

This Commentary is the first contribution from the Technology Enhanced Learning phase of the Teaching and Learning Research Programme (TLRP-TEL). This phase was launched in 2007, and currently comprises eight interdisciplinary projects with funding of around £12 million. We are grateful to two research councils for this support – the Economic and Social Research Council and the Engineering and Physical Sciences Research Council.

We aim to produce a series of Commentaries throughout the life of our work on Technology Enhanced Learning, which is currently scheduled to last until 2012.

The speed of technological innovation is becoming ever more rapid and each wave of innovation presents educators with opportunities and challenges. Innovation gives technologists a chance to reflect on their practice and how the technology might be adapted to good educational effect. What is rarer and more difficult is for educators and technologists to collaborate in asking how teaching and learning might be made more productive and efficient with technology, what exactly that technology might be, and how it might impinge on what is taught and to whom. These are some of the challenges addressed by TLRP-TEL.

Web 2.0 is a reality. Education 2.0 is an aspiration. I hope this Commentary will play its part in transforming the web into a technology that can shape a radically new vision of teaching and learning in the 21st century.

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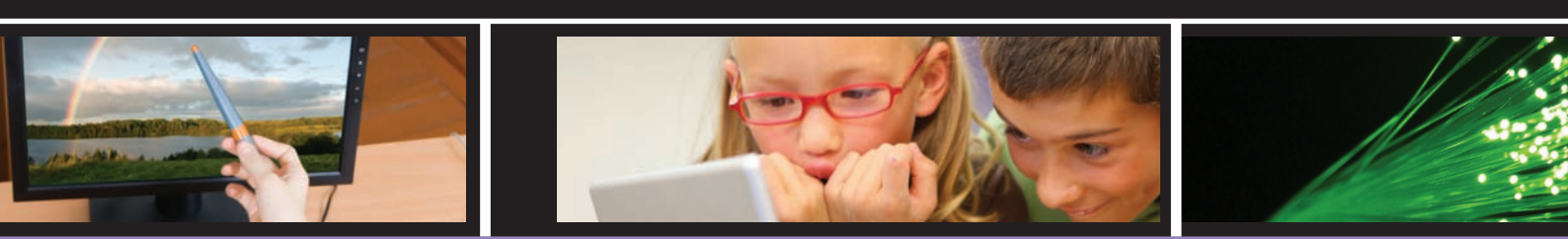
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This Commentary has been edited by Neil Selwyn on behalf of TLRP, with contributions by Neil Selwyn, Charles Crook, Diane Carr, Patrick Carmichael, Richard Noss and Diana Laurillard (October 2008).

For further information on the Technology Enhanced Learning phase of TLRP, see <http://www.tlrp.org/tel>

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Introduction

Neil Selwyn

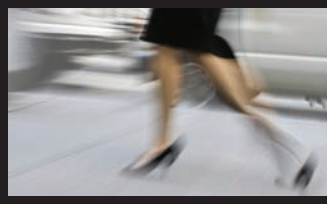
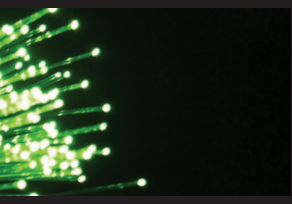
The past five years or so have seen growing excitement within the educational community about web 2.0 technologies. 'Web 2.0' is an umbrella term for a host of recent internet applications such as social networking, wikis, folksonomies, virtual societies, blogging, multiplayer online gaming and 'mash-ups'. Whilst differing in form and function, all these applications share a common characteristic of supporting internet-based interaction between and within groups, which is why the term 'social software' is often used to describe web 2.0 tools and services.

Web 2.0 marks a distinct break from the internet applications of the 1990s and early 2000s, facilitating 'interactive' rather than 'broadcast' forms of exchange, in which information is shared 'many-to-many' rather than being transmitted from one to many. Web 2.0 applications are built around the appropriation and sharing of content amongst communities of users, resulting in various forms of user-driven communication, collaboration and content creation and recreation. Commentators now talk of a 'read/write' web, where users can easily generate their own content as well as consuming content produced by others.¹

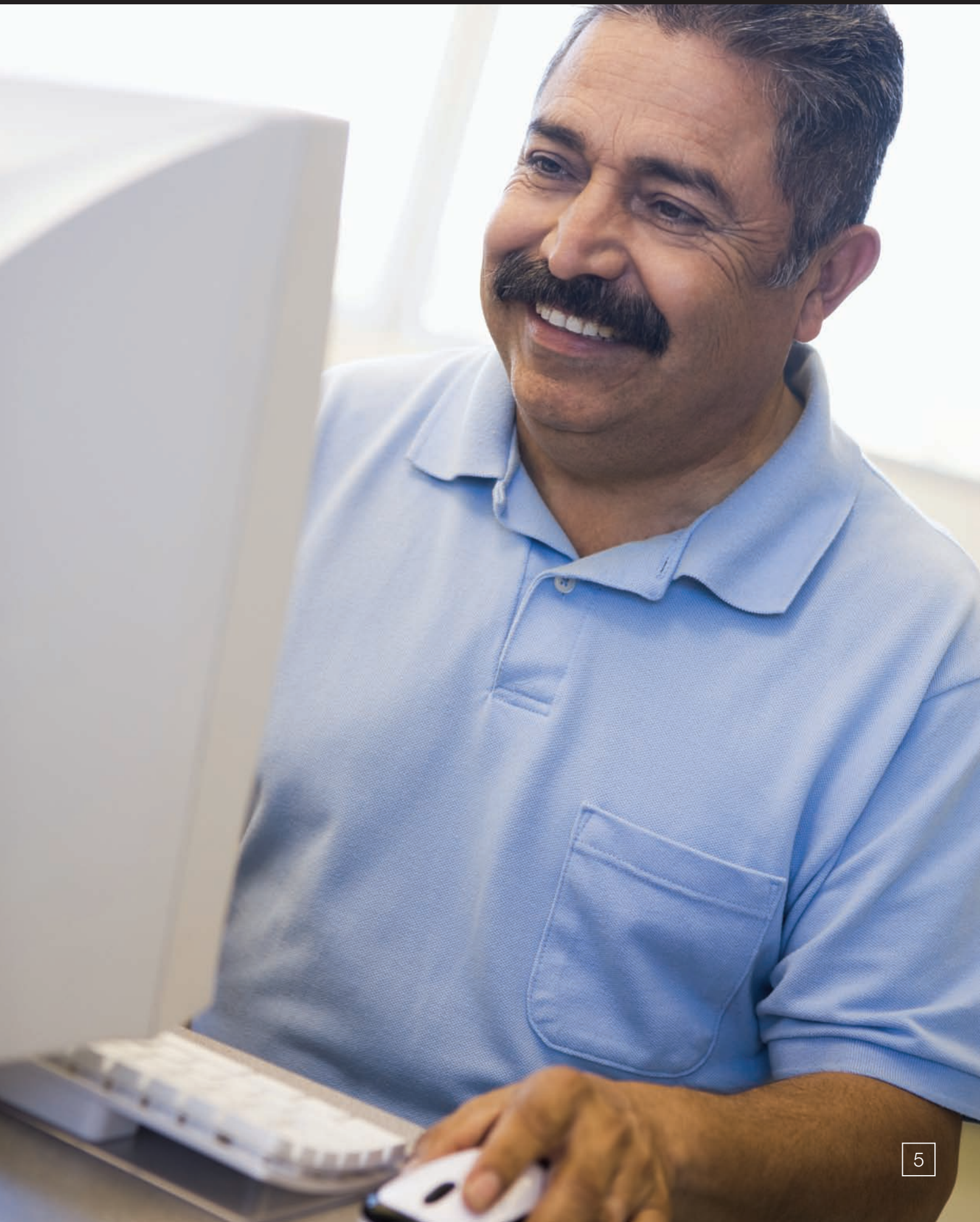
For example, Wikipedia is distinct from the Encyclopaedia Britannica Online because it is an open document that is created, updated, edited and refereed by its readers, thus deriving accuracy and authority from ongoing group discussion and consensus rather than the word of one expert. Similarly, Flickr could be considered as distinct from earlier online applications such as Ofoto in that users' photographs are made accessible to all and can be commented upon, labelled, categorised and edited by whole communities of users, making it a photograph-sharing rather than photograph-storage application.

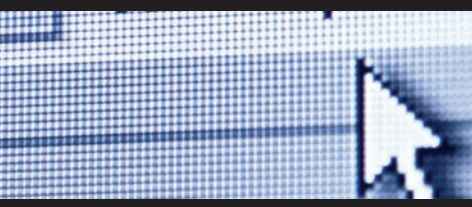
Given the importance of creation, collaboration and communication to the use of these technologies, educationalists have been quick to point out the potential of web 2.0 for supporting and enhancing learning. Yet despite valuable early contributions to the web 2.0 debate from, for example, JISC and Futurelab,² much of the discussion within the education community has been speculative.

This Commentary sets out to challenge the confident portrayal of web 2.0 by many educationalists in terms of an imminent transformation of learning and teaching. Careful thought has therefore been given to how technologists, educators and learners can best shape the fast-changing internet in the near future. It aims to explore how education can change the web, as well as how the web can change education.



Education 2.0?





What are web 2.0 technologies, and why do they matter?

Charles Crook

Why web '2.0'?

The internet is not the only thing to which the fashionable tag '2.0' gets attached. We find 'business 2.0', 'medicine 2.0', 'journalism 2.0', and even 'sex 2.0'¹. Usually this labelling device suggests that some traditional activity has now adopted a particular set of new tools. Web 2.0 tools comprise novel applications and services that run in a web browser. By invoking the language of software versioning, '2.0' implies that the technology heralds a step change in what we can now do with the web.

But a step change in some traditional practice is never a matter of simply using new tools – it is a matter of using them in a particular spirit. Web 2.0 makes certain new ways of acting possible, especially new forms of social participation on the internet. The seasoned technology observer Thomas Erickson captures this evolution when he writes: 'Something curious is happening on the world wide web. It is undergoing a slow transformation from an abstract, chaotic, information web into what I call a social hypertext'.² This view stresses how the web has increasingly offered individual users a more creative role in the active provision of information and in the participatory building of knowledge. Yet Erickson's comments were made in 1996. So how has the 'slow transformation' of a widely acknowledged internet feature - social activity - tipped into something that now feels very new?

The conditions for web 2.0

Many interacting forces determine the direction of internet development. However, we would stress two particular focal points. The first is the growth in the sheer number of internet users, which we term an increase in engagement. Second, the internet allows the virtualisation of exchange practices. These factors seem to drive the distinctive and intense patterns of web activity that encourage the tag '2.0'. The consequences associated with increased engagement are termed network effects. We call those associated with virtualisation levelling effects.

This increased engagement arises from and stimulates a potent mix of technical developments, notably growth in bandwidth, ubiquity, mobility, and capacity for data storage. High speed broadband connectivity has dramatically extended the range of material available as downloadable files or streamed media. It has also allowed an 'always on' pattern of internet use. Wireless connectivity has made internet services ubiquitously available. Hardware miniaturisation has allowed users a mobile connection to these fast and ubiquitously available services – internet on your lap, or even in your pocket. Finally, the falling cost of central data storage has allowed users to upload as well as download material. The resulting growth of user engagement has stimulated a spiral of development for yet further internet services. Moreover, it has created a premium for the usability of those services and made the web browser a universal and convivial platform for their delivery. But the really interesting consequences of a large, always-on population of users – the network effects – are to do with the emergent patterns of communication that they make possible.





A focus on the virtualisation of trading relations highlights a change in the location of exchanges, from the bricks and mortar contexts of real world trade to the electronic traffic of virtual world trade. Such virtualisation reduces overheads and drives down commodity prices. Many web 2.0 services have no charge at all. Their revenue comes from alternative 'premium' versions of the service or from advertising. This in turn motivates more user engagement. However, when the commodities are themselves in digital format (downloadable files rather than shipped CDs, for example), then a second consequence of virtualisation is the user expectation that the commodities they purchase will be upgradeable. This has encouraged a fluid and iterative approach to product design and to internet services more generally. It is captured in the fashionable web 2.0 phrase 'perpetual beta'. In development talk, the 'beta' stage of design is where a product is released while understood to be still only approaching complete and stable form. The ease with which digital products can be upgraded has encouraged a perpetual beta attitude towards design, where products and practices are inherently evolving, rather than comfortably finished.

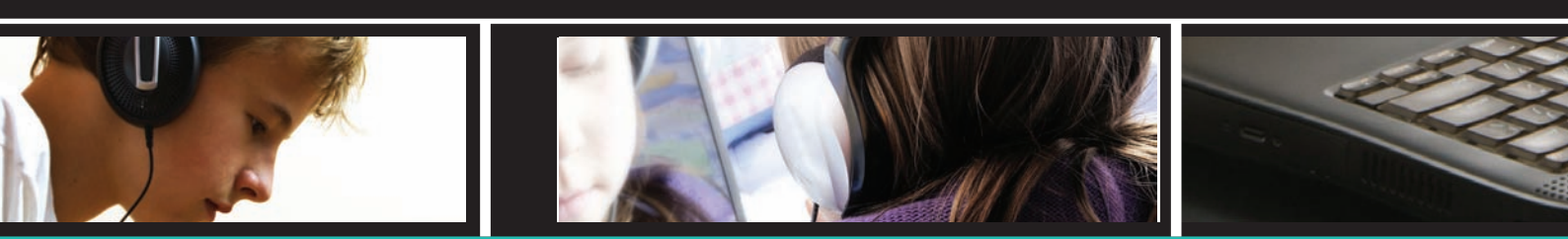
A final consequence of virtualisation is its 'levelling effect'. What gets levelled in the virtual world is the cost of product availability and also the cost of participating as a vendor in the various market places of exchange. It is no more expensive to store and advertise a copy of J.R. Hartley's obscure book *Fly Fishing* than it is Jeffrey Archer's latest blockbuster. More importantly, the low overheads of an internet presence will level the opportunities for marketplace participation, whether in selling books, providing services, or authoring opinions. It follows that a virtual consumer can locate *Fly Fishing* just as easily as they can find all of Jeffrey Archer's written work. Such levelling is more challenging when the product is news, commentary, or scholarship, and it certainly implies emancipation, empowerment, and participation. But that in turn must also imply searching, selecting, and filtering. In adopting web 2.0, education will have to confront the challenge of cultivating learner discernment as well as that of stimulating learner participation.

Key web 2.0 services

The activities most often associated with web 2.0 realise four typically human dispositions: the playful, the expressive, the reflective and the exploratory.

i Socialising the playful: games and virtual worlds

The socialisation of computer gaming lifts it from a typically private challenge into a competitive or collaborative multi-user one. A web 2.0 game is one that allows geographically distributed users to take part in a structured exchange. The themes are often the traditional warring formats, although educational formats are also possible³ and will doubtless evolve. However, the most high profile and promising examples are the virtual worlds, such as *Second Life*⁴. Enthusiasts will stress that these are not simply another sort of gaming, but another sort of living. The user acquires a screen persona (an 'avatar') that can move fluently in and out of custom-designed environments for interaction and display. Concerts, meetings, relationships and educational practices can all be managed in such spaces. Despite the apparent depth of participation that such virtual world systems allow, their impact remains modest compared with other web 2.0 activities. This may reflect the cumbersome processes involved in even simple acts of communication and sharing, or the lack of a critical number of active users, a crucial matter for the evolution of a web 2.0 service.



ii Socialising the expressive: media design, sharing, and publication

The capacity for trading and sharing media files, notably music downloads, has stimulated growth in the amateur production of such material. A number of tools have appeared to meet this interest. To some extent these mirror traditional tools for manipulating digital media, providing ways of splicing, editing, dubbing and so forth. Other tools encourage the mixing of ready-made items taken, as it were, from the shelf.⁵ The lively practice of the 'web mash-up' celebrates the potential of taking existing media items and 'mashing' them together to make a new product, typically accessible through a web browser. Expressive activity with digital material has become a realistic ambition for users, and the activity has been socialised through the growth of internet outlets that permit sharing, publication or broadcasting. These sites allow the posting of user-generated content, most famously in silos for video, photographs, sketches, and slideshows.⁶

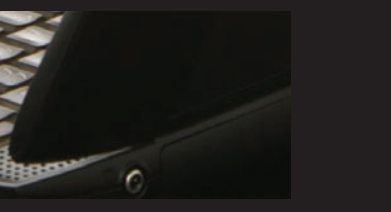
iii Socialising the reflective: blogs, social networks, and wikis

Traditional outlets for personal reflection include the diary and the notebook. Such resources have been socialised by web 2.0 technologies in a variety of formats. Perhaps the best known is the 'blog,' a web-based log or journal in which an author's postings (text, sound, images, video, or weblinks) become visible online to others who can engage with them by posting comments in response to the author's entries. The social networking sites, famously Facebook and MySpace, can be seen as elaborations of this format into more tightly-knit and manageable communities of reflective users. On these sites, registered users can specify the 'friends' who can access their blog-like web space. They can develop personal identity and cultivate relationships by posting and exchanging digital material, playing online games, and joining groups that share common interests. The blog tradition is personal and diary-like. The wiki shares a quality of 'perpetual beta' with the blog but it allows other users an equable right to edit and develop content in a common space. Thus it is well-suited to the collaborative building of specialist knowledge. The best-known version of this idea is Wikipedia.⁷

iv Socialising the exploratory: syndication, recommenders, folksonomies

The searching and filtering that comprise an individual's exploratory activity has also been socialised by web 2.0 technologies. The increasingly participatory nature of the web challenges the user to keep abreast of ever-emerging new material. Syndication involves some portion of a website being made available to users by their subscribing to a 'feed' that automatically delivers requested material and updates to their browser or some desktop 'aggregator' application. The most prominent example is the podcast, whereby a user may subscribe to or publish a regularly-released digital media file, such as a radio broadcast. Portals exist to help trace these podcasts.⁸ However, exploration also involves discovery. Web 2.0 socialises this by integrating data on selections that users make online. Internet book traders such as Amazon.com will capture the titles that their individual users browse. When a user selects a title, the trader can trace the selections of other users who have browsed that title and make them visible, thereby creating recommendations. Such coordination of user choices can also be applied to a user's personal music files, or to their web browser bookmarks if they are willing to make them visible to the integrating service.

A development of this anonymous sharing arises when users are encouraged to tag internet material that they create or find, particularly web-based articles, images, or videos. This activity generates a 'tag cloud' that may be centred on an individual, and thereby express their interests, or on other internet items such as a page, a picture, or a published article, and thereby express its content or concerns. The form of categorising that emerges from such activity has become known as a 'folksonomy' – distinguishing it from the more formal and ordered traditions of 'taxonomy'. There are a wide variety of tools that help users identify and navigate such descriptive systems.



Learning concepts behind web 2.0

Any educational practice that concerns the playful, expressive, reflective or exploratory aspects of knowledge building is likely to find web 2.0 tools and services a powerful resource. Moreover, educators can safely assume that most learners know about them. When directed at learning, web 2.0 impacts on four principal dimensions of the learner's experience. Two are broadly social in nature (collaboration and publication) and two are more cognitive (literacies and inquiry).

i) Collaboration Web 2.0 services support communication. They allow learners to coordinate their activities to various degrees of depth. This can range from the relatively trivial level of participating in anonymous recommender systems to the more intense level of interpersonal, verbal debate. Web 2.0 may offer educators a set of tools to support forms of learning that can be more strongly collaborative and more oriented to the building of classroom communities.

ii) Publication We expect to see the work of learners on display in a classroom. The read-and-write character of web 2.0 supports users in creating original material for publication. Its relatively unbounded space can offer a strong feeling of doing authentic research when students can publish and discuss the products of their study.

iii) Literacies Culture stimulates a form of intelligence that is 'literate'. Schooling cultivates a distinct orientation towards language, to which interactions with writing are crucial. Digital media stretch this tradition by offering new modes of representation and expression. Even the term 'literacy' now has to be stretched to admit other forms of representational fluency than those associated with the printed word. 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.

iv) Inquiry Web 2.0 technologies offer new ways for learners to conduct personal research. It creates new structures for organising data, new sources to refer to, new forms of authority, and new tools to interrogate this rich space of information. All of this has the potential to empower the student as an independent learner. But it also brings challenges to both learner and teacher. Web 2.0 knowledge structures are not navigated with the same tools or the same ease as more traditional documentary collections. It poses problems of authority and the ephemeral nature of web 'knowledge'.

Web 2.0 tools appear to strengthen fundamental aspects of learning that may be difficult to stimulate in learners. There are problems with web 2.0 learning in practice, but these tools do seem to mark a step change in the ways in which learners can interact with and on the web. Alongside business, journalism and medicine, it is therefore perhaps not too fanciful to talk of 'education 2.0'.





Educational hopes and fears for web 2.0

Neil Selwyn

Educational responses to web 2.0

The evolving nature of web 2.0 makes it a ready vehicle for a number of educational agendas. We should remain cautious of some of the more exaggerated claims currently surrounding web 2.0. Both 'booster' and 'doomster' discourses have grown up around web 2.0, portraying its possible educational 'effects' and 'impacts' in decidedly overstated terms.¹ At one extreme are enthusiastic hopes for a complete transformation of education systems, with some commentators extending the technology terminology of '2.0' through talk of a 're-booting' of teaching and learning. At the other, some commentators have used web 2.0 to generate moral panics about young people and the supposed death of education.

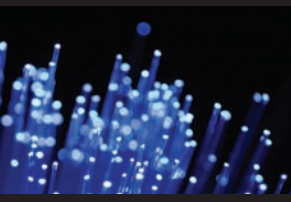
Web 2.0 and new forms of learning

There are strong links between web 2.0 and socio-cultural theories of learning, which see active and authentic learning taking place best where knowledge can be constructed actively by learners who are supported in communal social settings. It follows that web 2.0 tools may offer learners a more participatory experience of learning in which individuals have increased opportunities to interact with more learners and with more learning resources.

Much of the learning potential of web 2.0 is seen to derive from the co-construction of knowledge. A constructivist ethos lies at the centre of practices such as folksonomies, mash-ups and wikis, as well as being a central tenet of popular web 2.0 philosophies such as 'Smart Mobs', 'We Think' and the 'Wisdom of Crowds'.² Notions of constructivism and constructionism inform recent celebration of the participative learning cultures of virtual societies and multi-player online games.³ Similarly, the ability to collaboratively edit as well as individually read resources such as Wikipedia is seen to lead individuals to learn "what works and what does not in a way that was not possible with books. You wouldn't have even joined the debate".⁴ The collaborative spirit of these web 2.0 activities and many others like them has coalesced into a prevailing sense that "the internet has created greater opportunities for access, debate and transparency in the pursuit of knowledge than ever before".⁴

Web 2.0 and new forms of learners

Web 2.0 technologies are also associated with significant shifts in the nature of contemporary learners. A popular characterisation of upcoming generations of learners is that they are 'digital natives,' who have grown up in a world of computers, mobile telephony and the internet, and now lead lives that are reliant upon digital media. 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, having grown up without them. Commentators talk of young people as 'homo-zappiens', 'net savvy' and 'power users'. Some commentators talk of the 'internet generation', 'generation M' (media), 'generation V' (virtual) or 'generation C,' referring to characteristics such as connected, creative and click.⁵ Their digitally-mediated everyday lives are characterised by constant change, with technology lying at the heart of mobile, reflexive, 'liquid' lifestyles.⁶ These digital natives are thought to expect technology-assisted 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. As Marc Prensky warned at the turn of the century, "our students have changed radically. Today's students are no longer the people our educational system was designed to teach".⁷



Web 2.0 and new spaces and places for learning

These expected changes in digital learning and learners often lead to talk of the need to reform education, in particular the reorganisation of educational provision away from campus-based institutions and towards online environments and spaces. One popular contention is that schools, colleges and universities are unable to deal with the challenges posed by web 2.0 technologies for a number of structural reasons. These include the many formal and informal systems of regulation and control that characterise the organisation of education institutions, as well as the continued reliance on 'broadcast' pedagogies and linear hierarchical relationships to facilitate access to knowledge and learning.⁸ Young people are felt to be turning to web 2.0 based forms of learning in spite of - rather than because of - their educational institutions. As Henry Jenkins⁹ contests, it appears that "these teens are finding something online that schools are not providing them".

Indeed, a spirit of web 2.0-driven circumvention of schooling can already be found in a range of online services that aim to engage individuals with learning and the pursuit of qualifications outside the formal compulsory and post-compulsory system. Rather than being cursory additions to traditional schooling, these new services are seen as a first step in a radical rethinking and reorganisation of existing structures and organisation of education provision. As Charles Leadbetter¹⁰ reasons, the imperative of web 2.0 based education provision:

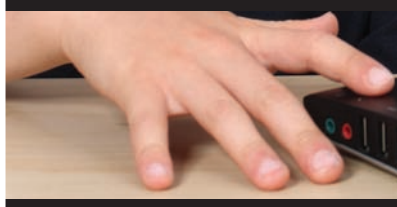
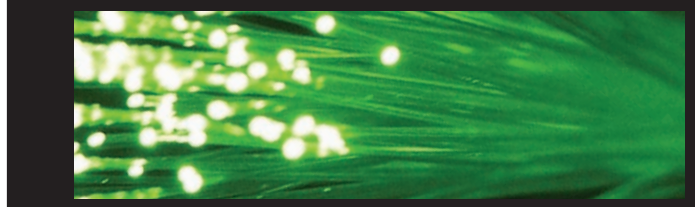
"...require[s] us to see learning as something more like a computer game, something that is done peer-to-peer, without a traditional teacher ... We are just at the start of exploring how we can be organised without the hierarchy of top-down organisations. There will be many false turns and failures. But there is also huge potential to create new stores of knowledge to the benefit of all, innovate more effectively, strengthen democracy and give more people the opportunity to make the most of their creativity".

Educational fears over web 2.0

The enthusiasms that currently surround web 2.0 and learning are tempered by a host of misgivings. Concerns that have been raised include the heightened disengagement, alienation and disconnection of learners who use Web 2.0 from education, and the detrimental effect that web 2.0 tools may have on 'traditional' skills and literacies. Fears abound in some sections of the education community that web 2.0 tools could contribute to the creation of a 'Google generation' of learners incapable of independent critical thought¹¹, and generally hasten the onset of what Ziegler has termed "the mis-education of Generation M".¹² Despite the popular positioning of web 2.0 applications such as social networking as exciting educational tools, some critics think they may distract learners from their studies.¹³ Concerns have been raised over web 2.0 tools distancing students from the offline realities of their formal education. As Bugeja¹⁴ complains, students' use of web 2.0 tools whilst physically on campus could be seen as a potential misuse of resources, with the education institution assisting students to disengage with their studies:

"information in the classroom was supposed to bridge digital divides and enhance student research. Increasingly, however, our networks are being used to entertain members of 'the Facebook generation' who text-message during class, talk on their cell phones during labs, and listen to iPods rather than guest speakers in the wireless lecture hall".

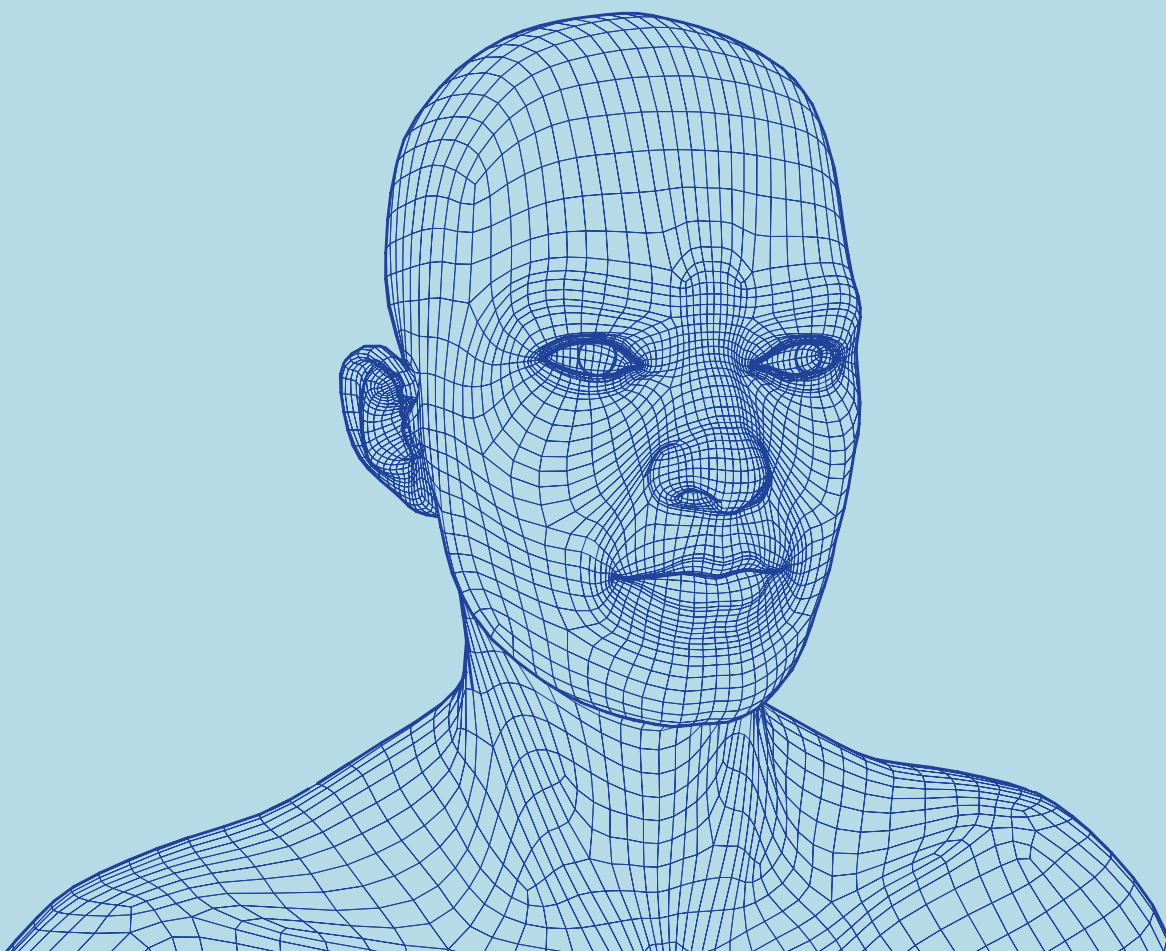


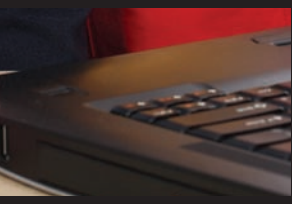


Other commentators point towards the contribution of web 2.0 to “the development of a culture of disrespect” between learners and formal education providers.¹⁵ There have been recent high-profile instances of school and university students being sanctioned for distributing inappropriate comments about their peers and teachers and, in a few instances, hastening the dismissal of unpopular teaching staff through web 2.0-based campaigns. Concerns have been raised over the realignment of power within the learner/teacher relationship that web 2.0 technologies appear to foster. For example, this is apparent in websites such as [Ratemyprofessors.com](#) or students posting candid video excerpts of their teachers on content-sharing sites such as YouTube. Whilst some commentators welcome the empowering nature of these technology practices, others in the education establishment portray it in negative terms - what a past UK education minister termed “the sinister downside of modern technology”.¹⁶

The need for an empirical perspective on web 2.0 and learning

As these examples suggest, web 2.0 is currently the focus of a number of long-running educational debates and controversies - not least over the devaluing of state-run education, the erosion of public values and the continued viability of schooling. Web 2.0 therefore leaves education technologists facing new variations on some age-old questions, especially whether the rise to prominence of these technologies can recast education and learning in more dynamic, desirable and democratic terms, or else is set to hasten the dumbing-down of education and turning-off of learners.





Learning and virtual world

Diane Carr

Virtual worlds

The term virtual world refers to a computer-based environment, and encompasses online games such as World of Warcraft as well as social worlds such as Second Life. Virtual worlds play host to collaboration, creative production and dissemination, socialising, role-play, programming and building. There are significant differences between online multiplayer computer games and social worlds, but educators are interested in the two for similar reasons, including their capacity to immerse and motivate learners, and the potential to alter a user's relationship to technology.¹

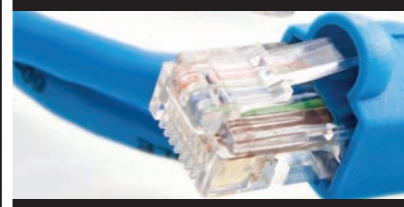
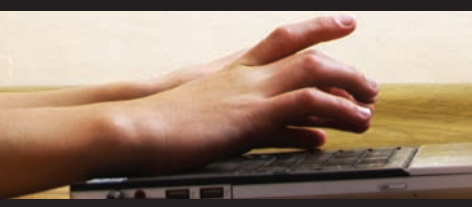
Games generally involve rules and goals. Yet multiplayer games are not predetermined, rule-bound experiences. Recent qualitative and quantitative research has helped to reveal the complexity of online game worlds.² Play in popular MMORPGs (Massively Multiplayer Online Role Playing Games) emerges across an elective spectrum. Games such as World of Warcraft do accommodate virtual combat and overt goals, but they also support the pleasures associated with exploration, chat, experimentation, improvisation, humour and role-playing. Online gaming involves playing within parameters (provided by rules or virtual physics, for example) but it also involves playing with these constraints. From trading, dancing and consensual duelling, to player-versus-player ambush, online games come to life through the actions and prerogatives of participants. Even combative, goal-oriented play involves players providing social support in the form of 'clans' and 'guilds', collaboration and mentoring.

Learning is central to playing an online game. But those with an interest in teaching are more likely to be drawn to social worlds such as Second Life. What Second Life offers that the current alternatives do not is a relatively stable and accessible, inexpensive and inhabited, persistent world where it is possible to build simulations of processes (biological or geological, for instance), as well as locations such as a cinema, a habitat or a campus.

To begin to explore Second Life it is necessary to design an 'avatar' - a personification in the virtual world. This avatar is named, but its gender and species can be switched. It might change from an elderly librarian to a rabbit or a robot. While in Second Life I might choose to explore, or I can focus instead on learning to make handbags, scooters, horses or houses. I can write or buy scripts (programming) that will enable my avatar to perform simple animations, and thus expand its (and hence my) expressive repertoire. In the guise of my avatar I can run a business and meet other 'people' at conferences, in nightclubs or at gallery openings. I might act in films that are shot in-world (known as 'machinima') or collaborate in the construction of a neighbourhood.

As this list of possible activities suggests, there is one Second Life, but many 'second lives'. Second Life is a toolset, a virtual world, and it supports social networks. It is not a game, but it is a platform for play, and a place where people might gather to build or play games. While users might not be confronted with a set of game rules, there are constraints in place, including the developer's Terms of Service, as well as community etiquette. While there might not be a specified mission or goal, there are goal-oriented practices and values including social approbation and reputation.

Some educators planning sessions in a virtual world such as Second Life focus on technical aspects (running classes on scripting, for example), or building and testing simulations. Others might exploit its creative or social aspects, or use Second Life to teach specific content (geology or geography, for instance) through discussion, demonstration or practical exercises. Other teachers and students might see Second Life itself as a cultural or technical phenomenon deserving of study. Some might simply regard the virtual world as a convenient location for a class meeting.



Various arguments might be made about which of these approaches are most innovative in terms of learning or teaching, or about which of Second Life's attributes are most valuable to educators. We suggest that undertaking effective pedagogic design in virtual worlds involves recognising and then selecting from the various offers of the particular application (from the technical to the theatrical) while bearing in mind the needs of a given educational context, be it a post-graduate course on ethnography or healthcare, or a media production class for teenagers.



Examples of virtual worlds and learning

Reports, blogs, wikis and conference papers documenting educators' experiences in Second Life are increasingly common. For example, a comprehensive collection of comments from different educators working in Second Life is presented in an ongoing series of 'snapshots' prepared by John Kirriemuir.³ They focus on further and higher education in the UK, and feature quotations, insights and commentary from a broad range of educators covering topics such as technical problems, institutional attitudes and effective practice. The annual Second Life Community Conference has a well-attended Education Track, and contributors' papers are available online.⁴ Information about education can also be accessed within Second Life itself, via posters at the various arrival areas. There are a number of active wikis and mailing lists⁵ that educators and researchers can access and contribute to. At this stage much of the reportage is exploratory yet these resources are evidence of the amount of interest in this area, and the range of work being undertaken. Here are some examples.



i Making 'Sloodle'

'Sloodle' is an open-source project affiliated with the University of the West of Scotland that is designed to combine the offers of Second Life (avatars, interactivity and 3D rendering) with those of Moodle, a 'learning management system', while addressing the perceived limitations of both.⁶ The resulting hybrid offers educators objects and documents that can be moved between an explorable 3D virtual environment and 'the Moodle classroom'.⁷ As David Livingstone, one of the developers, argues, such tools can enhance teaching and learning in higher education settings. He notes that social and contextual issues, such as a student's existing expertise and expectations, are likely to impact on that participant's assessment of a session:

"I've had quite varied reactions from students. My intake is usually a mix of Game Technology, Computer Animation, and Multimedia students. Students who are already experienced 3D animators or modellers invariably find the modelling tools in Second Life incredibly bizarre and awkward - and often struggle more than students with no prior 3D modelling experience. Technically minded students in a taught lecture and lab based class (on campus) may not see the point of Second Life - they want to do 'real programming' rather than 'play about in a toy world'. A minority discover the scripting language early on and like to play with it to see what they can do with it [...] Multimedia or web-development students often have more general skill sets, and also seem less likely to have the negative reactions".⁸

ii Ethnographic research training in Second Life

In a recent article 'Learning to Research in Second Life: 3D MUVES as meta-research fields', educators working at the Universidade do Vale do Rio do Sinos in Brazil have reported on their use of Second Life as a field for 'apprentice ethnographers'. Second Life allowed their students to conduct fieldwork independently and in different virtual locations, while having access the tutor via instant messaging for real-time support. The authors found that:

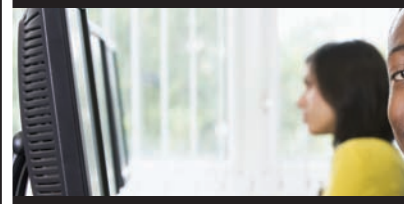
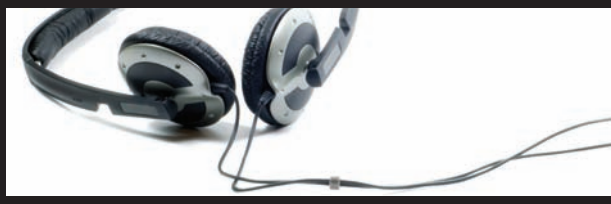
"the strategy of providing the students with complete freedom of action within Second Life, but remaining at their disposal to clarify doubts and provide support when required, resulted in a team of apprentice ethnographers that were both seriously engaged with the activity and sufficiently secure to be able to experiment and improvise".⁹

But there are disadvantages to Second Life as an educational setting, including problems relating to hardware, time lags due to varying internet connectivity, and difficulties relating to class control and the formalising of lessons.

iii Teaching research methods in Second Life

Researchers at the London Knowledge Lab have taught classes in Second Life on various topics, including internet research ethics and virtual world research.¹⁰ 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'.

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. A motionless avatar could mean a student is avidly following a rapid discussion, or that they are confused and alienated. Or that the student has gone to make coffee. 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.



Virtual worlds and learning - key messages from the research

Educators are showing fervent interest in virtual worlds. Reports and papers are becoming available, but in-depth, peer-reviewed studies of learning and pedagogy in virtual worlds are still rare. The sheer range of disciplinary perspectives (from the computer sciences to the visual arts) and variety of teaching and learning contexts (from adults to children, from formal to informal) make it difficult to draw general conclusions or to encapsulate findings.

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For educators, the existing literature on pedagogy and social learning, playful learning, drama, simulations, practical experimentation and communities of practice has clear relevance to virtual worlds. Virtual worlds also present educators with an opportunity to revisit questions of 'presence' or 'immersion' and thus make reference to older 'virtual reality' studies. Researchers appreciate that existing literature might be relevant, yet also recognise that these concepts and theories might themselves be challenged or altered when applied to virtual worlds. It is already possible to point to gaps in the literature and suggest areas for future research. These include:

- pedagogy and curricular design;
- social learning;
- the emergence of viable alternatives to Second Life;
- equality and access (in relation to disability or broadband, for example);
- institutional policy

Further work on theories of immersion, presence, identification, agency, role and affect could also enrich research in this area.

When researching or seeking to use virtual worlds as educational tools, it is important to acknowledge their ambiguity and variability. But this ambiguity is not a problem to be designed out. It allows virtual worlds to 'render strange' the conventions that underlie teaching including teacher and student roles, classroom layout and assessment practices. Virtual worlds have the potential to trouble the roles of teacher, learner and researcher in productive ways. These offers - in addition to their more obvious social, technical and creative potentials - are why educators are right to be interested in virtual worlds.



Inter-Life: Interoperability and Transition is a TLRP-Technology Enhanced Learning project based at the University of Glasgow, with partners at the Universities of Stirling, Sheffield and Edgehill. The project started in November, 2008.

It is developing a mobile 3D virtual community in which participants can work together on activities from their own computer or via a mobile device. The key investigations will focus on young people's skills development to enhance their management of life transitions. Key themes for investigation are:

- User engagement, co-design, and development

Users are centrally placed in the design of Inter-Life so that the development of the learning community engages them fully in project activities. Users can make changes to the project activities and 3D space to reflect their needs and ideas as they develop transition skills. This dynamics of this centrality is a key aspect of the investigation.

- Identification of learning outcomes, processes, and skills acquisition

One of the project's central aims is to understand how participation in a 3D mobile-enhanced community supports learning processes and outcomes, on both individual and group-based tasks and projects. An understanding of the role that 3D communities can play in social and cognitive learning is central to the development of these environments as educational spaces and the enhancement of learning designs.

- Participant identity formation and development associated with Inter-Life usage

Increasingly young people are engaged in social and learning activities in online and Web2 spaces. It is likely that these experiences become woven into their identity formation. Investigating the nature of these processes, and the distinctive contribution of 3D experiences, is a key aim of the Inter-Life Project.

- Professional development of educators working in 3D communities

As projects like Inter-Life migrate into the mainstream of educational activity we will need to understand the mechanics and processes of professional development that will enable educators to implement creative learning designs in 3D environments. The project will research, develop and document a framework for 3D professional development.





Learning and social networking

Neil Selwyn

What is social networking?

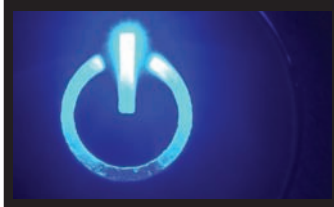
Social networking services (SNSs) are spaces for online conversations and content sharing, and are inherently capable of being personalised. A typical social networking service is based on the maintenance and sharing of users' 'profiles' - online spaces where individual users can represent themselves to other users through the display of personal information, interests, photographs, social networks and so on. Users of an SNS can maintain their own profile and access the profiles of others on the network with a view to establishing connections with preferred 'friends'.

The past five years have seen social networking become one of the most prominent and popular web 2.0 genres. Alongside the well-known MySpace and Facebook applications are more specialist social networking sites such as the business networking LinkedIn site and the Multiply site for older 'people who are settled'. Regardless of size, scope or focus, all these SNSs can be characterised as environments for democratic forms of self-expression and interaction between users. Given their broad range of features, social networking applications function in different ways depending on the preference of the user. Users can use social networking applications to 'hang out', to waste time, learn about each other or simply as a directory.¹ Learners often use social networking applications in the micro-management of their social lives, as an arena for social exploration and to develop social networking skills. The orientation of social networking applications towards self-presentation, the viewing of others' personal information and institutional life in school, university or workplace, has certainly proved attractive to younger users.

The education potential of social networking

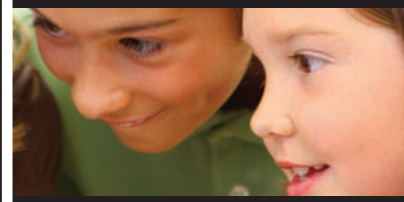
Social networking's rise to prominence in the lives of learners has prompted enthusiasm amongst educators. Some claim that social networking applications share many of the qualities of a good 'official' education technology. They permit peer feedback and match the social contexts of learning such as the school, university or local community. The conversational, collaborative and communal qualities of social networking services are felt 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".² One of the main educational uses of social networking is seen to lie in their support for interaction between learners facing the common dilemma of negotiating their studies.

Social networking services may also benefit learners by allowing them to enter new networks of collaborative learning, often based on interests and affinities not catered for in their immediate educational environment. As Maloney³ reasons, "social networking sites such as MySpace and Facebook have shown, among other things, that students will invest time and energy in building relationships around shared interests and knowledge communities". This has prompted some educationalists to explore the potential of social networking to augment 'conventional' interactions and dialogue between students and teachers. Some have welcomed the scope of social networking services such as Facebook to offer teachers a forum for "easy networking and positive networking with students".⁴



Education 2.0?





But it is also apparent that some of the qualities of social networking may clash with current pedagogical paradigms. Whilst educationalists may hope that social networking promotes exchanges between learners that are related to formal educational objectives, SNSs are also celebrated for providing channels for informal and unstructured learning. It has been suggested that social networking offers the opportunity to re-engage individuals with learning and education, promoting 'critical thinking in learners' about their learning, which is one of 'the traditional objectives' of education'.⁵ Some commentators say that SNSs offer "the capacity to radically change the educational system ... to better motivate students as engaged learners rather than learners who are primarily passive observers of the educational process".⁶

Examples of social networking and learning

Much of the educational potential of social networking arises from learners' informal uses of services such as Facebook and MySpace. But more formal applications also merit attention, such as the following two examples:

i School of Everything

The School of Everything is a social networking service that seeks to connect individuals with an interest in learning with individuals who are willing and able to teach. As the site's motto puts it, "Everyone has something to learn, everyone has something to teach". Members of the School of Everything community are encouraged to maintain profiles which describe what they are willing to teach and where. They might be professional tutors or interested amateurs. Potential learners can search through the community to find the teaching provision that best fits their needs and location.

Although some commentators have styled the School of Everything as "an eBay for stuff that does not get taught in school"⁷, the service is not primarily focused on for-profit tuition. The site is free to use, and interested teachers are encouraged to offer their services for free or else negotiate fees with the community. It is intended to stimulate a 'bottom-up' supply of teaching in contrast to the 'top-down' supply of instruction through the formal education system.

ii The University of Westminster's 'CONNECT' service

The University of Westminster's 'CONNECT' service typifies the growing trend amongst educational institutions to develop closed social networks accessible only to their staff and students. The Connect service was designed to fit alongside the Blackboard virtual learning environment, and allows teachers and learners to create their own profiles, upload photographs, videos and documents, join forums and discussion groups, send messages and publish blogs and presentations. Students can form social communities as well as study groups related to academic learning. It also allows incoming students to form networks before physically joining the university.

After one year of use, the service boasted over 3400 student and staff visitors from a community of around 25,000 students and had seen the establishment of over 100 communities. The bespoke development of an SNS by one university may appear futile in the context of Facebook and MySpace. But Oradini and Saunders' evaluation of CONNECT suggests that there can be added value in this bounded sociality by supporting communities of learners in their social and leisure pursuits.⁸ In addition it is suggested that some users preferred a closed site to a commercial one for education-related social networking.

Social networking and learning - key messages from the research

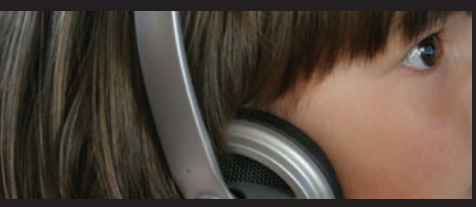
There is a growing research literature in the area of young people's use of social networking, much of which highlights educational applications of these tools. It appears to show that:

- Use of social networking varies with age and stage of education. Whilst one in five adult users currently maintain a social networking profile, this rises to around three quarters of secondary school pupils and nine in ten university students. Younger learners currently tend to prefer sites such as Club Penguin and Piczo, moving to sites such as MySpace and Bebo in adolescence, and to Facebook as late teens and young adults.⁹⁻¹¹



- Social networking services are used for peer communication and ‘news-casting’ experiences to others.¹² Emerging research findings suggest that school students’ uses of web 2.0 applications at home and at school tend to involve a ‘low bandwidth exchange’ of information and knowledge. Social networking applications appear to be used by young people to engage with learning content and other learners in a number of bounded ways, rather than supporting full interaction with information and knowledge to realise the ‘learning gains’ often attributed to digital media use.¹³
- A recent survey of UK undergraduates found that over half regarded social networking sites as potentially useful in ‘enhancing their learning’. However, only a third thought that their lecturers or tutors should use social networking sites for teaching and over a quarter said that university staff should definitely not use social networking in their teaching. As the authors concluded, “evidence shows that using these sites in education is more effective when the students set them up themselves; lecturer-led ones can feel overly formal”.¹⁴
- The primary educational significance of social networking would appear to be its informal use. One set of uses relates to learners’ co-ordination of the logistical elements of their studies. They use it to find out about assessment and examination tasks and the timing and location of lessons. A second use is to manage the social element of their studies, for example, making new friends, keeping in touch with friends and family at home, and providing spaces for learners to construct and maintain a public image to their peers.¹⁵⁻¹⁸





Web 2.0 - future issues and technologies

Patrick Carmichael

The semantic web and 'web 3.0'

Although definitions of 'web 3.0' and the 'semantic web' vary, for the purposes of our discussion the Semantic Web can be seen as:

“an extension of the current Web in which information is given well-defined meaning, better enabling computers and people to work in cooperation ... data on the Web [is] defined and linked in a way that it can be used for more effective discovery, automation, integration, and reuse across various applications.”¹

Ideas about the semantic web have evolved since its original description in the late 1990s. Berners-Lee et al.² presented an image of an integrated system of networked resources, services and appliances in which the online content of websites, databases and other resources is accompanied by machine-readable descriptions that add meaning to the content, and describe the structure and status of the knowledge of that content. This allows machines to process knowledge by means that are similar to human deductive reasoning and inference. In this way, the semantic web promises to improve automated information gathering and research by computers across the whole web, and therefore offers human users enhanced and customised searching and personalisation.

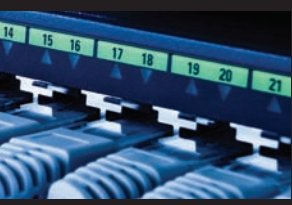
To some extent the Semantic Web is still seen as a 'grand challenge' for Computer Science. The largest barrier to its success is the re-engineering it requires of existing web 1.0 and web 2.0 resources. In the semantic web, the personal website or homepage of 'web 1.0' would progress beyond being a source of information for the interested human reader, and would be constructed to support automated harvesting and federated searching across a broader web of information and meaning. Clearly this offers opportunities to participate in distributed knowledge construction to the authors of such information. But it also involves the development of new technologies, skills and approaches, and places new responsibilities upon information providers.

When Berners-Lee and his colleagues recently revisited their original vision of the semantic web³ they admitted that widespread adoption had not yet taken place, but added that key prerequisites for the Semantic Web such as standards for the expression of meaning were now in place. Many of the existing elements of a future, fully semantic, web already have benefits in their own right: for users including information providers, community builders and those involved in developing learning tools, services and applications.

Towards the educational semantic web

The perception of the semantic web as being primarily concerned with improved searching and resource discovery has been reflected in its applications in educational settings. Most semantic web applications aimed at teachers and learners have concentrated on data discovery.⁴ However, some have argued that an “educational semantic web” is a space “open to be filled with meaning”.⁵ In a teaching and learning environment in which the potential of semantic web technologies had been fully realised, Koper⁶ argues, “teacher and learner engagement would be fluid, flexible and generative”.





The educational semantic web may be regarded as being at a stage in its development comparable to the pre-web browser era of internet use in the early 1990s, when the internet was conceptualised primarily as a means of accessing or disseminating information, rather than as a learning environment or a location for the collaborative construction of knowledge. Its development now may follow the availability of easy-to-use and freely available tools and environments designed to support the collaborative and generative engagement of which Koper writes.

Semantic web tools would clearly have applications in technology-enhanced learning applications and environments. They offer the potential for teachers to illustrate teaching resources with data drawn from across the web, and to engage students in problem formulation and hypothesis testing, bringing authentic data into teaching and learning environments. In the course of pilot work preparatory to the current TEL-TLRP 'Ensemble' project, for example, software developed by the SIMILE project at MIT⁷ has been used to develop web applications to support undergraduate teaching and learning in Plant Sciences. These allow teachers and students to explore plant epidemiology, plant evolution, and issues in plant conservation by using public-domain datasets and presented using a variety of visualisation tools.

Perhaps even more significant are the opportunities these emerging tools offer for learners to construct personal banks of resources, construct cases and instances, build simulations and models, and collaborate online and offline with other learners and with the products of their learning. This involves them in engaging with semantic web concepts, standards and technologies.

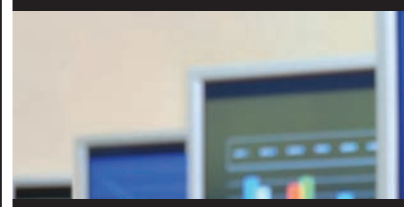
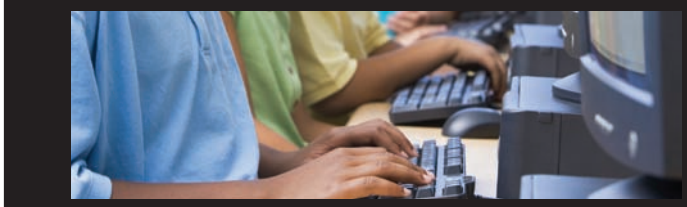
From a user, teacher or learner perspective, these potential applications blur and perhaps even erase the distinction between social 'web 2.0' and semantic 'web 3.0'. It seems likely that once appropriate tools and platforms are made widely available, elements and features of both genres will be integrated into new teaching and learning environments.



The Ensemble project and the educational semantic web (TLRP-TEL)

Ensemble: *Semantic Technologies for the Enhancement of Case Based Learning* will explore the potential of the emerging 'Semantic Web' and its associated technologies to support teaching in complex, controversial and rapidly-evolving fields where case-based learning is the pedagogical approach of choice. This TLRP-TEL project started in October 2008 and involves working with teachers and students in undergraduate and postgraduate courses at the University of Cambridge and City University, London, to explore both the nature and role of the cases around which learning is focused, and the part that emerging Semantic Web technologies and techniques can play in supporting this learning.

Ensemble recognises that teaching and learning environments are complex and evolving, and that participants in these environment may have multiple identities - as teachers, learners, researchers and workers. So appropriate learning technologies need to be robust yet flexible enough to support teachers and learners as they grapple with complex situations and develop creative solutions. This is the pedagogical and technical challenge for the Ensemble team, who are building a system that combines semantic web technologies, grid technologies, social software and digital repositories.



Education 2.0? Towards an educational web 2.0

Neil Selwyn, Charles Crook, Richard Noss and Diana Laurillard

The rhetoric and reality of web 2.0

This Commentary confirms the potential of web 2.0 to support learning and learners. Yet the evidence is that learners do not always use web 2.0 tools in straightforward educational ways, and their uses of web 2.0 technologies remain more limited in scope than the rhetoric sometimes suggests. Web 2.0 tools and practices are not being drawn into education as vigorously as might be expected, despite the many examples of best practice that can be highlighted.

Against this background, growing numbers of commentators are urging teachers and education institutions to maintain an air of interested but uninvolved detachment, recognising web 2.0 as a space for learners and informal learning rather than for teachers and the formal provision of learning.¹⁻² Yet these arguments surely under-estimate the significance of formal education, whilst making too much of informal learning.

Moving the web 2.0 debate forward will mean going beyond the abstract, context-free discussion where the educational potential of web 2.0 is seen as involving autonomous activities taking place wholly in online environments. This approach suggests that 'education 2.0' will come about as web 2.0 tools are appropriated by learners independently of formal educational systems. Yet we have seen throughout this Commentary that learner engagement with web 2.0 tools is rooted firmly in the realities of day-to-day life within social settings such as school, university and home.

This points to the need to think carefully about the clash between learners' informal uses of web 2.0 tools and the rather more formal aims and activities of educators and educational institutions. Web 2.0 tools can have a profoundly challenging and disruptive influence in an educational setting. Wikis, blogs and mash-ups present specific challenges to existing notions of academic authorship, authority and integrity. Whilst more radical educators may welcome these disruptive qualities, they may cause others to approach web 2.0 with caution or discount the use of web 2.0 tools altogether except when they reinforce existing practices and structures.

Given the undoubted educational potential of web 2.0, we would argue that it is incumbent upon educationalists to seek ways to lessen the gap between informal practices and formal procedures, and encourage and engineer more extensive, expansive, imaginative and empowering uses of web 2.0 by learners and teachers. Schooling is likely to remain the dominant form of learning in society, at least in the short to medium term. We need to seek to reconcile schooling with the challenges of web 2.0, and to explore opportunities for engineering re-schooling rather than de-schooling. The debate needs to shift towards how best to re-imagine the nature of web 2.0 technologies and the educational settings that they are used in. Here are some suggestions.

Re-imagining pedagogy and practice

There are clear opportunities to imbue pedagogy and educational practice with the spirit of web 2.0. This may involve the development of ways of teaching and learning that are more aligned with a sense of play, expression, reflection and exploration, and above all, creating rather than only consuming content. 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. We can consider these problems and opportunities in terms of the teacher, the educational institution, modes of assessment and curriculum content.



i Re-configuring the role of the teacher

The educational potential of web 2.0 is often aligned with notions of 'learner autonomy', which might suggest an increasingly less directive role for the teacher in the learner's experience. But web 2.0 does not somehow simplify knowledge building and thereby liberate the learner. Indeed its complexity brings significant challenges. The richness of the internet arena and the sophistication of web 2.0 tools should not conceal the significant distractions and obstructions that the learner must confront. Teachers should be positioned to play a crucial role in managing this experience. Collaborations need to be orchestrated if they are to be more than mere co-ordinations. The exposure of publication can be stressful as well as empowering. Confidence in reading the representational richness of the internet demands fluency in new literacies, which calls for careful tutoring. Research inquiry must be grounded in confident judgements about authority. All of these issues demand adjustments in the teacher's role.

ii Re-configuring the role of the education institution

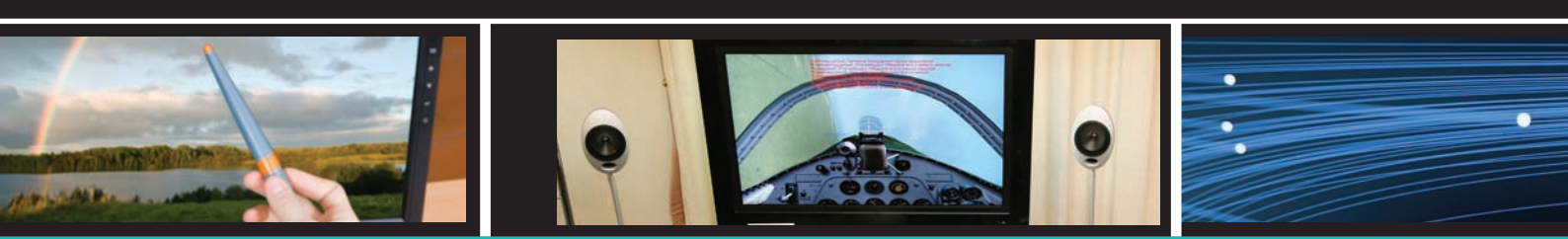
Web 2.0 also requires the role of the educational institution to be reconfigured to support the forms of learning associated with web 2.0 use. There is a clear role for schools, colleges and universities to act as initial points of learners' exploration of web 2.0 uses beyond the passive consumption of online content. We argue that formal education institutions be recast as sites of technological exploration rather than technological restriction. An obvious area for change is the way that learners' time, space and place are regulated and restricted in schools. Ways of developing 'cultures of trust' between learners and schools with regard to their use of technology should be encouraged. This could be achieved by allowing learners to negotiate the nature of their internet use in school.

iii Re-configuring forms of assessment

Web 2.0 also introduces the opportunity to design new forms of assessment to support learners to learn. Web 2.0 tools call for new forms of assessment in areas such as decision-making, adaptability and cooperation. Teachers also need tools that enable them to construct appropriate assessments and process them efficiently. These forms of assessment could also contribute to the decompartmentalisation of learning practices, examinations and assessment, at school and in the workplace, and to the validation of informal learning. This could facilitate learning throughout life, and transitions between formal and informal learning.

iv Re-configuring the curriculum

Finally, there may also be an opportunity to design new forms of curriculum, particularly to take advantage of the constructionist potential of web 2.0, the opportunity for learners to construct and share things and therefore ideas.⁴ Web 2.0 tools introduce the possibility of developing learner-led curricula, perhaps even asking learners 'what do you want to teach today?'.⁴ Perhaps less radically, there is an obvious need to redesign curricula to encourage the learner creation of knowledge, and support creativity, serendipity and exploration, as well as the acquisition of information. The formal curriculum may need to support learners in the confident use of web 2.0 tools and in the critical questioning of web 2.0 technologies.



Re-imagining web 2.0 technologies

We are not arguing that any redesign of web 2.0 and learning should be focused solely on formal education. There is also a pressing need for educational technologies that support learning through inquiry, discussion, production and practice. Technology designers and developers should see education as a distinct customer base for web 2.0 technologies, with its own specific needs and requirements. Education has more extensive needs and requirements than most other industries, but does not have the commercial power to attract significant R&D to serve its technology needs. Because it makes use of emerging technologies created for leisure and commercial use, education is always inadequately served. There is a need for web 2.0 technologies that are sensitively designed in collaboration with a range of educational stakeholders.

Given the importance of learning and the high stakes nature of the education system, educational users cannot afford to be subjected to a state of 'perpetual beta' where technologies are still being tested and refined. The longitudinal nature of education requires systems that are stable in terms of their availability, reliability and requirements for access. Learners and teachers require environments where data and content can be preserved and archived. They also require high levels of interoperability between applications to support tasks and activities across platforms.

There is also a growing need to develop technologies that support the integration and interoperability of data, information, and resources as learners move between school, college, workplace and home. Here the education system may challenge the technology sector to produce technology to manage integration and interoperability that is too complex for institutional managements to achieve.

All of these issues highlight the need for educational input into the process of technological R&D. More attention could perhaps be paid to the educational use of open source technology, which can interact with the development of web 2.0.⁵ Open source systems for the development of social networking (e.g. Elgg) and virtual world learning environments (e.g. SLoodle) are already being used. Perhaps there is scope here for a wider seamless integration of open cross-sector tools, resources and systems for education web 2.0.

Conclusions

Web 2.0 is still developing and will be subject to substantial changes as tools and applications evolve into web 3.0 and beyond. It is likely that some of the clashes between formal structures of education provision and less formal technology practices will recede over time. As Annette Wang⁶ reminds us, the internet is still only in an 'adolescent' stage of development, and as a result is playful, over-emotional and profoundly informal. Yet many of the issues raised in this Commentary will remain relevant to the discussion of whatever web technologies are prevalent in the near future, when Facebook, YouTube and Wikipedia have been superseded and usurped by new tools and applications.

Discussion of web 2.0 and learning needs to move beyond asking whether web 2.0 applications 'work' in education or enhance learning. Instead, educational technologists need to consider how web 2.0 can be shaped and designed along educational lines, and how education can be re-imagined in the light of new technologies. Educators should now be striving to work with technologists to shape the learning technologies of the near future. Learners require web 2.0 technologies that are fit for purpose alongside pedagogies and practices that are too. Only then can the undoubted educational potentials of web 2.0 be fully realised.



SynergyNet: Supporting Collaborative Learning in an Immersive Environment
Led by Liz Burd, Durham University

Personalised learning with Haptics when Teaching with Online Media
Led by Margaret Cox, Kings College London

Ensemble: Semantic Technologies for the Enhancement of Case-Based Learning
Led by Patrick Carmichael, CARET, University of Cambridge

MiGen: Intelligent Support for Mathematical Generalisation
Led by Richard Noss, Institute of Education, London

Inter-Life: Interoperability and Transition
Led by Victor Lally, University of Glasgow

A Learning Design Support Environment (LDSE) for Teachers and Lecturers
Led by Diana Laurillard, Institute of Education, London

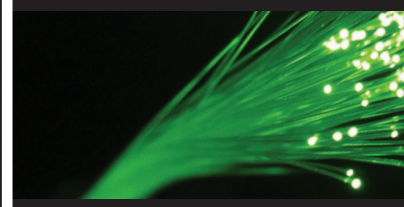
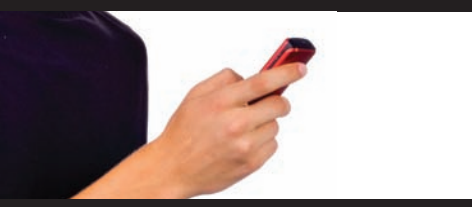
Echoes 2: Improving Children's Social Interaction through Exploratory Learning in a
Multimodal Environment
Led by Oliver Lemon, University of Edinburgh

Personal Inquiry (PI): Designing for evidence-based enquiry across formal and informal
settings of learning
Led by Mike Sharples, University of Nottingham

For further information, see: <http://www.tlrp.org/proj/tel.html>



References for this report are included in the downloadable version, available here:
<http://www.tlrp.org/pub/commentaries.html>



References

Introduction

[1] The origins of the web 2.0 definition are usually traced back to authors such as Tim O'Reilly and Clay Shirky. See the following documents as examples:

- O'Reilly, T. (2005) 'What Is web 2.0? Design patterns and business models for the next generation of software' www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
- Shirky, C. (2003) 'Social software and the politics of groups' www.shirky.com/writings/group_politics.html

[2] For good early overviews of the educational potential of web 2.0 applications see the following documents:

- Anderson, P. (2007) What is Web 2.0? Ideas, technologies and implications for education. www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf
- Franklin, T., Van Harmelen, M. (2007). Web 2.0 for content for learning and teaching in higher education. JISC www.jisc.ac.uk/media/documents/programmes/digitalrepositories/web2-content-learningand-teaching.pdf
- Freedman, T. [ed] (2006) 'Coming of Age: An introduction to the NEW worldwide web' www.terry-freedman.org.uk/db/web2/
- Martin Owen, Lyndsay Grant, Steve Sayers and Keri Facer (2006) 'Social software and learning' www.futurelab.org.uk/resources/documents/opening_education/Social_Software_report.pdf

What are web 2.0 technologies and why do they matter?

[1] Examples of the '2.0' suffix can be found here

- http://money.cnn.com/magazines/business2/business2_archive/
- www.medicine20congress.com/
- www.squidoo.com/journalism20
- www.sex20con.com/

[2] see Erickson, T. (1996) 'The worldwide web as social hypertext' *Communications of the ACM*, 39, 1, pp.15-17

[3] For examples of the warring format of online gaming see World of Warcraft [www.worldofwarcraft.com]. For examples of educational versions of warring format of online gaming see the environmentally-focussed 'Power-Up' game and the 'Arden' virtual world based on the works of William Shakespeare

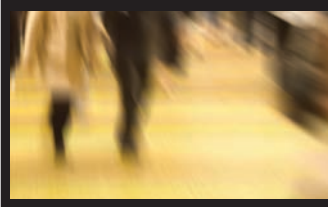
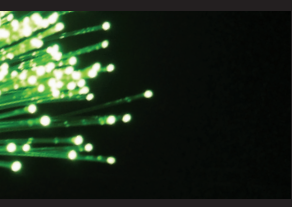
- www.powerupthegame.org/
- <http://swi.indiana.edu/ardenworld.htm>

[4] Second-life is perhaps the most prominent example of a virtual world: see <http://secondlife.com/>

[5] An example of an re-mixing application see <http://animoto.com>

[6] Many popular online applications exist to facilitate the sharing of user-generated content. For example:

- mash-up: www.popfly.com/
- user-generated broadcasting: <http://makeinternettv.org/>
- general sharing of user-generated content: www.loudblog.com/
- sharing of video content: <http://youtube.com>
- sharing of photographs: www.flickr.com/



- sharing of sketches: <http://sketchfu.com/>
- sharing of slideshows: www.slideshare.net/

[7] For more details on Wikipedia see www.wikipedia.org

[8] For examples of portals which help trace podcasts see www.podcast.net

Educational hopes and fears for web 2.0

[1] For a discussion of 'boomster' and 'doomster' discourses surrounding previous waves of education technology see Bigum, C. and Kenway, J. (1998) 'New information technologies and the ambiguous future of schooling: Some possible scenarios' in Hargreaves, A., Lieberman, A., Fullan, M. and Hopkins, D. (Eds.), 'International handbook of educational change' Kluwer, Springer, pp.375-395

[2] The popularisation of web 2.0 concepts has been propagated by a number of high-profile books published since 2000. Prominent examples include:

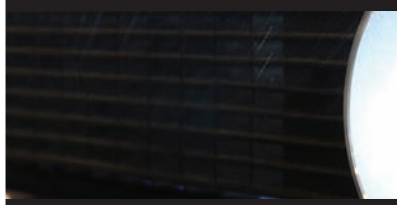
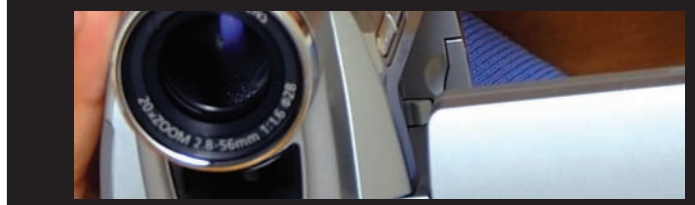
- Don Tapscott and Anthony Williams (2007) 'Wikinomics: How Mass Collaboration Changes Everything' Atlantic Books
- Chris Anderson (2007) 'The Long Tail: How Endless Choice Is Creating Unlimited Demand' Random House Business Books
- Clay Shirky (2008) 'Here Comes Everybody: The Power of Organizing Without Organizations' Allen Lane
- David Weinberger (2007) 'Everything is Miscellaneous: The Power of the New Digital Disorder' Henry Holt
- Charles Leadbetter (2008) 'We-Think' London, Profile
- Andrew Keen (2007) 'The Cult of the Amateur: How Today's Internet Is Killing Our Culture and Assaulting Our Economy' Nicholas Brealey Publishing
- Surowiecki, J. (2004) 'The wisdom of crowds: why the many are smarter than the few and how collective wisdom shapes business, economies, societies and nations' New York, Little Brown

[3] See Kemp J. and Livingston, D. (2006) 'Putting a Second Life "Metaverse" Skin on Learning Management Systems' in Livingston, D. and Kemp J. (Eds) 'Proceedings of the Second Life Education Workshop' SLCC conference, San Francisco, August, p.13-18. [www.simteach.com/SLCC06/slcc2006-proceedings.pdf]

[4] See Wales, J. (2008) 'It's the next billion online who will change the way we think' The Observer, 15th June, p.23

[5] The term 'digital native' is attributed to Marc Prensky, (see Prensky, M. (2001) 'Digital natives, digital immigrants' On the Horizon, 9, 5, October, pp.1-6). Other examples of the 'internet generation' discourse can be found in:

- Wim Veen and Ben Vrakking (2006) 'Homo Zappiens: Growing Up in a Digital Age' Continuum
- Donald F. Roberts, Ulla G. Foehr and Victoria Rideout (2005) 'Generation M: Media in the Lives of



8–18 Year-Olds' Kaiser Family Foundation www.kff.org/entmedia/7251.cfm

[6] See, for example:

- Bauman, Z. (2005) 'Liquid life' Cambridge, Polity
- Lash, S. (2002) 'Critique of Information' London, Sage.
- Urry, J. (2007) 'Mobilities' London, Sage

[7] Prenksy, M. (2001) 'Digital natives, digital immigrants' *On the Horizon*, 9 ,5, October, pp.1

[8] see Bigum, C. and Rowan, L. (2008) 'Landscaping on shifting ground: teacher education in a digitally transforming world' *Asia-Pacific Journal of Teacher Education*, 36, 3, p.250

[9] see Jenkins, H. (2004) 'Why Heather can write' *Technology Review [BizTech]*, February 6th, [www.technologyreview.com], n.p.

[10] see Leadbetter, C. (2008b) 'People power transforms the web in next online revolution' *The Observer*, March 9th, p.26. Examples of online learning services in the UK include the School of Everything (discussed in section 5) and NotSchool.Net - a well-established and officially-endorsed online platform which aims to re-engage UK teenagers otherwise excluded from the formal education system.

[11] see Brabazon, T. (2007) 'The Google generation' Aldershot, Ashgate

[12] Ziegler, S. (2007) 'The (mis)education of Generation M' *Learning, Media and Technology*, 32, 1, P.70

[13] see Cassidy, J. (2006) 'The Facebook generation' *The New Yorker*, 15th May

[14] see Bugeja, M. (2006) 'Facing the Facebook' *The Chronicle of Higher Education*, 52, 21, January 27th , p.C1

[15] see Ziegler, S. (2007) 'The (mis)education of Generation M' *Learning, Media and Technology*, 32, 1, P.70

[16] see Johnson, A. (2007) speech to the NASUWT Annual Conference, Belfast, 10th April. The rise of the student evaluative culture is also discussed in Otto, J., Sanford, D. and Ross, D. (2008) 'Does ratemyprofessor.com really rate my professor?' *Assessment & Evaluation in Higher Education*, 33, 4, pp.355 - 368

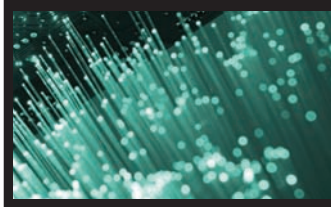
Learning and virtual worlds

[1] See examples of relevant research at the Digital Game Research Association's library at www.digra.org/dl and enter 'learning', 'immersion' or 'guilds' as search terms.

[2] For example, TL Taylor's ethnography (2006) and quantitative work by Ducheneaut (2006):

- Taylor, T.L (2006) *Play Between Worlds: Exploring Online Game Culture*. Cambridge, Mass. The MIT Press
- Ducheneaut, N., Yee, N., Nickell, E. and R.J. Moore (2006) 'Building an MMO With Mass Appeal: A Look at Gameplay in World of Warcraft' in *Games and Culture* 2006 1: pp 281-317

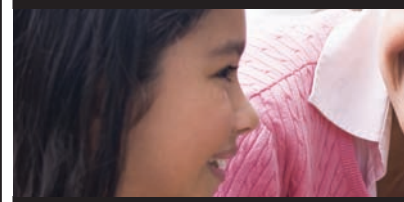
[3] Kirriemuir, J. (2008) A Spring 2008 'snapshot' of UK Higher and Further Education developments in Second Life. Online at <http://www.eduserv.org.uk/foundation/sl/uksnapshot052008> accessed 20.8.2008



- [4] Second Life Community Conference Education Track (2006, 2007) (collections from 2006 and 2007 are online at <http://www.simteach.com/SLCC06/slcc2006-proceedings.pdf> and <http://pacificrimx.wordpress.com/2007/08/26/slcc-2007-proceedings/>)
- [5] Sim Teach. Second Life Education Wiki
- http://www.simteach.com/wiki/index.php?title=Second_Life_Education_Wiki
 - For active wikis and mailing lists see <https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators>.
- [6] For more on Sloodle see www.sloodle.org/
- [7] see Kemp and Livingstone (2006) www.sloodle.com/whitepaper.pdf
- [8] Daniel Livingstone, personal email communication to the author (06.08.08)
- [9] see Fragoso, Fischer, da Silva, Freitas, Land, Loesch, Trindade, Mariani, and Delanhesi (2008) Learning to Research in Second Life: 3D MUVes as meta-research fields) in the International Journal of Education and Development using ICT vol.4 no 2, 2008. Online at <http://ijedict.dec.uwi.edu/viewarticle.php?id=467&layout=html> accessed 20.8.2008
- [10] see 'Learning from Social Worlds; Teaching in Second Life, 2007-2008' (D. Carr, M. Oliver and A. Burn) supported by the Eduserv Foundation. More information at <http://learningfromsocialworlds.wordpress.com/>

Learning and social networking

- [1] see Stutzman, F. (2005) 'Our lives, our facebook's' www.ibiblio.org/fred/pubs/stutzman_pub6.pdf
- [2] see Maloney, E. (2007) 'What Web 2.0 can teach us about learning' The Chronicle of Higher Education, 53, 18, January 5th , p.B26
- [3] see Maloney, E. (2007) 'What Web 2.0 can teach us about learning' The Chronicle of Higher Education, 53, 18, January 5th , p.B26
- [4] see Lemeul, J. (2006) 'Why I registered on Facebook' The Chronicle of Higher Education, 53, 2, September 1st , p.C1
- [5] see Bugeja, M. (2006) 'Facing the Facebook' The Chronicle of Higher Education, 52, 21, January 27th , p.C1
- [6] Ziegler, S. (2007) 'The (mis)education of Generation M' Learning, Media and Technology, 32, 1, pp.69
- [7] see Leadbetter, C. (2008) 'People power transforms the web in next online revolution' The Observer, March 9th, p.26
- [8] see Oradini, F. and Saunders, G. (2009) 'A university social networking system; can it add value?' Learning, Media and Technology 34, 2
- [9] we refer here to recent surveys by the Oxford internet survey, Pew Internet in American Life project, Ipsos Mori (2008) on behalf of JISC and Selwyn, N., Potter, J. and Cranmer, S. (2008) 'Primary pupils' use of information and communication technologies at school and home' British Journal of Educational Technology, 39 [forthcoming]



- [10] Lenhart, A. and Madden, M. (2007) 'Social networking websites and teens: an overview' Washington DC, Pew Internet and American Life Project Data Memo
- [11] Livingstone, S. (2008) 'Taking risky opportunities in youthful content creation' *New Media and Society*, 10, 3, pp.393-411
- [12] Crook, C. and Harrinson, C. (2008) 'Web 2.0 technologies for learning at KS3 and 4', Coventry, BECTA
- [13] De Rosa, C., Cantrell, J., Havens, A., Hawk, J. and Jenkins, L. (2007) 'Sharing, privacy and trust in our networked world' Dublin OH, OCLC Online Computer Library Centre
- [14] Ipsos MORI (2008) 'Student experiences of technology and e-learning', Coventry, JISC
- [15] For a discussion of issues relating to learners' co-ordination of education experiences and commentary on teaching staff see:
- Beer, D. and Burrows, R. (2007) 'Sociology and, of and in web 2.0: some initial considerations' *Sociological Research Online*, 12, 5, [www.socresonline.org.uk/12/5/17.html]
 - Mazer, J., Murphy, R. and Simonds, C. (2009) 'The Effects of Teacher Self-Disclosure via Facebook on Teacher Credibility' *Learning, Media and Technology* 34, 2 (forthcoming)
 - Selwyn, N. (2009b) 'Faceworking: exploring students' education-related use of Facebook' *Learning, Media and Technology* 34, 2 (forthcoming)
- [16] Madge, C., Wellens, J. and Meek, J. (2009) 'Facebook, social integration and informal learning at University: 'It is more for socialising and talking to friends about work than for actually doing work' *Learning, Media and Technology* 34, 2 (forthcoming)
- [17] Ellison, N., Steinfield, C. and Lampe, C. (2007) 'The benefits of Facebook "friends:" social capital and college students' use of online social network sites' *Journal of Computer-Mediated Communication* 12, 4, pp.1143-1168
- [18] Greenhow, C. (2009) 'Friend Me, Comment Me, Read Me: An Examination of High School Students' Use of MySpace Social Networking for Informal Learning and Identity Formation' *Learning, Media and Technology* 34, 2 (forthcoming)

Web 2.0 - identifying future issues and emerging technological developments

- [1] see: Semantic Web Activity Statement (2001) 'W3C Technology and Society domain' [www.w3.org/2001/sw/Activity]
- [2] see: Berners-Lee, T., Hendler, J. and Lassila, O. (2001) 'The Semantic Web' *Scientific American* May, pp. 34-43.
- [3] see: Shadbolt, N., Berners-Lee, T. and Hall, W. (2006) *The Semantic Web Revisited* IEEE Intelligent Systems 21(3) pp. 96-101.
- [4] see: Fensel, D., Hendler, J. and Liederman, H. (2003) *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential* (Cambridge, MA: The MIT Press).
- Nemirovskij, G., Egnor, M., and Heuel, E. (2007) 'SWAPS: Semantic Web Approach for Personalisation of Study', ICALT 2007: IEEE International Conference on Advanced Learning Technologies, July 2007.



- [5] see: Allert, H. (2004) 'Coherent Social Systems for Learning: an approach for contextualised and community-centred metadata' *Journal of Interactive Media in Education* vol 2004, issue 2 [www-jime.open.ac.uk/2004/2]
- [6] see: Koper, R. (2004) 'Use of the Semantic Web to Solve Some Basic Problems in Education: Increase Flexible, Distributed Lifelong Learning, Decrease Teacher's Workload' *Journal of Interactive Media in Education*, vol. 2004, issue 6 [www-jime.open.ac.uk/2004/6]
- [7] For details of the TEL-TLRP 'Ensemble' project see: [www.ensemble.ac.uk]. Acknowledgements are due to the undergraduate researchers and other staff who participated in the Ensemble Pilot activities which are described here: Megan Davies Wykes and Jodie Watson (Maths for Engineers); and Ben Roberts, Nicola Peart, Rob MacKinnon and Katy Jordan (Plant Sciences). For details of the SMILE project at MIT see:
- Mazzocchi, S., Garland, S. and Lee, R. (2005) 'SIMILE: Practical Metadata for the Semantic Web' Online at: <http://www.xml.com/pub/a/2005/01/26/simile.html>

Education 2.0? Designing the best fit between pedagogy and technology

- [1] See: Kitto, S. and Higgins, V. (2003) 'Online university education: liberating the student?' *Science as Culture*, 12, 1, p.25
- [2] See: Boyd, D (2007) "Why Youth (Heart) Social Network Sites: The Role of Networked Publics in Teenage Social Life." *MacArthur Foundation Series on Digital Learning – Youth, Identity, and Digital Media Volume* (ed. David Buckingham). Cambridge, MA: MIT Press - emphasis in original
- [3] see: Papert, S. and Harel, I. (1991) 'Constructionism' New York, Ablex
- [4] See Ben Williamson (2008) 'Serious games' entry to Futurelab Flux blog [<http://flux.futurelab.org.uk/2008/07/14/serious-games/>] Accessed 28.08.08
- [5] See: Bacon, S. and Dillon, T. (2006) 'The potential of open source approaches for education' Bristol, Futurelab (p.7)
- [6] See: Wang, A. (2006) 'Cyberself: identity, language and stylisation on the internet' in Gibbs, D. and Krause, K. (Eds) 'Cyberlines 2.0: Languages and cultures of the internet' Albert Park, Australia, James Nicholas, p.266



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