# Web 2.0 and Possibilities for Educational Applications

# **Daniel Churchill**

Web 2.0 is a metaphor for a spectrum of emerging novel Internet applications. Examples of these are blogs, wikis, social spaces, and podcasting. Spearheading these applications are innovative and creative individuals and successful liitemet companies, some of whom were virtually unknown even a year ago. They bring to the world not just novel applications, but also new ways of understanding the Internet. In this context, Web 2.0 is often seen as a "paradigm shift" to a new level of human understanding and expectations of the Internet and associated technologies. How might education benefit form Web 2.0? Although it is becoming increasingly more obvious that there are developments that cannot be ignored and that will affect us in education by creating challenges and opportunities, the specific educational benefits from Web 2.0 are not currently very clear. This article explores ideas and practices in relation to Web 2.0 and suggests how these might apply in education.

# What Is Web 2.0?

Increasingly, Web 2.0 has become a topic that dominates discussions related to advances in the Internet. But what is it exactly? Some suggest that Web 2.0 is a transformed and more advanced approach to applications of the Internet. Others appear critical of Web 2.0 and argue that there is no such thing, but only incremental progression of the Internet to a new level enabled by growth in capabilities of software and hardware technologies. For them, Web 2.0 is a meaningless "buzz" word. In any case, it appears that Web 2.0 is at least a metaphor that signifies a number of novel technological possibilities that have emerged on the Internet, mostly since the dot-com bubble

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deflation in 2001. These novel applications under Web 2.0 constitute advances in a number of ways from the traditionally predominant uses of the Internet as an information-delivery channel. Some of the major characteristics of innovative applications of Internet under Web 2.0 are discussed here.

# Read-Write Web

Web 2.0 applications often enable users not only to consume but also to create information and contribute to the sites by publishing content. In this context, Web 2.0 is also referred as to "read-write Web" (Gillmor, 2004; Richardson, 2006), while applications that allow this to happen can be referred as to "infoware" (O'Reilly, 2005). The two types of such applications most widely used are Blog and Wiki systems.

A blog is best described as a Web-based publication system that allows an ordinary Internet user to create a Web page consisting of periodical articles. In general, no sophisticated technical skills are required to create a blog. The final Web page can contain text, graphics, animations, and other media and provide links to other sites. The general Web community or selected groups of individuals can read this Web page and add their comments to the articles thereon. As a part from standard text-based blogs, there are other blog forms: linklogs (a collection of links maintained by an individual), moblogs (blogging with content posted from mobile devices), vlogs (blog posts as video recordings), and audilogs (blog posts as audio recordings). A blogger is someone who has a personal blog and provides periodical posts, while the blogsphere (or blogosphere) is the community of bloggers.

Wiki is also a Web-based publication system, which differs from blogs in that it supports an ordinary Internet user to participate in collective publishing activities to produce Internet-based informational resources. The best known collection of informational resources developed with wiki is Wikipedia. Articles in Wikipedia are written by individuals interested in particular topics. Once an article is initiated and written in its first version by someone, others are able to edit it and upgrade its content. The system keeps the history of versions of the article, and there might also be some accompanied discussions about the credibility and accuracy of its content.

Content that can be easily published by ordinary Internet users is not limited to text. Emerging tools (e.g., mobile phones, portable digital assistants, portable players, digital cameras, and often free and very userfriendly software and infoware) empower new forms of creative and productive expression (e.g., digital storytelling, creation of interactive representations, and other forms of multimedia). This, in turn, enables ordinary Internet users to become creators and proadcasters of multi-modal information. In this context of empowering ordinary people to have their voices heard by masses, some propagators of Web 2.0 suggest that it is a phenomenon that is leading to media revolution, is giving crowds an increasingly louder voice, and is facilitating global democratization. For example, Gillmor (2004) suggests that Web 2.0 is also the world of "we, the media," in which ordinary Internet users, not professional editors, decides what's important.

### Subscribing to Information

In Web 2.0, users subscribe to an information service and information is delivered to them when it becomes available. This is made possible through a socalled "syndication feed" or "RSS" (really simple syndication) protocol that allows information to be pushed to subscribers. For example, it is possible to subscribe to recent world news from CNN or BBC. This information will then be delivered to a pre-specified location. This location can be either desktop software known as "aggregator" or "feed-reader" (e.g., Newz Crawler) or a Web page that can easily be managed through an Internet-based service such as My Yahoo!. Information in audio and video formats can also be delivered through "podcasting." Podcasting utilizes syndication feed protocol to push audio or video content.

We can subscribe to our favorite radio news program or podcast created by some individual by using desk-top applications such as iTunes. This means that, for example, the latest broadcast of a radio program can be automatically downloaded to our system. Latest podcasts can also be automatically downloaded to our portable players (e.g., iPod) and in the morning all we have to do is to press the "play" button and listen to our chosen program on our way to work or school. This also means that we can podcast our own audio and video content to anyone who wants to subscribe to it.

# **Social Spaces**

Web 2.0 applications are usually about engaging people in collective activities in a social space where they, for example, converse, exchange resources and ideas, or simply have some fun. An example of a Web 2.0 social space is MySpace. It is often suggested that in Web 2.0, individuals benefit from "harnessing the collective intelligence" of communities (O'Reilly, 2005). In Web 2.0 social spaces, individuals can create, manage, and publish information and resources that they want others to access. These might include blogs, information about favorite activities, movies, and bands, or images and audio/video clips. Members of such spaces usually identify and connect with other individuals and form sub-communities of interest (or "tribes" in Web 2.0 terminology). Typically a member has his or her own Web page with resources and other content that includes information about favorite friends, with links to their spaces. By visiting a friend's space, other members can discover "friends of a friend" and expand their networks by adding some of these to their spaces.

Resources sharing and referencing systems are another powerful form of Web 2.0 social spaces. Examples are YouTube (for sharing of videos), del.icio.us (for referencing of Web sites), Flickr (for sharing of images), Napster (for sharing of music), and CiteUlike (for referencing of academic articles). However, these systems are not just about sharing of resources and referencing. Usually, such systems allow users to add a resource (e.g., a digital video) and through this process also to create their own tags or labels descriptive of that resource (thus differing from traditional meta-data systems that only prescribe tags).

These systems also allow individuals to add comments, provide recommendations, and assign a number of stars to the resource indicating its value in some way. These tags and other information surrounding the resource then become useful to others to "dig" through when searching for resources. Others can locate resources that are tagged with a particular tag, filter out resources that are evaluated with five or fewer stars, or explore resources provided by a particular person. In addition, such Websites usually track tags used, including the number of times they were used, and plots this information into a "cloud" of tags which are clickable and linked to resources that use them.

This Internet-based information retrieval methodology is referred to by the Web 2.0 community as "folksonomy." In such systems we are also able to access recommendations from the crowd about a resource, explore how the majority values the resource (e.g., based on a star rating system), and by examining tags used by the community to describe that resource. and explore the collective perception of it. It is often said that such information retrieval is amplified by the collective activities of all users of the system, and such environments are spoken of places where individuals can harness the "wisdom of crowds" (Suriowecki, 2005). These systems often allow individuals to subscribe (using syndication feeds) for information, such as when a particular resource that is marked with a particular tag has been added to the collection.

Another interesting idea that Web 2.0 promotes is the design of flexible systems that are able to "learn" and improve based on users' activities. An example of this idea in practice is the Amazon.com online store. Databases behind Amazon services keep records of an individual user's activities, such as, for example, products that he or she has purchased, and comments and recommendations he or she has provided. Future users are then matched with records of activities of previous users based on their current activity in order to provide them with certain best-fit recommendations. In such systems, users add value, and the system gets better as more people use it.

## The Internet as a Platform

Web 2.0 also signifies a gradual transformation of the Internet into a platform that contains tools traditionally understood as being native to desktop computers. For example, Google Docs (formerly known as Writely) is a tool that allows collaborative and individual word processing. A document resides online and can be accessed or edited by a predefined group of collaborators. This tool uses a familiar interface and works in a similar way to any word processing tool by allowing users to write documents, insert tables and images, check spelling, format look and feel, etc. This can be interpreted as an attempt by Google to transport traditionally computer-based software applications into the Internet environment. But the critical difference is that the tools are free for use (at least at this stage) and since they are residing on the Internet, we can always access the latest version (dispensing with the need to buy new versions, and reinstall and upgrade software on a local machine). Google has also released a version of a spreadsheet tool that operates on these principles. Eventually, Google might be able to provide an entire suite of tools to compete with Microsoft Office—with one potentially winning competitive advantage: free software always available in the latest version! This brings to question the future of the operating system as well: will this reside on computers or will the Internet replace it in the future?

# **Open Source**

An interesting phenomenon has emerged from Wikipedia, the online encyclopedia as noted above, developed by enthusiastic communities of ordinary Internet users acting as contributing editors. Skeptics expected that articles in Wikipedia would not be credible and accurate. Contrary to this expectation, an expert-led investigation by Nature identified an average science entry in Wikipedia as containing around four inaccuracies, whereas the highly regarded and peerreviewed Britannica Encyclopedia had about three So, what could explain this (Giles, 2005). phenomenon? It is now believed that the accuracy of Wikipedia articles is attributable to a large number of edits by many people, most of whom are honest in their intention to produce records of "human knowledge" that are as accurate as possible. People are keen to monitor developments of collectively written articles

of interest to them and quickly eliminate inaccurate entries.

Phenomena such as Wikipedia have led to increased trust that the majority of people on the Internet are honest in their intentions and that this majority will win over the minority whose intentions are otherwise. Lately, under Web 2.0, there has been a rise in open source materials. There are now various applications offered for download and free use (e.g., powerful desktop applications such as Free Serif Software, Google Sketch, Audacity, Photostory, Movie Maker, and Internet-based applications such as the Drupal content management system). Many applications are also provided in formats that allow others to enter source-codes and modify functionalities.

Rather than being designed in strictly secretive and protected formats, Web 2.0 applications are designed for "hackability." Another aspect of open source materials is "remixability." Web 2.0 systems open their databases because they want others to reuse this information and remix it in their applications. For example, the "Weather Bonk" Website combines data from a number of sources, such as maps and satellite images from Google Maps, information about weather forecasts from The Weather Channel, and live camera images from various sources, to create a new informational resource and experience for its visitors. In Web 2.0 terminology, such practice is referred to as "mashup."

# The Wide Spread of Web 2.0

A number of innovative Web 2.0 applications that have come to notice through the last couple of years have been shown to be possibly some of the most socially engaging phenomena in human history. Information from major news sources suggests that currently millions of people across the world visit Web 2.0 sites. These "digital end citizens" (Katz, 1997) provide their contribution in forms such as multimedia content, blogs, comments, and tags; develop new partnerships; and discover new knowledge from a pool collective intelligence of existing in these environments. The spread is fascinating! For example, some major news sources report that the YouTube digital video repository, which emerged just over a year ago, attracts more than 25 million hits a day (e.g., Hardy, 2006). It was declared as the invention of the year for 2006. Ordinary Internet users have uploaded over 40 million unique video clips to this site and regularly comment upon, rank, tag, and recommend these resources. YouTube was initially set up by three individuals who used their credit card funds as start-up capital; it was acquired late in 2006 by Google in a deal valued at US\$1.6 billion. Similarly, the social networking site MySpace reportedly has over 90 million members (BBC News, 2006). News Corp acquired it early in 2006 from its original founders, Intermix Media, for almost US\$600 million. Google has committed US\$900 million to MySpace for integrating their search engine in its environment.

Wikipedia is another Web 2.0 phenomenon, housing over 4.5 million artícles in over 100 languages (Wikipedia, 2006). It has become one of the world's most visited Websites, with millions of hits and thousands of edits and new articles per day (Giles, 2005).

Finally, blogs demand mention. Reportedly, blogs have contributed to the enormous growth of Internet sites over the last few years. The Web 2.0 site Technorati tracks blogs, and claims to be monitoring around 60 million (Technorati, 2006), although there are many more on the Internet. As many as 75,000 blogs are created every day, and bloggers—Reynolds (2006) calls them an "army of irregulars"—add over 50,000 updates every hour. Reportedly, 8 million Americans have created a blog (BBC News, 2005), while it predicted in 2006 that by now (2007) there would be up to 60 million bloggers just in China (Reuters, 2006).

# Education and Web 2.0

Although right now it is not clear why Web 2.0 attracts such a high number of ordinary Internet users, fully understanding why people behave as they do is a classical challenge for social sciences. One thing is certain based on the enormous numbers of Web 2.0 Internet users: A large number of our students will be coming to our classes with understandings and expectations of technology aligned with Web 2.0. These understandings and expectations will reflect the world and technology as they know it. In the business world, companies continuously strive to explore ways to redesign their strategies in order to meet the demands of emerging paradigms that dominate the understanding and expectations of a dynamic client base. In education, we are somehow stuck with a more rigid culture that often results in our being reluctant or slow in adapting. I suggest that we need to be alarmed by these rapid developments and tune into them, rather than remain passive bystanders.

What can we in education learn from Web 2.0 to design a technology-integration strategy that leads to pedagogically more productive engagements meeting the profiles of our students, and being otherwise relevant to the world? Currently, little is known about how education might use ideas from Web 2.0 in productive ways. An indicator that something is already moving on out there is the emergence of terms such as "E-learning 2.0" (Nichani, 2006), increased use of blogging in classrooms (Huffaker, 2004), attempts to use podcasting in teaching and learning [e.g., Duke Digital Initiative (Duke University, n.d.)], some attempts to design learning management systems based on Web 2.0 (e.g., Nuvvo), and the emergence of the first book dedicated entirely to Web 2.0 in teaching and learning, entitled *Blogs, Wikis, Podcasts, and Other Powerful Web Tools for Classrooms* (Richardson, 2006). Applications of Web 2.0 in teaching and learning might further promote:

- new forms of assessment such as digital portfolios (e.g., students' blogs that contain digital stories, interactive and visual representations, and other multimedia artifacts that demonstrate their learning);
- (2) use of Internet-mediated social learning spaces (which build on ideas and experiences from social spaces such as MySpace), and new forms of collaborative learning (e.g., along the lines of wikis);
- (3) new models and methods for design of learning objects and other kinds of digital curriculum materials that utilize emerging forms of multimedia expressions, open source, and remixing of data (mashups);
- (4) new models for resources sharing and support for technology integration of communities of teachers (e.g., along the lines of YouTube); and
- (5) new generations of learning management systems (LMS), or possibly no LMS at all, but rather, modular content and services management platforms that allow various Web 2.0 services to be selected and integrated into a customized solution (e.g., Drupal).

Currently, I am engaged in exploring the educational applications of Web 2.0 in contexts of two ongoing studies: (a) use of a blog to support teaching and learning in a graduate university course, and (b) social spaces and repositories for teachers.

The first project is a case study of a graduate university class using a blog-based environment to support teaching and learning. The environment is set up with students and the facilitator in a connected learning community that includes: (a) the facilitator's blog with links to students' blogs and course material, where the facilitator provides his or her own reflections on emerging issues affecting learning, and additional information and material, and where students comment and negotiate issues that affect their learning; and (b) students' blogs where they reflect, feature artifacts developed though course tasks, and invite each other to comment and contribute. Even though some tasks set for students involve group work, each student is expected to feature the outcome of the completed task in his or her own blog, reflecting on issues from their own perspective.

Overall, this study intends to understand the kinds of things that might be useful for learning that occur in this environment. Data is collected from the content of the blogs, a questionnaire, interviews with selected students, final grades for the course, and course and facilitator evaluations at the end of the semester. In addition, the study aims to explore how other Web 2.0 material supplements blogs in advancing this environment.

The second study is largely in a conceptual stage. The aim of this planned study is to explore the benefits of a social space that supports the sharing of resources for teachers. The study intends to design and implement the system and to subsequently study a spectrum of relevant issues. The system will allow teachers to share, catalog, and reuse digital resources. Surrounding this repository will be a social space. A repository based on Web 2.0 ideas should be in many ways different from and conceptually more advanced than learning object repositories currently promoted (e.g., Merlot). The sharing of resources is not the primary purpose for the existence of a digital repository and social space. Resources are a kind of "carrot on a stick" to bring teachers into a community that is willing to co-exist and contribute.

It is envisaged that a number of Web 2.0 ideas will be included in this proposed system in addition to a repository, such as: (a) folxonomy (or folksonomy) to allow descriptive tagging of resources by teachers and subsequent use of tags as a means of discovering useful stuff, (b) a wiki-like system that allows the construction of socially filtered recommendations for best pedagogical practices for uses of a particular resource, (c) syndication feeds to support and sustain engagement of members by pushing useful information, (d) tracking mechanisms along the line used by powerful Web 2.0 sites such as Amazon.com to support automated best-fit recommendations, and (e) use of podcasting. The main idea of this system is the social space, where teachers benefit from harnessing the ideas and activities of colleagues. Through discovery of useful pedagogical ideas, sharing of experiences, recommendations, and rankings of resources, and digging through tags and other methods of "community plumbing" within this space, the teachers would contribute and develop their own knowledge and pedagogical expertise, while increasing the base of available resources at their disposal. In this context, the system might serve as a novel and powerful collective intervention strategy, leading to the advancement of teaching and learning.

# Conclusion

For Richardson (2006), we "are at the beginning of a radically different relationship with the Internet, one that has long-standing implications for educators and students" (p. 133). Leading these developments are emerging innovative applications of the Internet that

are now often referred as to Web 2.0. In this context, Web 2.0 is a metaphor that signifies Internet advances stimulated by rising expectations of users, creative efforts of industry and talented individuals, and development of software and hardware capabilities. In addition, Web 2.0 is also a new paradigm, one that necessarily requires people—and institutions, in particular—to think outside the traditional frameworks of business, technology, media, education, and so on.

Web 2.0 applications, such as blogs, wikis, and social spaces, have so far demonstrated their capacity to engage an enormous number of ordinary Internet users in individual and collective activities. This is likely to be changing the culture of Internet users. In education, unless we give serious attention to Web 2.0 development, we could be encountering students who have expectations that are incompatible with our own thinking and the ways we integrate technology into our pedagogical practices. It is also a danger that unless we accommodate Web 2.0 developments in our teaching, we might find ourselves producing students unable to function in the Web 2.0-literate world outside.

Despite all the investment in hardware, software, staff, intervention, and research, the literature often appears critical about the speed of adoption of innovations and the success of technology integration in education. Indeed, this criticism may well be warranted, but whatever the case to this point, we now need to explore possible implications of Web 2.0 and mobilize resources to research and test applications of these technologies in teaching and learning.

One issue that has not been discussed thus far in this article is worthy of mention. The rise of the technical capabilities of mobile and handheld technologies (e.g., mobile phones, portable digital assistants, media players) as well as their much wider spread and portability compared to computers, suggests strongly that we are likely to witness increased application of Web 2.0 material targeting these devices. This begs a question that should be addressed: What implications might this have on technology integration in education?

# References

- BBC News. (2005). Blog reading explodes in America; http:// news.bbc.co.uk/2/hi/technology/4145191.stm
- BBC News. (2006). News Corp in \$580m buy; http://news. bbc.co.uk/2/hi/business/4695495.stm
- Duke University. (n.d.). Duke digital initiative; *http://www.duke.edu/ddi/*

**Acknowledgment:** This article was developed in the context of a study supported by a grant from the Faculty of Education, the University of Hong Kong.

- Giles, J. (2005). Encyclopedias go head to head. *Nature, 438*, 900–901.
- Gillmor, D. (2004). We the media: Grassroots journalism by the people, for the people. Sebastopol, CA: O'Reilly Media.
- Hardy, I. (2006). The viral video online revolution; http:// news.bbc.co.uk/2/hi/programmes/click\_online/5020364. stm
- Huffaker, D. (2004). The educated blogger: Using Weblogs to promote literacy in the classroom; *http://www.first monday.org/issues/issue9\_6/huffaker/*
- Katz, J. (1997). The digital citizen. Wired, 5(12).
- Nichani, M. (2006, Feb. 22–24). E-learning 2.0. Presentation at the NTU (Singapore) Teaching and Learning Seminar 2006: From Good to Great.
- O'Reilly, T. (2005). What is Web 2.0? Design patterns and business models for the next generation of software; http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/ 09/30/what-is-Web-20.html
- Reuters. (2006, May 15). China sees 60 million bloggers by year's end; *Reuters.com/*
- Reynolds, P. (2006). Bloggers: An army of irregulars; http:// news.bbc.co.uk/2/hi/4696668.stm
- Richardson, W. (2006). *Blogs, wikis, podcasts, and other powerful Web tools for classrooms.* Thousand Oaks, CA: Corwin Press.
- Suriowecki, J. (2005). *The wisdom of crowds*. New York: Random House.
- Technoraty. (2006). About Technoraty; http://www.techno rati.com/about/
- Wikipedia. (2006). Wikipedia: About; *http://en.wikipedia. org/wiki/Wikipedia:About*

#### Websites, companies, and software referred to in this article:

- 1. Amazon is available at http://www.amazon.com/
- 2. Audacity is available at *http://audacity.sourceforge.net/*
- 3. BBC (from British Broadcasting Corporation) available at http://www.bbc.co.uk/
- 4. CiteUlike (founded by Richard Cameron) is available at http://www.citeulike.org/
- 5. CNN (from Cable News Network) is available at *http://www.cnn.com/*
- 6. del.icio.us (belongs to Yahoo!) is available at *http://del. icio.us/*
- 7. Drupal (founded by Dries Buytaert and Hans Snijder) is available at *http://drupal.org/*
- 8. Flickr is available at http://www.flickr.com/
- 9. Free Serif Software (belongs to Serif) is available at http://www.freeserifsoftware.com/
- 10. Google is available at http://www.google.com/
- 11. Google Maps is available at http://maps.google.com/
- 12. Intermix Media is available at *http://www.intermix.com/*
- 13. iTunes (from Apple) is available at *http://www. apple. com/itunes/*
- 14. Merlot (from California State University) is available at http://www.merlot.org/
- 15. Microsoft Movie Maker is available at http://www. microsoft.com/moviemaker/
- 16. Microsoft Photo Story is available at http://www.micro soft.com/photostory/

- 17. Microsoft Office is available at http://office. microsoft. com/
- 18. MySpace is available at http://www.myspace.com/
- 19. Napster is available at http://www.napster.com/
- 20. News Corp is available at http://www.newscorp.com/
- 21. Newz Crawler (from ADC Software) is available at http://www.newzcrawler.com/
- 22. Nuvvo (from Savvica) is available at http://www.nuvvo. com/
- 23. Technorati is available at http://www.technorati. com/
- 24. The Weather Channel (from Weather Star) is available at http://www.weather.com/aboutus/back ground.html
- 25. Weather Bonk is available at *http://www.weatherbonk.com/*
- 26. YouTube is available at http://www.YouTube.com/

# **Additional Resources**

- 1. Jaokar, A., & Fish, T. (2006). *Mobile Web 2.0: The innovator's guide to developing and marketing next generation wireless/mobile applications. London, UK: Futuretext Ltd.*
- Kelly, K. (2006). We are the Web; http://www.wired.com/ wired/archive/13.08/tech\_pr.html
- LaMonica, M. (2006). Google deal highlights Web 2.0 boom; http://cnet.com.au/software/internet/0,239029524, 240061041,00.htm
- MacManus, R., & Porter, J. (2005). Web 2.0 for designers: http://www.digital-web.com/articles/web\_2\_for \_designers/
- 5. Mercurytide. (2005). Web 2.0: A very short introduction; http://www.mercurytide.com/knowledge/white-papers/ web-2.0-introduction
- 6. Warlick, D. (2005). *Raw materials for the mind: A teacher's guide to digital literacy.* Raleigh, NC: The Landmark Project.
- Wikipedia. (2006). Web 2.0; http://en.wikipedia.org/wiki/ Web\_2.0

#### Several useful Web resources:

- 1. Back to school with the Class of Web 2.0; http:// www.solutionwatch.com/512/back-to-school-with-theclass-of-web-20-part-1/
- 2. Blog by Karl Fisch that contains interesting vision for future of technology presented in a video "Class of 2020" at: http://thefischbowl.blogspot.com/2006/11/2020-vision. html
- 3. Collection of tools that support online collaboration; http://www.zoho.com/
- 4. EduBlog Awards contains a collection of blogs nominated for award: http://incsub.org/awards/2006/
- 5. Free wiki space; Wikispaces for school use: http://www. wikispaces.com/
- 6. Will Richardson's presentations: http://webloggedlinks. pbwiki.com/

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