

Web 2.0: What is it and how can it apply to teaching and teacher preparation?

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INTRODUCTION

Recently websites like Myspace.com and Facebook.com have been making headlines as prime examples of social software, web sites that attract millions of users, mostly teens and 20-somethings, who navigate and perform various aspects of their social lives online. These social web sites are part of a larger category of web technologies and experiences called Web 2.0.

While there is debate about whether there is a sufficient evolution in web technologies and usage to justify this categorization (Bray, 2005), the implementations of Web 2.0 technologies are causing social and cultural shifts that are having an impact on how students are learning their social environments and performing their cultural identities (Lankshear & Knobel, 2006). Web 2.0 therefore has implications for how educators address the generation know as millennials, students born between 1982 and 2000 in the US, and in-turn for how teachers are trained to educate millennials.

To explore the possible impacts and applications of this telecommunication evolution, this paper introduces Web 2.0 technologies, concepts, and applications (hereafter referred to simply as Web 2.0), and discuss how I am integrating Web 2.0 into my teacher preparation courses, while broadly outlining broader issues that impact how Web 2.0 can be used in teaching and teacher education.

BACKGROUND

Web 2.0 emerged as a concept during a conference looking at the commonalities of internet companies that survived the dot-com shakeout that occurred in 2001 (O'Reilly, 2005). Out of the conference came the observation that there were the constellation of a number of web technologies and applications that have emerged and evolved over recent years and that have changed the way that many people are using the Internet. These technologies offer different

means of accessing information and interacting with web content that facilitate the social, interactive nature of Web 2.0. In this section of the paper those technologies, concepts, and applications will be briefly described.

Technologies:

RSS - Rich Site Summary or Really Simple Syndication (RSS) is a format for delivering regularly changing web content (e.g., a blog, a podcast, a videocast). RSS allows someone with an RSS equipped web browser (e.g., Internet Explorer 7, Apple Safari), stand alone RSS reader (e.g., New Messenger [Windows], NewMacPro [Macintosh]), or web based RSS feed reader (e.g., <http://www.bloglines.com/>) to quickly view multiple textual headlines or sound /visual media (i.e., podcasts). RSS allows someone to easily stay informed by retrieving summaries of the latest content from the RSS enabled sites in which they are interested.

XML- Extensible Markup Language (XML) is a simple text format designed to support the accurate, flexible, and adaptable exchange of a wide variety of data. The power of XML is that it allows web developers to create their own tags and document structure. A result of this flexibility is that XML facilitates digital data to be shared between multiple software and data systems.

Ajax - Ajax, shorthand for Asynchronous JavaScript and XML, is a web development practice for creating interactive web applications. The goal of Ajax is to make web pages feel more responsive by exchanging small amounts of data with the server, so that the entire web page does not have to be reloaded each time the data on part of a page

changes. This is meant to enhance a web site's usability, speed, and interactivity.

API - An application programming interface (API) is the interface that a computer system, library or application provides in order to allow requests for services to be made of it by other computer programs, and/or to allow data to be exchanged between them. There are growing number of APIs that allow a web developer to integrate content from web sites like Google maps, eBay, and weatherbug into their site making possible a category of Web 2.0 application called a mashup (described below). There are currently about 400 website APIs.¹

Applications:

Blogs – A Weblog or Blog is a website that posts regular journal entries in reverse chronological order. They often consist of commentary or news and can contain a combination of texts, images, and web links. An important characteristic of blogs is the capacity to offer linkbacks (i.e., rebacks, trackbacks), notifications of when someone has linked to a specific blog posting. Linkbacks offer a form of reciprocity that adds to the social and linked nature of web content.

Pod/videocasts - Podcasting is a form of media broadcasting on the Internet that is designed to be played back on portable media players and personal computers. Using RSS one subscribes to podcast much like one subscribes to a blog. This capacity for syndication distinguishes podcasts from other downloadable media content.

¹ <http://www.programmableweb.com/apilist>

Wikis – A wiki is a website that allows users to collaboratively create and edit web page content using any web browser. Some wikis use a simplified markup language that allows simple editing without the need for knowing html while others use a "WYSIWYG" editor. Wikis harness the collective contributions of multiple users. An important characteristic of wikis is that they are able to display how a document evolves over time, thus providing an audit trail of its creation. The collaborative and open nature of wikis is both an advantage, by providing transparent documentation of a wiki entry's evolution, and a disadvantage, based on the increased danger of vandalism and inaccurate or poorly written or researched content (SEELYE, 2005). Features like built in version control and modification alerts allow egregious or intentional errors and fabrications to be quickly detected and corrected.

Mashups - A mashup is a website or web application that uses content from more than one source to create a completely new service. Typically mashup use the APIs from at least one web site. Common sources of mashup data include Google Maps and eBay. Often local data like crime information is combined with the data from the API enable web site (e.g., <http://www.chicagocrime.org/>).

Concepts:

Mixing the global with the local – This concept involves making global information available to local social contexts and giving people the flexibility to find, organize, share and create information in a locally meaningful fashion that is globally accessible.

New Interfaces – Web 2.0 involves finding unique ways of searching and accessing web content through new interfaces. Many of these new interfaces aggregate multiple RSS feeds around particular themes or are highly configurable by the user. These interfaces attempt to provide someone with an instant snapshot of web content around particular themes or at specific periods of times.

Microcontent – Microcontent are small digital units that can be moved, and then reused in multiple sites and for different functions. Microcontent can be text, images, URLs, audio files, or anything smaller than a Web site or whole Web page. The capacity for reusable content draws parallels between the concept of microcontent and that of learning objects. Microcontent typically consists of a single idea or concept that is available through a single stable URL and that is formatted to be displayed on a web page, in an email message, or on a handheld device (Dash, 2002).

The web as a platform to build educational experiences – Web 2.0 involves multiple shared infrastructure and standards such as RSS, XML, API's, AJAX that make possible structured microcontent, read/write web tools like blogging, podcasting, and web services. The different technologies have made it possible for the Web to evolve into a robust platform for innovation across numerous media and devices. This platform mimics many of the function currently performed by traditional operation systems like MS Windows, Linux, or the MacOS, but offers the added advantage of distributed processing and social networking. Some have argued that Google is constructing worldwide web operating (Skrenta, 2004) an example of which can be seen in Google Docs

and Spreadsheets, freely available and easily accessible word processing and spreadsheet applications. See Figure 1 below.

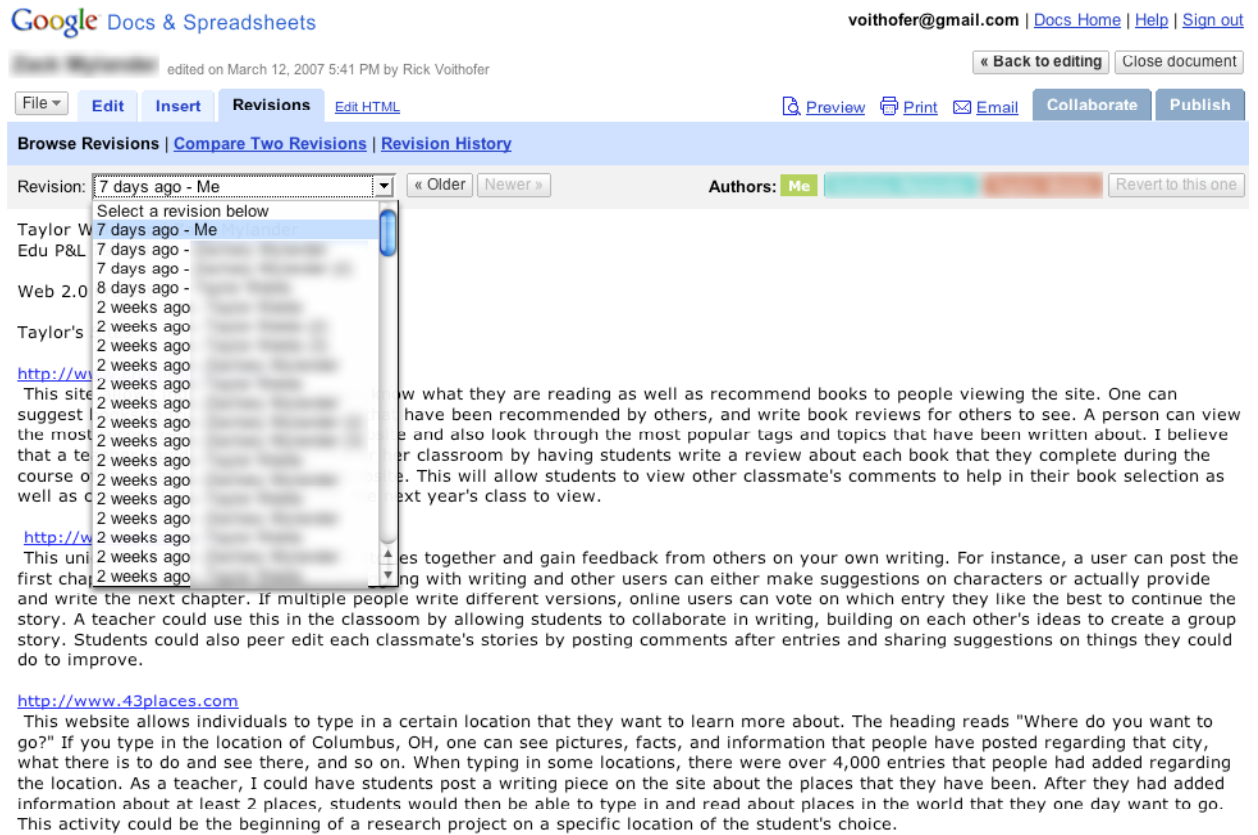


Figure 1 – Screenshot of a Google Docs word processing document.

Tags - Tags are descriptors or keywords that individuals assign to digital objects including images, sounds, reviews, stories, videos, in the practice of collaborative categorization known as folksonomy (see below). Related to tags are **tag clouds** visually weighted lists of tags. Tag clouds show all the tags used on a social networking site that uses tags and displays the most frequently used tags or the most voted on tags in larger,

pictures on flickr.com. In a narrow folksonomy the first tag is often coined by the creator where subsequent tags are written by individuals in order to find their way back to the object.

Social software - Social software are online environments, centering on special personal and professional interests that are specifically focused on building and verifying social communities. Social networking software is distinguished by its ability to facilitate three kinds of communication, one-to-one, one-to-many, and many-to-many in the form of, to name a few, text chat, instant messaging (IM), discussion boards, blogs, and wikis. Social software sites has proliferated in recent years because of their capacity to allow individuals to share “rich media”, video, pictures. Audio, photos, and other digital content that is self-created.

Social Bookmarking - Social bookmarking sites are a way to rank, classify, locate, and share Internet resources through the practice of tagging and inferences drawn from grouping and analysis of tags.

Some Web 2.0 websites include:

Social Software

<http://www.myspace.com>
<http://www.facebook.com>

Social Bookmarking:

<http://del.icio.us/>
<http://www.blinklist.com/>
<http://www.stumbleupon.com/>

<http://www.flickr.com/> - images
<http://ma.gnolia.com/>
<http://www.youtube.com/>

Collaborative Writing:

<http://www.google.com/docs>
<http://www.jotlive.com/>
<http://basecamphq.com/>

Writing, Searching, and Navigating the Blogshpere:

<http://www.feedster.com>
<http://www.blogpulse.com>
<http://www.waypath.com>
<http://www.blogger.com/start>

Organizing Microcontent:

<http://www.pageflakes.com/>
<http://www.netvibes.com/>
<http://reddit.com/>
<http://rollyo.com/>

IMPLICATIONS FOR EDUCATION

Tim O' Reilly, who popularized the term 'Web 2.0', characterizes the recent evolution of web technologies as creating an "architecture of participation". This architecture of participation marked by folksonomy, blogging, and Wikis, among others, is making the web a place that resembles an interactive learning environment that makes learning more personal, social and flexible (O'Hear, 2005).

Educators at different levels are exploring Web 2.0 concepts and sites. Recently (Alexander, 2006) has examined Web 2.0 in the context of higher education to describe its current and possible impacts. There are growing number of PK-12 educators using blogs and Wikis to show how they are used to promote literacy (Donohoo, 2006; Huffaker, 2005;

Lankshear & Knobel, 2006) and engage in authentic timely responses to real-world events and experiences (Britt, 2006; Richardson, 2006; Risinger, 2006; Ward, 2006). Coupled with students growing use of social software sites like myspace.com and facebook.com, there is an emerging convergence between social phenomenon and educational practices. This convergence deserves increased attention in teacher preparation practices. In the following section I discuss how I am exploring Web 2.0 web sites with secondary and middle childhood pre-service teachers.

ONE TEACHER EDUCATION APPLICATION OF 2.0

One common way to describe Web 2.0 sites is that they are in “Perpetual Beta” meaning they are constantly evolving and changing, often becoming extinct in a short amount of time. This volatility offers a representative microcosm in which to teach technology integration to teachers. Teaching with technology requires a great deal of teacher flexibility as technology is constantly changing and often in schools, is in various states of obsolescence and functionality. Web 2.0 as a genre of web sites exhibits a similar flux allowing for productive conversations with pre-service teachers about 1) the technical and pedagogical characteristics of educational technology, 2) the social aspects of educational technology, and 3) how to think about emerging technologies in relation to teaching.

In order to discuss how I am using web 2.0 sites in my teacher education courses, I will describe two projects that I assign to my students, an educational website evaluation assignment and an assignment that requires students to integrate Web 2.0 technologies into the context of a lesson plan idea. Both projects are part of a required technology integration course for pre-service secondary social studies, drama education, foreign and second language education, and English/Language Arts teachers and middle childhood science, social studies, language arts, and math teachers. The 32 secondary education students took the course during the first quarter of

their program (a five week summer class), two quarters before starting their student teaching while the 27 middle childhood students completed the course toward the end of their program during their student teaching (a ten week course). The middle childhood pre-service teachers were placed in a variety of urban and suburban schools with different access to technology resources. Both groups, with an average age of 23, are enrolled in a M.Ed. teacher preparation program. To offer some context about the students' familiarity with and use of Web 2.0 sites, each group completed a questionnaire at the beginning of the class that asks question, among other things, about their use of specific social networking sites. Table 1 below summarizes the results.

	Secondary Students (Data Collect May 2006) N=32	Middle Childhood (Data Collect January 2007) N=27
Myspace		
Never	19 (59.38%)	16 (59.26%)
Rarely	6 (18.75%)	7 (25.93 %)
Occasionally	3 (9.38%)	2 (7.41 %)
Regularly	3 (9.38%)	2 (7.41 %)
Often	1 (3.12%)	0 (0.00%)
Facebook		
Never	17 (53.12%)	10 (37.04%)
Rarely	1 (3.12%)	4 (14.81%)
Occasionally	1 (3.12%)	5 (18.52%)
Regularly	8 (25.00%)	6 (22.22%)
Often	5 (15.62%)	2 (7.41%)
Other social networking sites?		
Never	20 (62.50%)	20 (74.07%)
Rarely	3 (9.38%)	6 (22.22%)
Occasionally	5 (15.62%)	1 (3.70%)
Regularly	0 (0.00%)	0 (0.00%)
Often	4 (12.50%)	0 (0.00%)

Table 1 – Use of Web 2.0 sites by secondary and Middle Childhood Pre-service teachers

As can be seen from the data neither group represents large users of social networking sites.

Web Site Evaluation:

In a project on evaluating educational web sources for teaching², students were asked to post their reviews to a social bookmarking site called blinklist.com. As part of the assignment students are required to add specific tags to each web site reviewed (e.g., early childhood, social studies) in addition to their own personal tags (i.e., broad and narrow tagging). Students are then encouraged to search for specific tags that they used. What they see are sites that were reviewed by their peers in the course, in addition to sites reviewed and tagged by people outside of the class. This is an excellent example of mixing the local and the global.

The project provides an opportunity for these pre-service teachers to contribute and participate in a large-scale folksonomy. The course discussions that followed the project included reflecting on the public nature of posting their reviews. Some students felt discomfort making their opinions public, while others were thrilled to see their work integrated into public electronic spaces. Being able to discuss their experiences allowed them to begin to reflect on the different experiences that their students might have utilizing a public site and to think about when and why to restrict access to students work, especially when it is in a formative stage.

Web 2.0 Project:

In the second project pre-service teachers explore a number of Web 2.0 websites from a long list that is provided to them³ and develop a lesson plan idea that integrates and takes into consideration Web 2.0 concepts including:

- Mixing the global with the local
- Unique ways of searching and accessing web content through new interfaces

² For a complete description of the project see: <http://education.osu.edu/rvoithofer/791m/projects/evaluation.htm>

³ http://www.sacredcowdung.com/archives/2006/03/all_things_web.html

- The web as a platform to build educational experiences
- Tags, Folksomy, Blogs, RSS, Pod/videocasts, Wikis, and Social networking

Working in groups of two or three, students are asked to use a collaborative writing site like Google Docs⁴ to bounce back and forth different lesson plan ideas before developing a final lesson plan idea⁵. Collaborative writing sites like Google Docs allowed me as an instructor to see different versions of each groups project as it evolved. Figure 1 above shows the revision history of one group's work. Some of the ideas that students in each section of the course developed included:

Secondary Pre-Service Teachers:

- Drama education pre-service teachers use wikis as the basis for collaboratively writing an original play between multiple drama classes at different schools.
- English education teachers create a Shakespearean Rollyo.com search engine for an in-class Web quest.
- English education teachers use a wiki as a mechanism for English students to collaborative write a short story.
- Social studies teachers teach students about a state election process (campaigning, debates, voting etc.) by researching the issues and candidates for a current US Senate race. Students use different microcontent organizing sites, collaborative writing sites, and social bookmarking sites to track and document the evolution of a campaign.
- Foreign and Second language teachers use Google Earth and Blogger to send students on a treasure geography hunt in which they will search for famous monuments relevant to the target language.

Middle Childhood Pre-Service Teachers:

- An eighth grade science lesson on pollution and waste in which students mimic <http://www.recycletorrance.org/>, a Goggle maps mashup with the locations of recycling centers in Torrance California. Using recycletorrance as a model students map the locations of recycling centers in their own community.

⁴ <http://docs.google.com/>

⁵ For a complete description of the project see: <http://education.osu.edu/rvoithofer/791m/projects/web20.htm>

- A geography lesson that incorporates world travel where students research a country and plan a trip to that country. In the project students use Vcarious.com, a travel-based social networking site to access brochures and reviews about their country of choice. Then they use Google Earth to gather geographic information about a country including latitude, longitude along with satellite pictures and virtual tours. Using these and other sites students sketch an itinerary and budget an itinerary (with a \$2500 budget) for their trip.
- A Fifth grade English class uses www.bibli.ca, a creative writing social networking site to find poems in an area of interest. This would be followed with posting their own poems to the site and tagging them (i.e., narrow folksonomy). The lesson would use peer, self, and teacher evaluation through www.bibli.ca.
- A seventh grade lesson on the middle ages that uses thumbstacks.com, a site for creating and sharing presentations, to jigsaw a lesson. Students would share presentations with each other and make comments on each other's presentations.
- A sixth grade language arts lesson on character development and plot formation. Using glypho.com, a collaborative fiction writing site, students would write and peer edit narratives. The lesson would emphasize the process of writing.
- A seventh grade World History projects in which students write a diary style journal of a person living in the middle ages using the interactive online journal at <http://www.sixapart.com/livejournal>.
- Students research and explore various people who played a role, small or large, during the American Civil War. They would then write a report on the person that they researched using the word processing site (www.thinkfree.com), an automatic bibliography composer (www.easybib.com), and a presentation maker (www.zohoshow.com).
- A project in which Eighth grade language arts students maintain a reflective journal based upon literature circle books, writing them in a blog format rather than in a traditional notebook. The blog format would allow students to include digital media including visuals with their entries. Students would be encouraged to respond to one another's posts, both within a book group and across groups. The teacher will post additional prompts in a master blog that the whole class can reference.

Of particular note between the two groups of pre-service teachers was the fact that the secondary teachers had not started their student teaching yet, while the middle childhood teachers were in the midst of their student teaching placements. Looking at the projects that the two groups produced it was clear that the middle childhood pre-service teachers found it easier to

develop creative lesson plan ideas and to grasp Web 2.0 concepts having consistent contact with young learners.

BROADER ISSUES

As coordinators and faculty in teacher preparation programs consider adding Web 2.0 concepts and tools into their classes and programs, there are number of broad issues to consider. As with any technology, its promise is counterbalanced by new challenges. Some of the issues, promises, and challenges to consider include:

- **Flexible Course Boundaries** – Those who participate in Web 2.0 culture are engaged in a highly hyperlinked environment in which digital content is collaboratively generated, commented on, categorized, linked to and from, and modified. Borders between categories of knowledge and media are flexible and contingent. In such an environment, the separation of teacher education programs into discrete, often poorly articulated, courses will be difficult to maintain in light of the epistemological changes being brought about by Web 2.0. The interconnected nature of Web 2.0 technologies allows teacher education programs to provide better integration and continuity across multiple courses. For example, if a teacher program values particular principles like diversity, equity, individualized instruction, multiple assessments then these can be used as tags for the digital documentation that pre-service teachers develop during their program. Each pre-service teacher could generate a tag cloud that shows a visual representation of how they addressed these principles in their program.
- **Establishing Better Connections to Students** – As Web 2.0 technologies are woven into the fabric of K-12 students formative cultural experiences it will be

necessary to prepare teachers to be active participants in blogspheres, wikispaces, and other informal electronic learning environments. For teachers to guide students in the construction of knowledge, they will need to be able to create authentic learning experiences for students that address how knowledge is mediated in electronic spaces.

- **Intellectual Property** - Any systematic inclusion of Web 2.0 into teacher education practices must include a thorough consideration of issues surrounding Intellectual property. Important issues facing Web 2.0 technologies like microcontent, textual poaching (Jenkins, 1992) and mashups surround intellectual property. As text, images, audio, and video are uploaded, tagged, linked, and commented on, traditional notions of fair use and intellectual property will be insufficient and reveal numerous gray areas for educators. Including the teaching of the Creative Commons⁶ licensing to teacher candidates will go a long to addressing the increased copyright ambiguity brought about by Web 2.0. The Creative Commons enables copyright holders to grant some of their rights to the public while retaining others through a variety of licensing and contract schemes including dedication to the public domain or open content licensing terms.
- **Question the Social** - It is important to prepare teachers to question the “social” when they think about social software. Central to this questioning includes looking at what assumptions define the social, who is included and who is excluded in the social system of a Web 2.0 site. Every technology presents some sort of interface with which a person interacts with it. Asking how do Web 2.0

⁶ <http://creativecommons.org/>

interfaces include and exclude certain epistemologies and ontologies provides teachers with critical tools to frame the social learning experiences of their students. Helping students to navigate between physical and virtual spaces and identities is an important skill that teachers must develop in preparing students in the 21st century.

CONCLUSIONS:

While the moniker “Web 2.0” is sure to quickly fall out of favor in light of another technology categorization, the concepts and technologies that have evolved around this label have contributed to the changing mediascape in which many students are navigating their social lives and, in turn, negotiating some aspect of their learning. Because students’ information literacy in any content area is closely tied to the (increasingly electronic) texts that they frequent, how teachers guide their students in the development of their information literacy skills is crucial. In the case of K-12 students who use Web 2.0 sites, it is important to tie information literacy development to the interface metaphors (book or social networking site) and communication channels of the predominant media that students experience and inhabit.

Based on data that I collected from the pre-service teachers in my course, Web 2.0 sites and concepts are not an integral part of the lives of many new teachers, even given their relative youth. The possible implication of this is that what may come naturally to their future students may be quite foreign to them. If this disparity proves to be a wider issue beyond my students than an argument can be made for the integration of Web 2.0 in teacher training and further research about how best to accomplish the integration.

From my own limited experience, it was clear to me that the pre-service teachers who had student teaching experience were better able to grasp Web 2.0 principles and think through the

possibilities and implications of integrating these web technologies into their teaching. Beyond that giving pre-service teachers time to explore these sites also contributed to their grasp of the concepts. Because the secondary students took my course during a five-week summer session they did not have sufficient time to experience a variety of sites compared to the middle childhood students who took the course during a regular ten-week quarter. The extra time gave the middle childhood pre-service teachers opportunities to compare and contrast more sites to see patterns emerge and to think about how a site might benefit their teaching.

REFERENCES

- Alexander, B. (2006). A New Wave of Innovation for Teaching and Learning. *Educause Review*, 41(2), 32-44.
- Bray, T. (2005). Web 2.0 or Not? Retrieved July 5th, 2006, from <http://www.tbray.org/ongoing/When/200x/2005/08/09/Web-2.0>
- Britt, J. (2006). Go Blogging with Social Studies Field Trips. *Learning & Leading with Technology*, March, 29-29.
- Dash, A. (2002). Introducing the Microcontent Client. Retrieved November 23rd, 2006, from http://www.anildash.com/magazine/2002/11/introducing_the.html
- Donohoo, J. (2006). Increasing Literacy: Reflections on a Blog Pilot Project. *Learning & Leading with Technology*, 33(8), 34-35.
- Huffaker, D. (2005). The educated blogger: Using weblogs to promote literacy in the classroom. *ACE Journal*, 13(2), 91-98.
- Jenkins, H. (1992). *Textual Poachers* New York: Routledge.
- Lankshear, C., & Knobel, M. (2006). *Blogging as Participation: The Active Sociality of a New Literacy*. Paper presented at the American Educational Research Association.
- O'Hear, S. (2005). Seconds out, round two [Electronic Version]. *The Guardian* Retrieved July 1st, 2006 from <http://education.guardian.co.uk/elearning/story/0,10577,1642281,00.html>.
- O'Reilly, T. (2005). What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. Retrieved December 1st, 2006, from <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-2.0.html>
- Richardson, W. (2006). Lesson Plans for the Read/Write Web [Electronic Version]. Retrieved May 22nd, 2006 from <http://weblogg-ed.com/2005/lesson-plans-for-the-readwrite-web-2/>.
- Risinger, C. F. (2006). Using Blogs in the Classroom: A New Approach to Teaching Social Studies with the Internet. *Social Education*, 70(3), 130-132.
- SEELYE, K. Q. (2005). Snared in the Web of a Wikipedia Liar. Retrieved July 8th, 2006, from <http://www.nytimes.com/2005/12/04/weekinreview/04seelye.html?ex=1291352400&en=6a97402d6595c6f1&ei=5090>
- Skrenta, R. (2004). The Secret Source of Google's Power. Retrieved November 12th, 2006, from <http://blog.topix.net/archives/000016.html>

Wal, T. V. (2005). Explaining and Showing Broad and Narrow Folksonomies. Retrieved October 3rd, 2006, from http://www.personalinfocloud.com/2005/02/explaining_and.html

Wal, T. V. (2007). Folksonomy Coinage and Definition. Retrieved February 8th, 2007, from <http://vanderwal.net/folksonomy.html>

Ward, H. (2006). Children's bog blog puts NASA in the shade. *Times Educational Supplement*(4670), 5-5.

Wikipedia. (2006). Folksonomy [Electronic Version]. Retrieved March 2nd, 2007 from <http://en.wikipedia.org/wiki/Folksonomy>.