as well as resources have emerged. The figure below draws on, and expands from, Margulies' (2005) and Conole and Weller's (2008) taxonomies (tools, content, implementation) to map the OER landscape.

⁵³ http://www.core.org.cn/cn/jpkc/index_en.html

⁵⁴ <http://www.jocw.jp>

⁵⁵ <http://graduateschool.paristech.org/>

⁵⁶ <http://www.irel-open.ie/>

⁵⁷ <http://wikieducator.org/>, <http://en.wikiversity.org>, <http://p2pu.org/>, <http://www.smarthistory.org/>

⁵⁸ www.oercommons.org

⁵⁹ www.wikieducator.org/OER_Handbook

⁶⁰ http://oerwiki.iiep-unesco.org/index.php?title=UNESCO_OER_Toolkit.

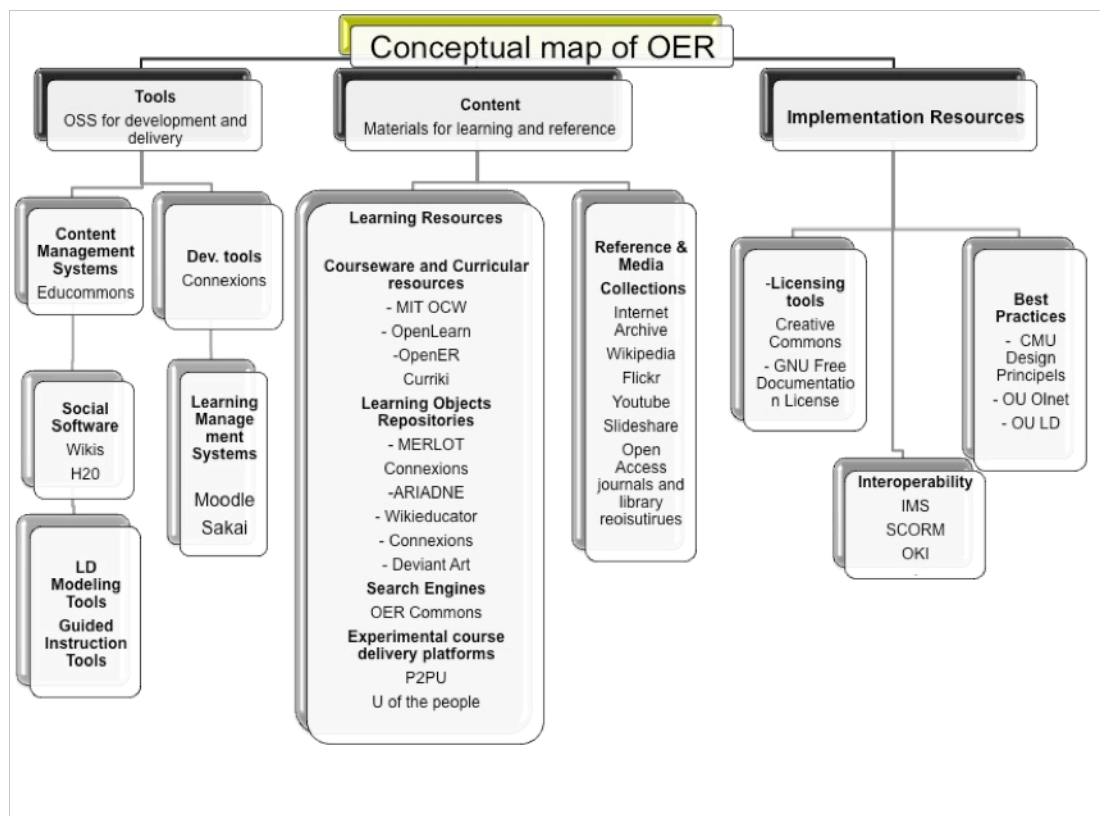


Figure 3: Conceptual Map of OER: Expanded from Marguliers (2005) (see Alevizou, 2010; see also OECD, 2007, Conole and Weller, 2008)

Three key reports provide a comprehensive review of the development of the OER movement, describing many of the major initiatives in the field and some of the key achievements (Atkins et al., 2007; Hylén and Schuller/OECD 2007; Gaser, 2007). A collection edited by Iiyosh, Kumar and Seely Brown (2008), considers the wider notion of ‘openness’ and what it might mean in an educational context. The ability of OER to serve as equitable and accessible alternatives to increased costs and commercialisation of education (Ishii and Lutterbeck, 2001) continues to be a central role for incentivising individuals and mobilising activists, advocacy groups as well as funding and policy organizations. Popular arguments reviewed in the literature – though mostly speculative – point to the possibility that OER proliferation may facilitate meeting more personalised teaching and learning requirements; to opportunities for collaboration among peers in the develop, use and reuse open materials globally and across different disciplines. Such possibilities may ultimately positively influence both academic endeavours and the scholarship of teaching and learning. Yet two core issues emerge regarding the nature of openness, peer sharing and modification and are require further empirical exploration. The first relates to the degree that engagement in learning through OER, means also engaging in developing more transparent pedagogies; the second relates to the relationship and tensions between access and tracing of re-use.

As Iiyosh and Kumar argue 'the key tenet of open education is that education can be **improved** by making educational assets visible and accessible and by harnessing the **collective wisdom** of a **community** of practice and reflection' (Iiyosh and Kumar, 2008: 10, *emphasis added*). Open Education it has been argued not only creates avenues for a) engaging educators around the world and b) offering additional resources for classroom students; but also, c) as support for independent learners, auto-didacts and self-learners. Participation, whether as an educator or casual learner is often framed as an opportunity for experimenting and gaining information, digital, networking and media literacy skills, through, and within, the field of curricular design and instruction. It is too framed as an opportunity for developing a supportive dialogue for the representation of pedagogies and pedagogical knowledge. In a recent discussion between Stephen Downes and David Wiley – both advocates, scholars and practitioners in OER – what was suggested was that:

Institutions are invited to explore the effectiveness and viability of open solutions to address large-scale educational reform. Teacher training and faculty development efforts are areas of particular interest, along with opportunities for continuous education. [...] 'if open educational resources are to represent a rich tapestry of the ways in which we manifest ourselves – the ways in which we immerse ourselves in multiple creativities – they too offer an inviting, lower-risk and lower-cost platform for being experimental and innovative in the field of education' (paraphrased from the Wiley-Downes discussion at the OpenEd preconference, Alevizou, 2009).

Indeed a body of literature has emerged from research into OERs that come from conventional universities and points towards these directions (Petrides and Jimes, 2006; Petrides et al., 2008; Kanchanaraksa et al., 2009; Schuwer and Mulder, 2009). McAndrew et al. (2009) note that the OpenLearn initiative has provided new means of working with *both* formal partnerships *and* to build also less formal partnerships and collaborations. It has also helped towards examining and improving organizational structures and processes, as well as pedagogical philosophies among educators that shared their materials in an OER form. Another strand in the literature points to informal learning communities forming around open educational resources (Bourbules, 2007; Ala-Mutka, 2009). Burbules focuses on what he describes as 'self-educating communities' groups engaged in formal, informal, or non-formal teaching and learning activities amongst themselves. His primary interest is with online self-educating communities, using the web as an educational medium. He offers a typology of the kinds of online networks of 'improvement' and co-education. He also discusses the internal practices and norms that allow these networks to act successfully as self-educating communities, and points to the areas in which these practices produce tensions and contradictions.

While tensions between informal environments and given and measured tasks (such as accreditation) need to be recognized, establishing presence in informal spaces helps institutions to get visibility. It also enables institutions to connect with prospective students and self-learners that have the potential to contribute to developing pedagogical innovations coming from people from within institutions and external communities (Gurley and Lane, 2009). Community, creative participation and collaboration in both formal and informal contexts are central to the effectiveness and sustainability of OER.

Understanding the nature and interface of openness in the context of a rapidly changing educational context, is important from a research perspective, but also has a number of tangible and practical benefits. Firstly, it is likely to lead to better understanding of how OER can be designed and repurposed, which ultimately may lead to a greater uptake and use. Secondly, adopting more open approaches to the design process could lead to better understanding of learning and teaching ideas as well the creation of a vibrant community of scholarship around learning and teaching (Conole, 2009/Learning in an Open World Vision Statement⁶¹).

Educators' motivations and OER teaching practices

A significant body of research is now available on how educators and learners are accessing and using OER materials (Wiley and Henson, 2006; Harley et al., 2006; Hylen, 2006) McAndrew et al., 2009). In a survey of 452 college instructors conducted in 2007 Petrides et al. (2008a) found that 92% had searched for course-related materials on the Internet. Reasons included:

- the desire to integrate new materials into their courses
- to improve their teaching methods and knowledge
- to connect with colleagues who had similar teaching interests (Petridis, et al. 2008a cited in Petridis et al, 2008:100).

These results are on par with MIT's consecutive evaluation reports of its OCW collection, which too reveal that educators are accessing OER to support their course planning and preparation and to enhance their personal knowledge (MIT, 2006; 2009a).

The sharing of one's own materials and the reuse of others' OERs is less expansive (see Harley et al., 2006; Hatakka, 2009). In Petrides et al's (2008a) study of online instructors, evidence directs to the following: while 67% of those surveyed were willing to share their course materials with others over the Internet, only 25% were willing or intending to make their course materials available in an OER form. Evident in the literature and in our own research is that issues of ownership, confidence, relevance and quality are prominent inhibitors, alongside issues relating to legal constraints and technical literacy, lack of professional incentives and a culture (or expertise) in sharing and remixing openly. The last two aspects are closely associated with awareness raising strategies, policy and institutional support. As several interviewees that participated in our study 'on collaboration and context in OER' (see Alevizou, 2009a) note:

The one thing is the use of the technology, new technology and wikis. An the other is opening to the world, right. So that, that barrier has been well discussed I think. It's an emotional thing I think, cos play it out rationally, its advantageous to teachers largely, and researchers. But emotionally it's scary, they are unprepared, their resources aren't good enough, they think there might be commercial gains (Wikieducator, Interviewee, 13/08/09).

⁶¹ <http://cloudworks.ac.uk/index.php/cloud/view/2804>

There is high quality threshold and self-censorship that is imposed by teachers themselves; and that's considered as barrier for creating additional courses for the OER platform...Additional awards should motivate people (OpenER Interviewee, 24/07/09).

We need to make sure that OERs are not stand alone projects within institutions...When people invest time and resources, they need to see a tangible benefit: this could relate to students feeling that they are better educated; in a better way, in a different way. But it also depends on the institution having created a policy environment that is supporting faculty having dedicated their time and energy (OER Africa Interviewee, 12/08/09).

Despite these barriers there is evidence that over time, positive attitudes regarding motivation exist and a recognition of – among those that participate in relevant initiatives – positive influence in research, teaching and learning practices. According to the most recent evaluation surveys conducted by MIT OCW (2009a), 17% of educators coming to the site have reused content and 32% expect to do so in the future, 47% of the total cohort of educators combine OCW materials with other content; 30% adapt course syllabi; 30% adapt assignments or exams.

Most importantly, evidence suggests that teachers who indeed publish in an OER platform form enjoy the benefits of localised and global exposure with respect to scholarly and scientific communities, engage better with their students (prospective, current and alumni) and improve their teaching practices and experimentation. As one interviewee from MIT OCW puts it:

Faculty have about a half dozen things they carry around in their head, that they'd like to do to their course if they found time to do it, and publishing openly provides them the occasion to make those changes they were planning to make. And so about a third of the Faculty tell us they've improved their course materials through the publication process. And another third say they've become more comfortable in using the web as a teaching tool, or through publication. Then when Faculty are going to produce their own courses, or get their own courses ready for teaching here on campus, about 80% go to the Open Course Ware site to find materials to look at what their colleagues are teaching, look at how other courses are structured (MIT OCW Interviewee, 08/08/2009).

Connexions and Wikieducator have also been used as platforms for educators to experiment with and publish widely in a variety of fields for all levels of education including vocational education and teacher training; The sites serves as an apprenticeship platform for educators by allowing them to observe how others in their respective fields communicate with each other and also to publish their own contributions, or improve others' content, which can be relatively small – echoing 'legitimate peripheral participation' (Lave and Wenger, 1991) that is characteristic of open source communities:

I think, generally, we fit nicely into those models where you have now the opportunity to re-use, in fact teachers are going, 'oh..., you mean I don't have to take this book as it is, I can re-arrange the chapters'... That's the first one, and then the second one is 'oh you mean I can put my own work in there, oh...'. And so those, those are evolutions that take place. Then they'll try more, and some will be adopters, some won't be...(Connexions Interviewee, 10/08/09).

This allows educators to 'learn to be' open, co-creators; in this instance by peripherally participating in 'improving' and adding their own perspectives and experiences from using

resources in respective contexts. Such peripheral participation can result in a cycle of more experimentation and engagement with peers and hence contribute to a gradual transformation of departmental, and eventually, institutional cultures. In some ways, as some of our interviewees put it, the adoption of an OER mindset amongst faculty, follows a classic example of diffusion of innovations (Rogers, 1962):

We put surveys in the field to students, to alumni, to faculty, and we tried to get that information out so that it became clear to the community what the benefits were for MIT in participating. But overall I think what we saw was really kind of a classic diffusion of innovation occur. Where you know, we got the early adopters on board, we got them to become our best advocates, and so they got the next group and the next group, and it sort of led to a point where the question on campus became 'why haven't you published', rather than 'why would you publish'. And I think that students were really important in driving that, because once the students began to see it as a tremendous resource, they would go and look for a particular faculty members materials, if they wouldn't find it, they'd go and find the faculty member and say well why haven't you published on Open CourseWare (MIT OCW Interviewee, 08/08/2009).

Variations in higher education institutions regarding 'OER-readiness' exist, with universities with expertise in, and pre-existing structures to, support distance learning having a competitive advantage over residential institutions, both in terms of infrastructure and institutional support. But having and maintaining a strong vision, along with advocacy and inclusive strategies for supporting teachers and students, is also deemed paramount, in both distance and residential universities. Increased engagement with content for prospective and home students is cited as a common incentive at both institutional and faculty levels. This increases the opportunities for pre-practicum and personalized learning. In addition, making student contributions (such as seminar notes, lab reports and personal reflections through blogging) also available in a open-courseware form, is seen by educators as an important factor for improving teaching and learning and for creating more open and participatory cultures. As some interviewees noted, involving the students in the OER movement has a number of benefits and can contribute to bringing about changes in cultural attitudes and the way in which learning and teaching is undertaken. For others, teaching using OER has become part of their professional practice. Below we provide some examples whereby engagement with OER content intersects with teaching practices in an OER fashion.

A new EU-funded initiative, OPAL⁶² is articulating how Open Educational Practices are currently located within the development and use of OER. Its aim is to explore ways to improve the quality of OER and spiral innovation around OER. How might Web 2.0 technologies be used as a form of 'pedagogical wraparound' to promote discussion about OER? Indeed OER research and development activities provide useful grounds for exploring new approaches in learning and teaching. This work has enabled the teaching community to experiment, to explore how these resources might be used in different contexts and how they can be shared and repurposed, as is evident by the diversity of OER initiatives worldwide. These range from whole-scale institutional projects, to cross-sector discipline initiatives, as well as individual projects which focus on use of OER for collaboration and

⁶² OPAL: <http://qualityoer.pbworks.com/FrontPage>

peer learning. The same can also be said of other crowd-sourced projects such as *Wikieducator*, *Wikiversity*, *Deviant Art* and *Smarthistory*.

OER classroom communities

George Siemens and Stephen Downes created an ambitious course and delivered it for the first time in 2009 – not only were the tools and resources they used in the course free, but so was the expertise. (See this blog post for a reflection on the experiment by George Siemens⁶³) The twelve-week course was called ‘Connectivism and Connective Knowledge Online Course’⁶⁴ They described the course as a MOOG (Massive Open Online Course). The content, delivery and support for the course was totally free, anyone could join and an impressive 2400 did, although the actual number of very active participants was smaller (ca. 200). The course provides a nice example of an extension of the open movement, moving a step beyond the Open Educational Resource movement to providing a totally free course. Siemens, reflecting on the course said the following:

Did we change the world? No. Not yet. But we (and I mean all course participants, not just Stephen and I) managed to explore what is possible online. People self-organized in their preferred spaces. They etched away at the hallowed plaque of “what it means to be an expert”. They learned in transparent environments, and in the process, became teachers to others. Those that observed (or lurked as is the more common term), hopefully found value in the course as well. Perhaps life circumstances, personal schedule, motivation for participating, confidence, familiarity with the online environment, or numerous other factors, impacted their ability to contribute. While we can’t “measure them” the way I’ve tried to do with blog and moodle participants, their continued subscription to The Daily and the comments encountered in F2F conferences suggest they also found some value in the course⁶⁵.

David Wiley, Associate Professor of Instructional Technology and director of the Center for Open and Sustainable Learning (COSL) at Utah State University is a well-known researcher in the area of Learning Objects and Open content. Using wikis and blogs, he runs a course entitled, “Introduction to Open Education”⁶⁶. The novelty of the course (launched in 2007) was that it was free and offered to anyone in the world. The only requirement was the availability of a blog, to be used to publish weekly posts on the various topics of the course. The course could be attended in different ways:

- *credit*: students who needed credit had to sign up for an independent study at their university and find a supervisor to whom the instructor should send a grade at the end of the term,
- *non-credit*: students could attend the course without any grading from the instructor. If they completed it they could get a certificate at the end of the course stating its successful conclusion,
- *informal*: fully non-credit attendance of the activities.

⁶³ <http://ltc.umanitoba.ca/connectivism/?p=182>

⁶⁴ [http://e4innovation.com/?p=370 - _ftn1](http://e4innovation.com/?p=370_-_ftn1)

⁶⁵ <http://ltc.umanitoba.ca/connectivism/?p=182>

⁶⁶ <http://open.byu.edu/ip692r-wiley/>

The core objectives of the course were to offer a firm grounding in the current state of the field of open education, including related topics like copyright, licensing, and sustainability, and to get participants thinking, writing, and debating about current practices and possible alternatives in open education. Using participant observation as a methodological approach to study social interaction within course, Fini et al. (n.d.) offer a number of interesting insights. While the initial didactic structure of the course promoted individual learning modalities for reading and structuring reflections, during course delivery, peer participants took were encouraged to take more control over curricular design and activities. The authors noted that tight connections between content and users were gradually developed, and that creative and collaborative dimensions were also evident. Responding to a network of participants, the instructor restructured the development of the course proposing a final version, which was modified and broadened on the basis of the learners' observations. At the end of the course, starting from the learning material produced by the participants, the teacher extrapolated a new pattern of renewal that was going to be used in the new versions of the course. In describing the course design, Wiley outlines a whole philosophy for teaching in OER fashion:

There are two ways to describe the design of this course, and both are equally valid. On the one hand, this course is a mix of direct skills instruction combined with project-based learning and collaborative problem solving. The course employs a progression of increasingly complex problems with supportive information, and requires students to synthesize hundreds of pages of literature, interview data, and their own design intuition to produce meaningful artifacts both individually and as part of highly inter-dependent teams. The idea of teach-reteach (characterized by Gong's description of the Three Person Problem) is at the heart of the students' day-to-day learning experiences (Wiley, 2009⁶⁷):

Similar endeavours have been undertaken within the Wikiversity platform for a course entitled 'Composing free and open online educational resources'⁶⁸. Leinonen et al. (2009) note that the experiment was designed so that the course could model teaching and learning — that is, combining elements from acquisition, participation and knowledge-building metaphors of learning. From the organizational perspective, the course relied in many ways on conventions common in free adult education, and outline both opportunities and challenges in the field and in teaching and learning with wikis.

Exploring the intersections among teaching, learning communities and research, Ferreira (2009) outlines two 'Pilot Learning Projects', one in the subject of 'Ethics and Technology', and the other in the area of Design. Both were run in the OpenLearn platform, using communication tools and community in LabSpace – OpenLearn's interactive platform. Core aims of the pilots were to explore a) ways in which OpenLearn can contribute to course development at the OU by providing a platform for experimentation and trial of new ideas; and b) to document and reflect on the opportunities afforded at the boundary between formal/informal learning at the interface between the OU and OpenLearn (Ferreira, 2009: 20). Ferreira offers interesting perspectives that bring to light tensions that have already been discussed in this report:

⁶⁷ 'Course Description: <http://open.byu.edu/ipt692r-wiley/syllabus/>)

⁶⁸ http://en.wikiversity.org/wiki/Composing_free_and_open_online_educational_resource

Despite the widespread marketing and media discourses around the idea that ‘content is free; it’s a matter of editorialising’, comments such as these are representative of a position more widely shared amongst those who teach: ‘Without a teacher, learning is difficult and, often, impossible’. ‘It took me six months to find my way around something I could have learnt in a week, if I had some stepping stones’. ‘Even strongly motivated groups of learners quickly collapse without a teacher’. Whilst some of the underlying concerns amongst some colleagues seem to revolve around views that construe ‘openness’ as a potentially destabilising element, less reactionary views revolve around concerns with ‘quality’ as something that can be assessed, measured, and used as evidence of ‘success’: ‘quality’ of learning resources, ‘quality’ of the learning experience afforded by the involvement of a teacher and ‘quality’ of the individuals produced by such experiences. But are these concerns rooted only in politics and its questions of power? [...] From this perspective, a major area of impact of OERs is that their availability is not only creating new challenges but also bringing to light previously veiled tensions and questions regarding identity and boundaries, and this provides a fascinating area for further investigation (Ferreira, 2009: 48-9).

Repurposing and reflecting: designing resources, designing collaborative communities

Motivations for contribution in OER platforms or Open Courseware repositories follow similar patterns to open publishing. Petrides et al. (2008) offer useful insights regarding ‘author’ use and reuse in OER. They focused on the Connexions platform and performed a rigorous statistical analysis of log files of activity over a five-year period, along with follow up interviews with a selection of participants within the platform. While the qualitative data provided insights into use and reuse practices, the qualitative data added depth to the findings by delving into the ‘why’ and the ‘how’ that goes behind use and reuse practices, collaborative authorship, as well as challenges and discontinuation of use and reuse. Among the factors influencing contribution and continuous use cited in the findings were:

- prior familiarity with publishing online content
- a sense of improvement of teaching practices
- and support in professional development, which helped feed a continuum in publishing, augmenting and re-using content.

As the authors note: ‘Users explained that as teaching professionals they had a heightened need for timely content for their students and colleagues’ (Petrides et al., 2008: 112). Incentives for persistent users included ideology, technical know-how and a recognition that this type of engagement helped their professional development; they also saw it as useful for connecting with subject-specific instructors and teaching scholars across geographical boundaries. However, intermittent and eventual non-users (some of whom were also educators) were disincentivised by lack of technical skills, relevance of content, and reluctance to the idea of group authorship (see below for more about collaborative co-authorship and community structures).

Certainly, educators’ prior knowledge and familiarity with Web 2.0 or technical skills, as well as motivations towards openness and crowdsourced education, are key components for the sustainability and success of the OER movement (see for example, Downes, 2007).

As research in the field has indicated, educators’ concerns over relevance and quality hinder use and reuse. The relevance of content incorporates several layers, e.g.

examples from developed countries may not be relevant for students originating from other cultures, the pedagogy used may not be appropriate, or the level of the content may not be appropriate (Albright, 2005; Unwin, 2005; Selinger 2004). Quality can mean different things (including the legacy of the host institution of the educator/OER producer in question); however, common quality issues include accuracy of the information and knowledge distributed in the content. Just because content is 'correct' it does not, however, mean that it is appropriate to use in every context (Attwell and Pumilia, 2007; Albright 2005). Quality is also a matter of trust: the users have to trust the information provided if they are to use it (D'Antoni 2006, Hylén 2006). Analysing three interpretive case studies (Teachers in Bangladesh, Content developers in Sri Lanka, UNESCO OTP's users), Hattaka (2009) reveals how not only factors related to content issues (such as quality, relevance) but also language affect the actual reuse of OERs. Furthermore educational rules and restrictions in different countries, access, technical resources, intellectual property, awareness, computer literacy, teaching capacity, and teaching cultures play a role in limiting the adoption of open content. Among the reported findings, for instance, teachers "see the content development process as self-development" (Hattaka, 2009: 7, 13) and are often reluctant to merely copy materials provided by others. Moreover, finding, assessing and modifying materials on the Internet is considered time consuming and excessively complex. Educators would find it easier to utilise materials with a finer granularity. An additional issue deals with the lack of trust towards open content not provided by recognized institutions. This implies a limit to the idea of Web 2.0 communities as accredited producers of educational open content. Issues of quality, technical expertise, notions of ownership and time considerations (even when institutional support in enabling reuse is provided) are consistent with findings reported by other researchers (see also Wilson and McAndrew, 2009).

Other barriers include the tensions around contextualisation. During a Blended Learning Design workshop at Brunel University (as part of the OU's Learning Design Initiative⁶⁹), we hosted a stall on OER to assist with raising awareness about OERs and finding relevant resources⁷⁰. Some educators mentioned that they would be delighted to share their own resources, but were also sceptical of context-independent resources. This suggests that if resources need to be 'granular' so they can be found easily, they also need to offer explicit learning designs, and an interactive interface to enable feedback and/or dialogue about 'reuse' in other contexts. Licensing regimes are another issue. Indeed, issues related to contextualization are key concerns. Some note that highly decontextualised OERs are reusable at larger scales and for a greater number of learning situations; yet this means that they are more expensive to produce and difficult to localise and personalise. This is because such resources (e.g. learning objects) by nature of their high level of granularity are devoid of the context that may be needed to make them comprehensible (e.g. Calverley and Shephard, 2003). Given that incorporation into instructional activities has been identified as a central feature of reuse (Recker et al., 2004), enabling the contextualisation of OER across various teaching and learning situations is vital to support this process. Conole and

⁶⁹ <http://ouldi.open.ac.uk>

⁷⁰ <http://cloudworks.ac.uk/cloud/view/2556>

Weller (2008) argue that adopting a learning design methodology may provide a vehicle for enabling better design and reuse. Aligning with Cantoni, who advocates that the community of use and the context within which OERs are created are key, Conole and Weller (2008) argue that OERs in themselves are simply resources, which have potential that is only unlocked in use.

In terms of making a more explicit connection between the learning design and work on pedagogical patterns, Conole and Jones describe a case study that is represented both as a pedagogical pattern and a visual learning design (Conole and Jones, 2010). More recently, via the Olnet initiative, work has been undertaken to explore the connection between linking OER, learning design and pedagogical patterns (Dimitriadis et al., 2009; Conole et al., 2010). There are a number of hypotheses being tested with this new work.. Firstly, that the application of methodologies from work on Learning Design and Pedagogical Patterns may help the design and reuse of OER. Secondly, that OER have implicit designs and that if these are made explicit, they can be shared (and hence repurposed) more easily. Thirdly, that active representation of the design process through a visualisation tool (like CompendiumLD) that draws on existing resources (such as Open Educational Resource repositories), together with design methods (from learning design and pedagogical patterns research), can help guide and inform the design process. The outputs of the design process (an OER and an associated design) can then be shared with the community via appropriate repositories (such as OpenLearn) and social networking sites (such as Cloudworks).

A culture of sharing and building more context around OERs was perceived as critical to meeting the needs of students, according to forty leaders in open education and technology who met in Barcelona on October 19-20, 2009, at the Open EdTech Summit sponsored by the Open University of Catalunya and the New Media Consortium. *Creating the university of the future* was the title of the summit and the focal question for the event was whether Open Educational Resources (OERs) are examples of creative use of Web 2.0 in a higher education context. The Call to Action summarises⁷¹ the major findings of the 2009 Open EdTech Summit; Of those, point 5 is of particular interest:

Content producers and users alike must embrace strategies (reflective blogging, metadata, documentation of process, visualization of learning, etc.) for linking content generation to "pedagogical wraparounds" that embed context within effective learning practices. Such strategies would ensure that the focus remains on learning objectives and process, rather than on the technology used to deliver the learning materials.

Alongside the development of a community, an infrastructure for authoring, collaboration and repurposing is deemed necessary for enabling the creation of a critical mass of content that can be continuously improved upon. OpenLearn's [Lab Space](#) section is specifically design to encourage educators to 'collaborate with others and publish new versions of learning materials to share with the world'. In each OER, the 'Versions' block includes

⁷¹ <http://oet.wiki.nmc.org/CallToAction>

'Upload this unit' and 'Make a copy for revising'. The Connexions site offers variable content and structure complicate *en mass* operations, but individual modules and collections are accessible, structured, and supported for reuse/remix with the most liberal Creative Commons license. In terms of providing a social and community interface, the site is similar to OpenLearn's LabSpace, providing not only packaged content but also resources and tools to facilitate reuse, remixing, and republishing OERs. Connexions enables members to create online content individual as well as collaboratively; author users can create private work areas, and versions of modules created can be improved or augmented in these areas or others when published (at the author's discretion). Authors can create online shared workgroups and invite others to join. As Petrides et al. note (2008: 112), workgroup members cited the overarching structures of groups as an important factor in maintaining collective efforts, alongside clear role assignation for ensuring regular maintenance and updating. Nonetheless, common tensions and conflicts often surface around attribution and ownership. McAndrew et al. (2009: 50-4) offer several examples of collaborations and repurposing within LabSpace and claim the most common motivations for collaboration are the following:

- Benefits from a space in which to create and support a community
- Informal association with the Open University
- Researching tools for teaching purposes
- Publishing own materials
- Translation into different languages

With sophisticated technical capabilities and community architectures in place, the role of mentorship in facilitating repurposing, comes forward in many OER platforms, as several of our interviewees from OpenLearn, Wikieducator, Connexions and Wikiversity note. On the other hand, endorsing cultures of reflection and connecting the nodes in existing networks of teacher-learners and students-learners is also seen as a way to cultivate existing communities of interest and practice. As Seely Brown and Adler (2008) note:

'We need to construct shared, distributed, reflective practicums in which experiences are collected, vetted, clustered, commented on, and tried out in new contexts. One might call this "learning about learning," a bootstrapping operation in which educators, along with students, are learning among and between themselves. This can become a living or dynamic infrastructure— itself a reflective practicum.' (n.p.).

We are starting to see examples of initiatives which are exploring ways of achieving this. Within the OU, we have developed Cloudworks, which provides a platform for sharing ideas and designs about teaching and learning. Another example of such a practicum is the online Teaching and Learning Commons⁷² launched in 2008 by the Carnegie Foundation for the Advancement of Teaching. The Commons is essentially an open version of the Foundation's Gallery of Teaching and Learning⁷³ which has been operating for the past nine years. The Gallery provides an online showcase for case studies of successful teaching and learning

⁷² <http://commons.carnegiefoundation.org/>

⁷³ <http://gallery.carnegiefoundation.org/>

projects that have been supported by the Foundation, along with a set of web-based tools (the KEEP Toolkit⁷⁴) for creating these case studies. The Commons is an open forum where instructors at all levels (and from around the world) can post their own examples and can participate in an ongoing conversation about effective teaching practices, as a means of supporting a process of “creating/using/re-mixing (or creating/sharing/using). Research into how these types of platforms can be used to support sharing and discussion of practice is beginning to emerge (Alevizou et al, 2010; Conole and Culver, 2009; Conole and Culver, 2010). A number of other fields of enquiry including motivations and experiences of learners in an OER context have generated a lot of attention and a burgeoning body of literature is emerging.

Appendix 9: Issues raised by the introduction of new technologies

A number of key insights emerge from comparative studies we outlined throughout the review. These include:

- Institutional arrangements
- The educator's role
- The attitudes and roles of students
- Tensions around the nature of openness
- Assessment practice

Institutional arrangements

The introduction of Web 2.0 technologies impacts on existing organisational structures. There needs to be a balance of experimentation by individuals and institutional coordination. Such a balance is not easy and of course this tension accompanies the introduction of any new technology. However the problem is exacerbated with Web 2.0 technologies, which in many respects are fundamentally at odds with institutional systems. Appropriate support mechanisms are also needed, and clear articulation of the kinds of institutional support provided is paramount. For example if external sites such as Flickr are used in a course, the institution needs to have a clear policy statement on what happens if the Flickr site goes down. Inclusion of specialists (such as educational technologists and learning designers) who have a broad understanding about Web 2.0 technologies is also important and should be brought into any discussions about the use of Web 2.0 technologies at an early stage in the design process. As Fitzgerald, Steele et al. (2009) note, relying on scholarly enthusiasm is not enough to ensure effective use, other factors need to be considered as well. There are also different views on the value of institutional systems versus open source or external tools and services. Many argue that existing VLEs and *Walled Garden* models to blogging or wikis are actually taming staff and students' creative experimentation, and that such protected spaces are not fully exploiting the pedagogical potential of these genres (Hemmi et al., 2009; See also Roberston, 2008; Elgort, 2007; Choy and Ng, 2007; Reimann and Weinel, 2007, Minocha, 2009, BECTA, 2008). However it is also true that there are significant challenges associated with the technical and functional

⁷⁴ <http://www.cfkeep.org>

integration of tools that have been developed and maintained externally and this is a significant barrier to embracing them for those with institutional support responsibilities.

The educators' role

It has been argued that interaction in Web 2.0 environments will facilitate the shift from the traditional roles of 'teacher' as expert and 'learner' as recipient towards bringing learners to the core of the learning processes. Metros and Bennett (2002) report on the results of an informal web-based survey conducted in the early 2000s. The study covered 97 higher education institutions and focused on exploring the creation of digital resources/learning objects, and the kinds of sharing practices around these. The study found examples of educators beginning to assign their students the role of co-producers of digital content (see also the OER case studies below and the notions of co-creation). This early work points towards a trend for de-hierarchising the role of the teacher as the sole creators or purveyor of knowledge and students becoming co-creators in curricular design and content creation. This trend has been amplified with the introduction of social media (see Collis and Moonen, 2006), where user-generated content is common place and where there is a variety of tools for sharing and discussing digital artefacts. Using wikis as examples, Palloff and Pratt (2005) argue for the need for curricular designs and pedagogical instruction focused around the role of the teachers as mediated facilitators, rather than authoritative instructors.

Siemen's list of the new roles that teachers need to adopt in networked learning environments described in the main report are insightful in that they provide a framework for thinking about how roles are changing and what mechanisms might be needed to help shift practice in this direction. Successful use of tools such as wikis or blogs in courses is dependent on a number of factors. Firstly, learning outcomes need to be clearly mapped to course activities and assessments. Secondly, support is needed to provide teachers with the skills they need to integrate these tools into their courses – skills around effective design as well as delivery. In terms of design teachers need to gain a clearer understanding of what these technologies can do and how they can be integrated with the other aspects of the course. It is also about enabling them to think about how to create the necessary course conditions and climate to support the establishment of an online community. In terms of delivery it is about helping them to adopt more of a facilitative role, helping them to engage in and support student-led activities. Thirdly, the starting point needs to be based around the educators' prior use of and familiarity with new media. Similarly it is important to understand the nature of the students involved and their prior experience of these tools.

Bower et al. (2006) and Robertson (2008) describe empirical results around a group of HE teachers using wikis. They observe that two factors are important to ensure success. Firstly, an appropriate induction programme for teachers on the use of social media. Secondly, continuous assistance at both the technical and the pedagogical levels. Bruns (in Fitzgerlald, Steele et al., 2009), Choy and Ng (2007) and Bower et al. (2006) all argue that the design of learning tasks affects both the students' motivation to participate and their learning experience. All these researchers note that although there is an inherent assumption that wikis are suited to tasks that require negotiated meaning, the task authenticity too can have an impact on student contributions. Integrating short-term or small-scale group projects or

problem-based tasks can be a promising way to explore and utilise the pedagogical potential of the wiki applications. To optimise the effectiveness of the learning experience, academics should anticipate the collaborative requirements of the tasks being prescribed, and then make every effort to ensure that the tools provided meet those requirements. Bruns (2008) and Fitzgerald, Steele et al. (2009) report that peer skills develop gradually (through previous critiques, development of students' own portfolios and development in collaboration in a small teams). Building networking skills to involve both planning and maintaining a space, are key strategies to alleviate risks. A staged shift from collaboration in small teams to collaboration in larger teams allows for the gradual development of creative and team building skills.

Likewise, mediated interaction is part of revising ideas about teaching. Fitzgerald, Steele et al. (2009) report on the ways in which tutor wikis were used to enable online resource sharing and reflection on teaching scholarship. They found that discussions about pedagogies were embedded in these subjects. Close support from a learning designer, who could offer curriculum design advice and mentor tutors, was a key factor for success. In addition, in this study a wiki was also used to assist the face-to-face joint curriculum writing, documentation and reflection activities, undertaken by the team.

Hemmi et al. (2009) describe the use of wikis and blogging in more conventional face-to-face settings (i.e. in a Divinity course at a residential university in Scotland). Here the focus was on use of these as motivational tools for discussion and class collaboration. They were used to encourage progressive peer interaction and the reflective comments enabled tutors to re-assess their roles more as facilitators, rather than as 'authoritative sources'. Hemmi et al. and others (Fitzgerald, Steele et al., 2009; Palloff and Pratt, 2005; Bruns, 2008, Choy and Ng, 2007, Bower et al., 2006) have reported the benefits of the use of these tools in terms of enabling tutors to continually revise their teaching. Also these tutors were adapting their discourse style as they became more accustomed to working within the wiki and blog environments and as they began to use these as collaborative 'classroom' environments. Alongside these evident shifts in actual practice, the participation inevitably also increased the teachers' level of scholarly reflection.

These spaces can be used to promote situative learning approaches, where the participants (both learners and teachers) have a sense of belonging to a community of practice, and where the role of the educator is explicitly spelled out as facilitator and helper (e.g. Choy and Ng, 2007; Siemens, 2009). While many researchers note that more work is needed to enable students to establish a sense of belonging to their discipline community, existing evidence in the field of teacher education suggests that use of these tools to facilitate community belonging is occurring. McLoughlin et al. (2007) report on the ways in which the implementation of Web 2.0 (reflexive and collaborative blogging and podcasting/voice discussion board) within the institutional LMS was used to enable a structured, peer-to-peer e-mentoring framework for a Graduate Diploma of Secondary Education at the Canberra campus of the Australian Catholic University (ACU National). Empirical data collected from blog posts, podcasts and interviews with both students and teachers, demonstrated that the e-mentoring approach was effective for emotional and psychosocial support. It also provided a means of giving feedback and encouragement in the development of professionally centered conversations among students. It was also valuable

for educators in terms of reviewing innovative pedagogies and revising their theoretical thinking and pedagogical practices. The environment acted as a space for mutually evolving skills and a collective community of reflective practitioners. The authors of the paper acknowledge the multiplicity of free and publicly accessible online mentoring and networking sites across a range of professional groups in education, and argue that their embeddedness within structured learning environments has fostered cross-institutional collaborations and the development of professional 'learning communities' beyond the institutional or degree boundaries.

The attitudes and roles of students

The mismatch between students' expectations and actual experience in their courses is widely reported in the literature, and in particular, the tension between didactic and more student-centered approaches, and the balance of expert guidance and individualized support. Students' prior knowledge and familiarity with Web 2.0 tools influences their readiness to adopt tools effectively within the curriculum, even when the use of these tools is an integrated part of the learning design (e.g. Fitzgerald, Steele et al., 2009; Bruns, 2008; Collis and Moonen, 2008; Roberston, 2008; Elgort, 2007; Bower et al., 2006; JISC, 2009).

Tensions around the concept of openness

The pedagogical ambivalence surrounding the nature of sharing, self-representation, identity negotiation and formal requirements of assessment is widely reported. As Hemmi et al.(2009: 25-26) note for example, with students switching between virtual and real identities, issues of manipulation and self-promotion transpire (see also Minocha, 2009). While self-reflection and the 'informal nature of self expression' in a public space is seen as a positive component, the integration of the blog – indeed a public, fragmented and 'slippery' form of writing – within formal assessment structures generated both positive and negative reactions among tutors and students. In their study they noted that the sense of an expanded audience (beyond the tutor), was complemented by the sense of an existing audience. This also fed into the negotiation of the framing of student writing for an intended audience. Use of blogs acted as a space for the negotiation of self in terms of their style of writing and students' positions as learners. Some students were concerned about the expectations on assessment and the stylistic differences around writing as 'students' and writing as 'bloggers'. This was particularly evident with students that had prior experience in blogging. The wider context of course design, learning intentions and outcomes and also aspects of digital literacy and experience of students performing 'digital personas' are fundamental components that require further study regarding negotiation and effectiveness. As Hemmi et al. (2009) argue that:

(T)he negotiation of identity in the context of new writing environments is interesting both for the way in which it highlights issues around the 'offline and online versions of the self', and also – particularly within the context of assessment – the way in which it highlights the significance of the exercise of power through the production of knowledge. ...Confession enables individuals to actively participate in disciplinary regimes by investing their own identity, subjectivity and desires with those ascribed to them through certain knowledgeable discourse (Edwards 1997: 9). Assessed blogs with a focus on reflection can be likened to a confessional space for students to explore, and regulate, their own subjectivity through learning. This can be productive as well as problematic – some kinds of identity work may enable students to learn more, or learn differently (Hemmi et al., 2009: 25-6).

The ability to collaboratively co-create materials dissolves traditional distinctions about content generation and ownership (who creates it and how it is used). Making sense of this in terms of designing, delivering and assessing courses requires new negotiation and networked literacy skills (see Fitzgerald, Steele et al., 2009; Beetham et al., 2009; Jenkins et al., 2006). Many report on the use of wikis more as vehicles for promoting communication and sharing, rather than as genuinely collaborative and constructivist platforms (see for example Anson et al., 2009). Issues of trust, authorship/ownership attribution, etiquette, confidence and transparent collaboration in dealing with others' contributions and last, but not least, group cohesion and tensions between anonymity and reward are among the most productive and problematic issues around use of blogs, but more specifically with wikis (see Arafeh and Song, 2009; Ramanau and Geng 2009; Fitzgerald, Steele et al., 2009; Beach et al., 2008; Elgort, 2007; Bower et al., 2006). As Hemmi et al. note (2009: 28), while some students relished the less 'disciplined' nature of the wiki, others found it strangely lonely, less interactive and less of a 'community' space than the conventional discussion board. Questions of attribution and etiquette within particular learning contexts were also voiced. A common concern that was expressed among students relates to issues of ownership ('tampering with others' contributions would offend co-participants' some students pointed out) and negotiation of consensus within particular assignments.

Assessment practices

Collis and Moonen (2007) discuss some of the issues affecting instructors who implement a contribution-oriented pedagogy in their courses. A number of issues surface, in particular the workload and management burdens this entails, assessment-related issues, intellectual-property considerations and the difficulty of, and need to, shift mindsets. In terms of management issues, a key characteristic of contribution-type activities is that the instructor does not know in advance what the students will contribute. Thus, if the instructions given to the learners are not clear and explicit in terms of what is expected, the management burden for the instructor can become overwhelming. Assessment is a major challenge in contribution-oriented and collaborative pedagogical approaches. Collis and Moonen (2008) argue that students are, understandably, highly sensitive to potential ambiguities in grading and marking. To ensure the quality of learning from both the educators' and learners' perspectives and therefore a better chance of embedding Web 2.0 tools successfully, a number of factors need to be in place (Collis and Moonen, 2008: 100). Firstly, both instructors and students must value an educational approach where learner participation and contribution are balanced with acquisition. Secondly, a pedagogical approach must be used that reflects contribution-oriented activities where students create at least some of their own learning resources. Thirdly, the approach must be scaffolded in practice by interlinked support resources for both instructors and students. Uncertainty must be reduced as much as possible for the students in terms of what is expected of them, and to what standard. Finally, the processes, as well as the products produced by the students, must be assessed as part of overall course assessment practices.

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