Student Inquiry and Web 2.0

by Pam Berger

Web 2.0 applications are changing how educators interact both with each other and with their students. Educators can use these new Web tools daily to create, share, socialize, and collaborate with students, colleagues, and newly developed network contacts. School librarians are finding that Web 2.0 tools are bringing them more ways to embrace and promote new learning environments for the 21st-century learner.

Changing Times

A few years ago, students would search online in a few databases, type their research papers in *Word*, print them, and hand them into their teachers, perhaps sharing the key points with classmates through a *PowerPoint* presentation. Times have changed; using Web 2.0 tools, these same students can collaboratively locate, evaluate, and share relevant Web-based resources using a social bookmarking Web site. They can post, edit, and share their findings on a class wiki incorporating links to videos, photographs, podcasts, and other online resources for their teachers, classmates, and others to view and offer feedback. They can collaborate with peers, manage and organize information, work in teams, and learn real-life skills. Typical Web 2.0 style services can include blogging, user tagging, RSS feeds, wikis, user ratings, user comments, video and photo sharing, community citation services, social bookmarking, and microblogging.

Web 2.0 Characteristics in Schools

Although Tim O'Reilly was thinking in a broader perspective when he coined the term "Web 2.0," many of the concepts and ideas clearly relate to technology use in the school. Web 2.0 characteristics support the principles of good teaching and learning—active participation and collaboration.

▸**User participation.** Web 2.0 applications encourage users to share their ideas, opinions, content, and more. "A core concept of Web 2.0 is that people are the content of the site. That is, a site is not populated with information for users to consume. Instead, services are provided to individual users for them to build their network of friends and other groups (professional, recreational, etc.). The content of a site then comprises user provided information that attracts new members of an ever-expanding network" (O'Reilly 2005).

Social networking sites are probably most often associated with this concept since the primary purpose is to build networks. *Facebook* and *My Space* are the most popular and well known, with a combined membership of 380 million active accounts. There are also specialized online network sites such as *Shelfari*, *Good Reads*, and *Library Thing* for book lovers that attract over 3 million Americans. Steve Hargadon, in his blog on *Infinite Thinking Machine* states, "Social networks are really collections of Web 2.0 technologies combined in a way that help to build online communities" (http://www.infinitethinking.org/2008/01/social-networking-in-education.html). The focus is on building online communities that involve grouping specific individuals or organizations together. Social networking moved from "a niche activity into a phenomenon that engages tens of millions of Internet users" (Lenhart and Madden 2007).

▸**Harnessing Collective Intelligence.** Collective Intelligence is defined as "a form of intelligence that emerges from the collaboration

and competition of many individuals" (http://en.wikipedia.org/wiki/Collective_intelligence). It is based on the Web's original premise of shared information. "Hyperlinking is the foundation of the Web. As users add new content, and new sites, it is bound into the structure of the Web by other users discovering the content and linking to it. Much as synapses form in the brain, with associations becoming stronger through repetition or intensity, the web of connections grows organically as an output of the collective activity of all Web users" (O'Reilly 2005).

New applications, services, and tools have been developed to allow users to more directly share with each other. *Wikipedia, The Free Encyclopedia* is an online encyclopedia that anyone can add to or edit, *del.icio.us* is a social bookmarking site, and *Flickr* is a photo sharing tool; these are a few pioneers of Web 2.0 services. A typical application of "harnessing the collective intelligence" in a school setting is a wiki, an easily created Web site where multiple users can add and edit content. It is a great resource for students to use to collaborate on such projects as research papers, team projects, and study guides.

▶**Collaboration.** Free, flexible, and server-based programs are readily available to use for collaboration. Students can open their browsers and begin to edit word processing documents or spreadsheets in *Google Docs* or *Zoho Notebook*; create mindmaps in *Bubbl.Us* or *Mindmeister*; organize, share, and swap information in *Wikispaces*; and even hold online meetings in *Skype*. Students no longer need to save a document and email it to a classmate, edit it, and send it back. Today's electronic documents allow collaborators to work in a synchronous environment on a single document; groups of students

can create, share, and edit them online. Students can connect with each other and explore how their interests and abilities can be used to enhance class projects.

Transition to Wired and Mobile

Educators in all types of school and economic levels are increasingly dealing with a student population that is more wired and has grown up in a highly digital atmosphere. They have been trained to absorb and process information in fundamentally different ways from previous generations. These young people are leading the transition to a fully wired and mobile nation (see Figure 1). The majority of teens in the United States, 87% of those aged 12 to 17, use the Internet—that's 21 million youth. Seventy-five percent of teens who use the Internet, or about two-thirds of all teenagers, use instant messaging (IM) and 54% know more IM screen names than home telephone numbers.

The Internet is the primary communication tool for teens: 70% use instant messaging to keep in touch and 56% prefer the Internet to the telephone. Teens are utilizing the interactive capabilities of the Internet as they create and share their own media creations. Fully half of the teens who use the Internet could be considered content creators (Lenhart and Madden 2005).

Instructional Design for Inquiry

Most of the professional literature on pedagogy advises that it is best to prepare students

for the complex world in which they will live and work. To do this, educators should develop interactive, inquiry-based, technology-rich curriculum. According to Bransford and his colleagues, active, rather than passive, learners are better able to understand complex material and can more effectively transfer information and concepts learned in one setting to the process of solving problems encountered in another (1999). Not surprisingly, research shows that today's digital students learn more when engaged in meaningful, relevant, and intellectually stimulating schoolwork and that the use of technology can increase the frequency for this type of learning (NCREL and the Metiri Group 2003).

In developing the *Standards for the 21st-Century Learner*, the American Association of School Librarians (AASL) identified nine common beliefs that support learning. The second belief, which states, "Inquiry provides a framework for learning," focuses on students developing not only the skills, "but also the disposition to use the skills, along with an understanding of their own responsibilities and self-assessment strategies" (2007). The inquiry approach is focused on using and learning content as a means to develop information-

Figure 1. "A Vision of K-12 Students Today," *Teacher-Tube.* http://teachertube.com/viewVideo.php?video_id=47293&title=A_Vision_of_K_12_Students_Today
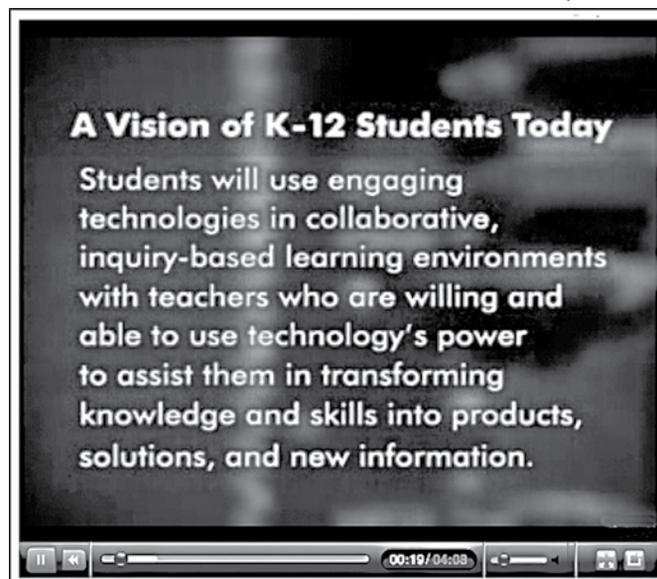
Figure 2. Inquiry and Web 2.0 Tools Integration Guide

The Phases of Inquiry	Teaching and Learning Strategies	Technology Tools/Resources
Connect Connect to self, previous knowledge Gain background knowledge to set context for new learning Observe, experience	Conversing Facilitated conversation Small group discussion and dialogue Research journals Learning logs Charting the Inquiry/ Information Searching Process Webbing Pre-reading aids (visual organizers, structures overviews, semantic maps) Engagement and exploration activities	EduBlogs, Ning, Wikispaces, Skype GoogleDocs, Zoho Suite Mindmeister, Bubbl.us, Mind42, LooseStitch Google Earth, Teacher Tube, Flickr
Wonder Develop questions Make predictions, hypotheses	Class brainstorming Peer questioning Question stems Anticipation Guide	GoogleDocs templates, Mindmeister, Bubbl.us
Investigate Find and evaluate information to answer questions, test hypotheses Think about the information to illuminate new questions and hypotheses	Find information Two column note taking ▷Notes/Reflection ▷Main Idea/Details, Examples Ideas from Text/ Connections to Prior Knowledge Guided Practice Organize sources; Evaluate information	Google, Clusty, Ask, Kartoo, Exalead, Intute Google Docs, Zoho Notebook, iOutliner, SpringNote Wikispaces (pathfinders) Jing, Voicethread Google Reader, Diigo, Delicious, SimplyBox Netvibes, Pageflakes, 30 Boxes, TaDaList Mindmeister, Bubbl.us
Construct Construct new understandings connected to previous knowledge Draw conclusions about questions and hypotheses	Charting, Mindmapping Composing Questioning: teacher-to-student, student-to-teacher, student-to-student	Edublogs, Wikispaces, PBWorks, GoogleDocs, Zoho Suite Polleverywhere, GoogleDocs, Zoho Suite Edublogs, E-mail, Instant Messenger, Skype, Twitter
Express Express new ideas to share learning with others Apply understandings to a new context, new situation	Use of rubric with specific criteria Select format based on needs of topic and audience Teacher and peer conferencing	Google Docs, Zoho Suite Voicethread, Glogster, Podcast, Animoto, Flickr, TeacherTube Skype, Blogs, Nings
Reflect Reflect on own process of learning and on new understandings gained from inquiry Ask new questions	Feedback from teacher and peers Reflection Log: I Used to Think/Now I Know	EduBlogs, Wikispaces, E-mail, Ning GoogleDocs, Voicethread, Podcast

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processing and problem-solving skills. It's a student-centered approach with the teacher as a facilitator of learning. Students are involved in the construction of knowledge through active involvement and, most importantly, asking questions; questions are at the heart of inquiry learning.

Barbara Stripling explains that inquiry requires active engagement and that "inquiry places students at the heart of learning by empowering them to follow their sense of wonder into new discoveries and insights about the way the world works" (Stripling 2003, 4). Students identify what they already know, ask intriguing questions about what they do not know, investigate the answers, construct new understandings, and share those understandings with others. The entire process is permeated with reflection and critical thinking, so that the result of inquiry is not only deep learning about the inquiry question, but also the development of skills for independent learning.

The Stripling Inquiry Model has six phases; however, it's not a linear process but rather a recursive one in which the learner might revisit a previous stage to ask additional questions or organize information, as the need arises. Each phase involves critical thinking skills that empower young people to learn on their own and develop the thinking skills to be independent, lifelong learners. The phases are as follows:

▶Connect: observe, experience, connect a subject to self and previous knowledge
▶Wonder: predict, develop questions and hypotheses
▶Investigate: find and evaluate information to answer questions, test hypotheses
▶Construct: draw conclusions, arrive at new understandings
▶Express: apply understandings to a new context, share learning with others
▶Reflect: examine one's own learning and ask new questions (Stripling 2003, 8).

Technology and, in particular, Web 2.0 tools and services can be used throughout the inquiry process to support the appropriate thinking skills. The key is to focus on student learning, not the Web 2.0 technology. The focus is on the phase(s) of inquiry at which students are concentrating and deciding which technology tool can best support the thinking processes and instructional strategies of that phase of inquiry. This increases the effectiveness of both the learning experience and the use of technology. An outline of the inquiry phases aligned with Web 2.0 technology tools and instructional strategies can be seen in Figure 2.

For Web sites that support inquiry and *Standards for the 21st-Century Learner*, log on to AASL's "Top 25 Websites for Teaching and Learning" (http://ala.org/aasl/bestlist). This link has a list that "honors Websites, tools, and resources of exceptional value to inquiry-based teaching and learning as embodied in the American Association of School Librarians' *Standards for the 21st-Century Learner*. The "Top 25 Websites" foster the qualities of innovation, creativity, active participation, and collaboration. They are free, Web-based sites that are user friendly and encourage a community of learners to explore and discover" (http://ala.org/aasl/bestlist).

In Summary

Web 2.0 applications support the principles of good teaching and learning—active participation and collaboration. To meet the learning needs of students today, educators, including school librarians, must embrace these tools in a way that supports interactive, inquiry based, technology-rich learning. All must be accomplished in a way that increases the effectiveness of both the learning experience and the use of technology. School librarians can be key players in helping establish this type of learning and teaching environment by making use of the resources available (e.g. inquiry models, AASL's *Standards*

Harnessing the Learning Power of Web 2.0

A distinguishing characteristic of Web 2.0 tools is the ability to harness the collective intelligence and encourage collaboration, thus allowing users to share and collaborate. Each type of Web 2.0 tool accomplishes this task in a different way.

Organizing and Managing Information. The tools in this group are well suited to support the Investigate and Construct phases of inquiry. They support development of organizational skills and are usually described as arranging, categorizing, extracting, grouping, and selecting. It's through this process of organization that students start to see patterns and relationships between pieces of information, thus helping them to make sense of the information. The tools generally fall into five categories: start pages, graphic organizers, calendars, outliners, and list makers. A few examples are *Mindmeister* (http://www.mindmeister.com), *Netvibes* (http://www.netvibes.com), *30Boxes* (http://30boxes.com), and *LooseStitch* (http://loosestitch.com).

Content Collaboration. These tools create a space for collaboration, content development, and interaction and encourage analysis and synthesis of information in the Construct phase of inquiry. A few examples are *Google Docs* (http://docs.google.com), *Wikispaces* (http://www.wikispaces.com), and *Zoho Notebook* (http://zoho.com).

Media Sharing is incorporated into the inquiry process during the Express phase when students share their new understandings. When student create their own media, they are active participants in their own learning; their interest and motivation increases because they are in control of their learning. Students are engaged, learning improves, and products are created and made available for others to share, interact, and learn from. The projects created through these tools are easily edited, encouraging students to get feedback from others and revise their work. A few examples are *VoiceThread* (http://ed.voicethread.com), *Glogster* (http://www.glogster.com), *Jing* (http://www.jingproject.com), and podcasts.

for the 21st-Century Learner, the AASL "Top 25 Websites," etc.). They must learn about, use, and teach the the application of Web 2.0 tools for student learning. In this way school librarians can provide leadership for meeting the needs of the 21st-century learners as they work with classroom teachers and students.

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