Original Articles

Mashing, burning, mixing and the destructive creativity of Web 2.0: applications for medical education

Steven Wheeler

Faculty of Education,
University of Plymouth,
Plymouth,
United Kingdom
S.Wheeler@plymouth.ac.uk

Maged Kamel Boulos

Faculty of Health & Social
Work, University of Plymouth,
Plymouth,
United Kingdom
maged.kamelboulos@plymouth.ac.uk

Abstract

We examine the recent growth of social software (Web 2.0) and its initial impact on education, and offer a review of some of the recent research conducted in the evaluation of its pedagogical applications. We highlight the propensity of students to be both creative and destructive in their use of social software, particularly with wikis, web logs (blogs) and other text based environments. Student activities within these social software environments can cause tension and conflict, and reactions vary, but outcomes have been generally positive. Some medical education examples are reviewed, providing the reader with worked examples of the use of social software in action in clinical education contexts.

Keywords

Interactive software, Web 2.0, collaborative learning, wiki spaces, blogs

Introduction

The emergence of social (or so-called 'Web 2.0') software provides new and exciting opportunities for teachers to create dynamic, collaborative and sociable learning environments for their students. This incarnation of the world wide web holds transformational potential for teachers and students alike (RICHARDSON, 2006). Mashups, mixes and aggregations of digital artefacts form the basis for a dynamic and creative emerging environment within which students can learn through collaborative working and community based enquiry. Feed burning software enables users to receive alerts of web page updates direct to their desktop computers or mobile devices. The popularity of these applications is rising rapidly, as students see the opportunities to free up time and space so that learning can be fitted into busy lifestyles.

However, a dilemma has arisen. Although, by its very nature, social software attracts activities which have democracy and freedom from institutional influence at their heart (RICHARDSON, 2006), such freedom may have the effect of opening the door to abuse or misuse of technologies. Seemingly destructive elements may emerge where the right to participate is exploited. Institutional rules may be infringed, causing a detrimental effect upon the traditional organisation through subversion of previously accepted practices. In this paper we explore the creative and destructive

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nature of Web 2.0 participation and its implications for education.

Autonomous learning

Students using Wikis and 'blogs generally work autonomously and independently, beyond the reach of any recognised authority, so it is debatable to what extent educational institutions can, and should attempt to 'manage' such learning technology. It follows that some universities may see a need to control the use of such software in formalised learning contexts, but lack the surveillance power necessary to facilitate it. Younger students in particular often engage in the use of social software to share bookmarks, images and videos, and other media outside of the auspices or control of their parent institution. Popular sites include Bebo, FaceBook, YouTube and MySpace, all of which are used by millions of subscribers each day. Regulation of such activities, even if desirable, would be impractical for most organisations.

Wikis

There is an obvious attraction to such freely available webspace tools, but the question is whether educational authorities should attempt to harness the power of such applications, or leave them to evolve in an uncontrolled and 'viral' manner. The notion of natural selection – 'Darwikianism' is a term applied to the lifecycle of wikis – can be applied as a yardstick to test the longevity and utility of social software.

Wikis quickly evolve into shared knowledge repositories as communities aggregate their contributions over time (GODWIN-JONES, 2003) and the 'wisdom of the masses' can be applied to the creation of the 'knowledge artefacts'. The social web promotes a stimulating and creative environment where readers become writers, and consumers become contributors (BOULOS et al., 2006). It is literally, the 'read/write' web.

'Unmanaged' learning environments

Regardless of a natural orientation toward unmanaged independence, tutors who manage educational provision from a distance may be uniquely placed to tap into the power and potential of social software. Teachers may attempt for example, to create student centred activities that engage and challenge *through* the platform of social software. Such activities might need to be managed loosely in keeping with the autonomous nature of social spaces.

There has been a long running debate about the effectiveness of media and technology to influence learning (KOZMA, 1994; CLARK, 1994), but choice of delivery technology is crucial to the success of a programme. Web 2.0 software goes beyond the somewhat stilted and linear 'managed learning environment' or MLE approach established throughout much of higher and further education, providing an architecture of participation that encourages students to engage in non-hierarchical communities of learning. Perhaps the new term 'unmanaged learning environment' should be applied to the use of Web 2.0 software in distance education. Certainly, the days of the managed learning environment appear to be numbered.

More commonly, the term 'personalised learning environments' or PLE has been coined to describe open architecture systems in which users create, mix and edit their own content. Content can be 'tagged' using keywords so that other users, both within and outside the user group can find pages and if permitted, also participate in the editing. One popular tag organisation site, Del.icio.us.com, enables such processes to be managed by individuals and groups in a highly visible and accessible manner. Whichever way such openly editable software is viewed, it is clear that this particular role of the teacher/instructor is being radically re-engineered, with teachers becoming resources whilst students take a more active role in the generation and representation of knowledge.

Social presence

Encouraging students to immerse themselves in richly collaborative learning environments in which they are able to create, mix, modify and extend their own knowledge artefacts using social software as personal 'cognitive tools', is not merely desirable (JONASSEN et al., 1999). It should also be a clear goal for all those who wish to create social presence in distance education. Socially isolated individuals may be generally less healthy than those connected to a richly social environment. PUTNAM (2000) suggests that social capital enables individuals to widen their awareness of the ways in which their fate is linked to community. "The networks that constitute social capital also serve as conduits for the flow of helpful information that facilitates achieving our goals." (PUTNAM, 2000). If used correctly, social software provides such a networked environment, providing students with communication tools and virtual contact that emulates co-presence.

There is a perceived 'coldness' reported by many students whose learning is mediated largely through technology (WALLACE, 1999; RICE, 1993). The notion that one is not merely interacting with a technology, but that warmth of human contact exists at the 'other end' is vital for the success of most remote learners (WALLACE, 1999). Social presence reflects the student's perception that s/he is communicating with people *through* the technology (SHORT et al., 1976). Achieving an effect of social presence is therefore important in distance education, for without it, students can feel isolated. With a sense of social presence through direct tutorial intervention however, students feel that they are not alone in their long distance journey and often raise their game (BELAWATI, 2005) and similar responses are observed

in children's learning (TUNG et al., 2006). Personal communication, immediacy of responses from tutor and peer group, and a common sense of purpose within a community of learning are all features that contribute significantly toward stronger perceptions of social presence (WHEELER, 2006). The social web has the potential to deliver these features.

Division of labour

One of the features of wikis and other community based authoring software such as Google Docs and Spreadsheets, is that all members of a community or user group are able to modify, expand or delete previous entries with alacrity (RICHARDSON, 2006). Such activities, although apparently destructive, tend to result in greater clarity of thought, more judicious correction of errors, and clearer elaboration of previously posted content and ideas. The division of labour required to engage an entire group of students in content generation can be explained within an activity theory framework (ENGESTRÖM, 1993). Division of labour in this context refers to the horizontal relationship between members of the learning community as a result of their mutual actions and interactions. Wikis can subvert traditional values such as personal ownership and intellectual property (RICHARDSON, 2006), whilst community ownership of the content becomes an equalising factor. A vertical division of 'power and status' may also be present which exemplifies this differential (THORNE, 2000). If such a division is not resolved within the community of learners, conflict results.

Thereby, editors and organisers of open architecture spaces carefully regulate content generation by wielding the power to remove offending or inappropriate posting of content. This is achieved by simply 'rolling back' to a previously more acceptable version of the wiki page through the wiki 'page history' facility. In an education setting, wiki development is wisely left as the purview of the student group. Any vertical power differential or status division can be ameliorated by the teacher adopting the role of observer within the creative/destructive process.

Ownership and agreement

There is little doubt that the boundaries between that of the professions and the general public are being gradually eroded by the proliferation and widespread adoption of social software. A cursory examination of medical or legal wiki sites will confirm this. New partnerships are opening up where lay-people and professionals coalesce their ideas, connections and transactions to create repositories of knowledge that transcend the traditional resources previously available. There is a sort of 'swarm mentality' emerging from virtual interactions, probably first pointed out by RHEINGOLD (1998) and others. The swarm software such as wikis, folksonomies and application sharing are merely the tools that are facilitating this social

revolution. Ultimately, professionals are beginning to realise that they are no longer the arbiters of all knowledge, but that through the use of information and communication technologies, all can contribute within the 'architecture of participation' (O'REILLY, 2004).

Some students have expressed unease about the ease at which previous 'hard work' is deleted or modified beyond recognition. They sometimes hold the belief that the ideas are 'theirs' which indeed, in many cases, they are. This is until the 'Send' button is clicked, and from this point onwards, the content has become 'public property' and can then be subject to any amount of destruction. We have already indicated that conflict can occur, and disagreements have been observed between our own students during wiki editing and content generation. In this context, the notion of intellectual property becomes problematic, and unless wiki group members agree on the content, an endless series of 'modification wars' can ensue. Overall, wiki users must realise that the editing space is open and free for all to use and contribute toward, and that the creative/destructive process is ever ongoing.

Blogging and creative writing

Writing to the web has never been easier, as many students are discovering. Web logs, or 'blogs take the form of online reflective diaries and are predominantly web pages produced by individuals, although groups and corporations can also be involved. There is also a facility for readers, often bloggers themselves, to enter into dialogue with the blogger, and to generate discussion over a period of time.

Many bloggers report that regular 'blog writing enables them to discover a more creative side to themselves (NÜCKLES et al., 2004). Some declare that 'blogging has made them better writers and ultimately, better communicators (WILLIAMS et al., 2004). There is also a strangely addictive quality to blog writing, particularly if the blogger is aware of an audience. Students generally write blogs about what affects them during their studies, and relish the facility to share their thoughts with others. They enjoy receiving comments back from readers, thereby indicating that the postings are being read and valued. Membership of a social tagging utility such as Del.icio.us or Technorati can also increase traffic to a blog, and when other bloggers link their sites, blog listings rise in the 'popularity' rankings. Some star bloggers already enjoy regular readerships numbering thousands (WILLIAM et al., 2004; BOULOS et al., 2006).

Encouraging students to create a group blog, where each member of the group has responsibility to contribute to the regular postings, is a valuable means to engage quieter students and a fair equaliser in the quest to engage all students in active, discursive learning. Research indicates that writing learning diaries can foster a deeper cognitive engagement with course content (NÜCKLES et al., 2004) and encourages critical

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reflection (KUHN, 1991). Further, if couched within a learning context the dialogue between bloggers can generate rich and meaningful engagement with course materials, experiences and new ideas (WILLIAMS et al., 2004).

Virtual worlds and second lives

A virtual world is a computer-based, simulated multimedia environment, usually running over the Web, and designed so that users can 'inhabit' and interact via their own graphical self-representations known as avatars. Virtual Worlds Review (http://www.virtualworldsreview.com/) provides a useful list of persistent online two-dimensional (2D) and three-dimensional (3D) virtual worlds that emphasise social interaction. Of these, Second Life (http://secondlife.com/ - Figure 1) is perhaps the most popular today, which in mid-February 2007 boasted more than 3.5 million virtual citizens or 'Lifers' all with their own fully textured high-resolution avatar that can be finely customised. (http://www.virtualworldsreview.com/secondlife/).

Virtual worlds like Second Life are not mere 3D multiplayer games. The immersive experience that such environments offer combines many of the features of Web 2.0 like instant messaging, profiles, users' ratings and social networking, and a unique form of online social interaction that involves sharing various objects and creative collaboration on building and running places and services in the virtual world (user-generated content). SLurl (http://slurl.com/), a Web-based service allowing external location-based linking or teleporting' to places in Second Life (bookmarked by users), has also been launched. Some financial experts even see unique business and marketing opportunities in Second Life (e.g., http://money.cnn.com/2006/11/09/technology/fastforward_secondlife.fortune/index.htm and FT articles: http://www.ft.com/cms/s/cf9b81c2-753a-11db-aea1-0000779e2340.html and http://www.ft.com/cms/s/3e21a6ca-7a37-11db-8838-0000779e2340.html). The potential of such a rich experience in education must also be great.

In a virtual world, educators can create online communities that students can log into and interact in. Within these educational virtual worlds, students will use their avatar to learn about new assignments and to create projects that are viewable within the virtual world (http://en.wikipedia.org/wiki/Virtual_world#In_the_classroom). Indeed, Second Life features a dedicated education-oriented section or community, and several educational institutions in the USA are already making use of it (see 'Top 20 Educational Locations in Second Life' (with teleport links using SLurl): http://www.simteach.com/wiki/index.php?title=Main_Page).

Educause has pages dedicated to Second Life (e.g., http://connect.educause.edu/taxonomy/term/2174/0), which has also been the focus of many recent
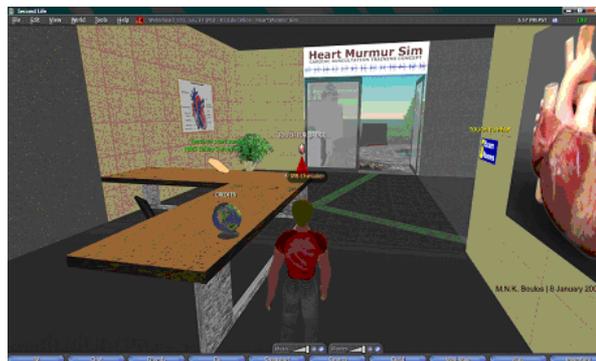

Figure 1 – Screenshot from the *'Heart Murmur Sim - Cardiac Auscultation Training Concept'* educational virtual world created in *Second Life* that allows visitors (clinical students) to tour a virtual clinic and test their skills at identifying the sounds of different types of heart murmurs, based on sound files from McGill University's Virtual Stethoscope (http://sprojects.mmi.mcgill.ca/mvs/mvsteth.htm).

educational blog posts (e.g., http://steve-wheeler.blogspot.com/search/label/Second%20Life).

ANTONACCI et al. (2005) have explored the nature of Second Life in an online paper complete with video presentations. More recently, YELLOWLEES et al. (2006) evaluated Second Life as a medical education tool for learning about psychotic hallucinations, and concluded that 'the use of Internet-connected graphics environments holds promise for public education about mental illness'.

Results from a recent survey by the US-based 'Center for the Digital Future' of 2,000 individuals (part of a six-year study into attitudes to the Web) found that many members of online communities believe virtual communities are as important as their real-world counterparts (BBC NEWS ONLINE, 2006). 3D virtual worlds then, appear to have much creative collateral to offer to education as social spaces for learning, but as with all applications, there are caveats.

Main disadvantages

Despite the fact that Second Life has two separate worlds or grids, one for teens and one for adults, and a wealth of useful user-generated content (e.g., http://orthodoxwiki.org/Virtual_Chapel), undesirable elements such as gambling/Internet addiction, pornography and online child (and adult) sex exploitation remain big problems in Second Life. The same is true in many other Web 2.0 social networking services such as MySpace. Even after a 'Lifer' deselects 'Show/Search Mature Places and Events' in Second Life, there is still a strong possibility that they may encounter unsolicited objectionable content (TERDIMAN, 2006; REUTERS, 2007).

Another minor shortcoming is the need for a fast broadband Internet connection and high-end computer and graphics card to be able to smoothly run the Second Life software client, which must be installed on user's machine and communicates in real time with Second Life servers and other online Lifers in the virtual world.

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Mashups and other contrivances

The increasingly sophisticated array of software made available to the connected community brings with it the ability to destroy and recreate previously generated digital artefacts. Known as 'mashups', many of the modified images, sounds and textual landscapes found in Web 2.0 bear little or no resemblance to their initial incarnations. Such repurposing is a increasingly common feature on Web 2.0. One notable mashup is an amalgamation of mapping resources.

Online mapping services like Google Maps (http://maps.google.com/) allow users to navigate most of the globe (and even the moon - http://moon.google.com/) through an interactive Web interface, viewing varying levels of resolution through maps, satellite imagery, or a combination. Mapping mashups can overlay one or more data feeds from other online sources on those maps, resulting in new user-generated interactive maps that can have clickable markers showing specific points of interest. Mapping mashups can even show links to additional Web information about those points (definition adapted from: Educause. Seven things you should know about... Mapping Mashups. http://www.educause.edu/ir/library/pdf/ELI7016.pdf).

As RSS (Really Simple Syndication/Rich Site Summary) is becoming more and more prevalent as a means of publishing and sharing information online, it has become increasingly important to extend it to allow location to be described in an interoperable manner. This move enables users to request, aggregate, share and map geographically tagged feeds (SCHUTZBERG, 2006). Daden's Avian flu feed for Google Maps is a practical example of a health-related 'geofeed' (http://www.daden.co.uk/pages/000208.html). Another example, HEALTHmap (http://healthmap.org/), a Global disease alert mapping system, is also based on Google Maps and news feeds (Figure 2).

Moreover, courtesy of free or inexpensive software like GooPs (http://sites.onlinenw.com/goops/goops.php) and GpsGate (http://franson.com/gpsgate/), users can overlay their own position on the same maps and also view the position of their friends in real time over the Web, if they have a simple GPS device (a position tracking device based on the Global Positioning System) like an inexpensive USB GPS mouse receiver connected to their laptop or PC.

Photography enthusiasts can use cameras with built-in GPS to enable them to attach exact Earth location coordinates to each photograph at the spot it was taken. However, even without such devices, people are still able to 'geotag' their photos and utilise existing Web 2.0 services such as Flickr (http://www.flickr.com/groups/mappr/), Mappr (http://www.mappr.com/), and Google earth (http://earth.google.com/) in many novel and exciting ways (TORRONE, 2005).

More recent examples of mapping mashups include Jotle, a Google Maps-Flickr (photos)-YouTube (videos) Mashup (http://www.jotle.com/) and 'Google Books and Maps' (for a medical geography example of the latter, see the 'Places mentioned in this book' section at http://books.google.com/books?vid=ISBN159385160X).

Mapping mashups are thus an excellent example of remixing (sharing, reusing and repurposing) information in Web 2.0 to produce value-added content. The global distribution of 'free' geospatial tools, imagery, and maps by Google and other providers is to be commended as a significant step towards the ultimate 'wikification' of maps and GIS or Geographic Information Systems (BOULOS, 2005)

SYM-SMITH (2007) describes how Web 2.0 and social-computing concepts - in which the technology puts the power in the hands of the users, not institutions - are rewriting the rules in the area of Earth navigation. Educause has published two interesting two-page sheets on the uses of mapping mashups (Educause.
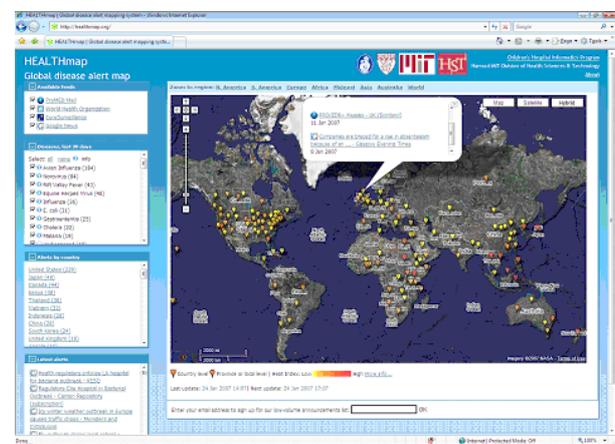

Figure 2 – Screenshot of HEALTHmap (http://healthmap.org/), a mapping mashup service that overlays health-related news links from multiple sources on maps sourced from Google Maps, using the API (Application Programming Interface) that Google Maps is providing for this purpose (http://www.google.com/apis/maps/).

7 things you should know about... Mapping Mashups. http://www.educause.edu/ir/library/pdf/ELI7016.pdf) and Google Earth (Educause. 7 things you should know about... Google Earth. http://www.educause.edu/ir/library/pdf/ELI7019.pdf) in education and their implications for teaching and learning. Mapping mashups certainly have a great potential in education and some educators are already using them (see the above Educause sheets).

Mapping mashups offer many possibilities to creative educators, but these possibilities will need to be identified, explored in various settings/scenarios, and carefully researched and evaluated to document best practices before they can be used confidently in daily teaching and learning activities.

Conclusion

Within this short paper we have shown that many opportunities exist for students to engage in social interaction and learning through Web 2.0 enabled

software. Sharing, aggregating and mixing of digital objects can be both creative and destructive, but generally result in more rounded and accurate outcomes. Ultimately, wikis, blogs, mashups, 3D virtual worlds and other sociable applications can create for students a vibrant, dynamic and challenging informal environment in which to learn. Such environments go beyond the traditional boundaries of the educational establishment, and transgress into areas that are yet to be fully explored, raising interesting questions for teachers to address. One thing is certain – the popularity of social software on the Internet will continue to grow, as more users begin to exploit the potential to generate their own meaning and construct their own personalised learning experiences.

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About the authors

Steve Wheeler

Steve Wheeler is Senior Lecturer in Education and ICT in the Faculty of Education at the University of Plymouth. He has worked with educational media and technology since 1976, and has worked as a consultant on several groundbreaking e-learning projects, including the RATIO project (UK) and South Dakota's state wide broadband network (USA). He is a visiting lecturer/professor at several universities in the US and Czech Republic and is regularly invited to speak at international conferences worldwide. His research interests include learner perception and e-learning, and he serves on the editorial boards of six international academic journals, including ALT-J, Interactive Learning Environments and IRRODL . His most recent book is entitled 'Transforming Primary ICT'.

Maged N. Kamel Boulos

Maged N Kamel Boulos is Senior Lecturer in Health Informatics at the University of Plymouth, Devon, UK. He previously worked as Lecturer in Health Informatics at the University of Bath, and worked before that at City University, London, both in UK. As well as his medical degree and Master in Dermatology, he holds an Master in "Medical Informatics" from King's College, University of London, and a PhD in "Measurement and Information in Medicine" from City University, London, both in UK. He is well published on the topics of Web 2.0/social software, the Semantic Web and geographic information systems, including Internet/Web GIS, in health and healthcare. He is also the Editor-in-Chief of the Open Access International Journal of Health Geographics http://www.ij-healthgeographics.com, and one of the Principal Investigators of the CAALYX EU FP6 e-health project http://caalyx.eu.