

Excerpted from

Web 2.0: New Tools, New Schools

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Web 2.0: New Tools, New Schools provides a comprehensive overview of the emerging Web 2.0 technologies and their use in the classroom and in professional development. Topics include blogging as a natural tool for writing instruction, wikis and their role in project collaboration, podcasting as a useful means of presenting information and ideas, and how to use Web 2.0 tools for professional development. Also included are a discussion of Web 2.0 safety and security issues and a look toward the future of the Web 2.0 movement. *Web 2.0: New Tools, New Schools* is essential reading for teachers, administrators, technology coordinators, and teacher educators.

Schrum and Solomon explain and detail the state of modern education, the wide variety of new technologies that impact teaching and learning, and introduces some of the coming challenges.



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new world, new web, new skills

Think back to when you were in school; consider how different everything was then. There was a simpler, clearly defined path to the future, or so it seems in retrospect. While that may or may not have been true for all of us back then, no one today would view the world or the path to the future as being simple.



new world

We live in a wired, globalized world in which communication and collaboration are possible 24/7. Corporations have become multinational and their workers can be anyplace and work at any time. Fast connections and standardized software link these corporations with workers wherever they are, and some members of this workforce live in parts of the world where salaries are low and benefits are unheard of. Technology is the driving force that created this environment. Technology makes people in remote locations viable employees who are eager to have the jobs.

Companies use technology to become lean and efficient. They can track their goods and services from point of origin to delivery and at every step along the way. They know what they need at any moment and can make adjustments to the supply

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flow in real time using technology from a distance. They trim expenses, including worker costs. When workers in Asia are as well educated as Western graduates, are just as well versed in using new tools, and require significantly smaller salaries, it is clear where the jobs will go.

The Web is changing too. It has morphed from static HTML pages where readers could find and copy information to interactive services, where visitors can create and post information. The transition from using desktop-based applications to new online tools means that we can work differently. We no longer just find and use information; the Web is now a participatory, interactive place where we

create information collaboratively and share the results. Everyone can participate thanks to social networking and collaborative tools and the abundance of Web sites that allow us to post journals, photos, movies, and more. The Web is no longer a one-way street where someone controls the content. Anyone can control content in a Web 2.0 world.

So what does this mean for teaching and learning? As educational leaders, we should understand changes in the Web and how they reflect changes in the world

around us. We should provide these new tools to our students so that they are prepared for new challenges.

Young people in the developed parts of the globe are very aware of the new tools at their disposal and many of them spend hours online using these tools. Because these new technologies and new capabilities engage and motivate students, we can use them to educate. If you're reading these pages, you're among the first wave of people who will move schools and educational technology forward by harnessing these new tools and new models of learning. Of course, young people may be ahead of us in using tools, but leaders like you will help them use the tools in educationally appropriate ways.

economics 102

While we debate the purpose of education in America, we have to accept that in part it is to ensure that citizens are ready to be intelligent employees. We may want to think in terms of a well-rounded education for its own sake, but that education has to include a focus on the skills and abilities that students will need if the next generation is to remain competitive in a changing world. *New York Times* columnist and Pulitzer Prize-winning author Thomas Friedman says the world is flat; the advantages the West used to have are disappearing; new dynamics are changing economics and society, and the East is gaining ground. A convergence of factors makes this a time of great change.

Friedman identifies three world “flatteners.” First are the new technologies and the new processes made possible or enhanced by these technologies. Second are new ways of working and a new playing field for doing business. Third is a whole new set of people who have emerged onto the playing field and want to work. Because they have access to new technologies, they can “plug and play” their way into being competitive (Friedman, 2005).

The impact on businesses is clear. According to *BusinessWeek*, “Competition keeps intensifying around the world. For one thing, after decades of rising power, Asian companies are starting to run circles around American and European rivals across a wide variety of industries” (Hof, 2006, pp. 80–81).

For many companies, being competitive means spreading jobs throughout the world. For example, one out of every 10 jobs in the U.S. computer, software, and information technology industry will move overseas in the next two years, and

one in four IT jobs will be sent offshore by 2010. The impact in dollars is as great as on employment. Daniel Pink (2006) in *A Whole New Mind* says, “At least 3.3 million white collar jobs and \$136 billion in wages will shift from the U.S. to low-cost countries like India, China and Russia by 2015” (p. 39).

Competition takes place all over the globe. For example, Uruguay partners with the Indian outsourcing company Tata. “When Tata’s Indian employees in Mumbai are asleep, its 650 Uruguayan engineers and programmers now pick up the work and help run the computers and backroom operations for the likes of American Express, Procter & Gamble and some major U.S. banks—all from Montevideo” (Friedman, 2006, n.p.).

Soon “technology will literally transform every aspect of business, every aspect of life, and every aspect of society.” The world is changing from a primarily vertical “command and control” universe to a horizontal “connect and collaborate” one (Friedman, 2005, pp. 233–234).

The Web is key in this transformation; the democratization of information and technologies that is taking place online is a world-changing phenomenon. “These

In the future, *how* we educate our children may prove to be more important than *how much* we educate them (Binder, cited in Friedman, 2005, p. 302).

digital, mobile, personal, and virtual technologies; file changing and instant messaging; VoIP; videoconferencing; computer graphics, and new wireless technologies make all the other changes happen faster, better, and smarter” (Friedman, 2005, p. 51).

If companies in the developed world are to continue to excel at efficiency and innovation and survive against the competition, employees must acquire new skills such as having “ongoing relationships rather than executing transactions, tackling novel challenges instead of solving routine problems, and synthesizing the big picture rather than analyzing a single component” (Pink, 2006, p. 40).

Some people in the developed world will be left behind. Barbara Ehrenreich, whose books show how hard life is for the millions of people in the U.S. with low-end jobs and the problems of laid-off white-collar workers, “has started an organization called United Professionals to help white-collar workers, be they unemployed, uninsured, downsized, stressed out or merely anxious” (Greenhouse, 2006, n.p.).

Education at U.S. universities has traditionally been seen as valuable. Many students who want to reach the top have traveled there to learn. Friedman (2005) cites data from the Institute of International Education that shows in the 2004–2005 school year, 80,466 of the foreign students enrolled at colleges and universities in the U.S. were from India, 62,523 were from China, and 53,358 were from South Korea. Their enormous hunger to get ahead drives them to “outlearn the competition” (p. 214).

Now these countries are changing their precollegiate education systems to prepare the next generation. Starting in 2006 in Shanghai, according to Joseph Kahn (2006) of *The New York Times*, China is refocusing history textbooks from “wars, dynasties and revolutions to economics, technology, social customs and globalization” (n.p.). One author of the new textbooks says that the alterations “reflect a sea change in thinking about what students need to know.... The goal of our work... is to make the study of history more mainstream and prepare our students for a new era” (n.p.).

The South Korean government is adopting open-source software for K–12 in a nationwide project to help create a national computing infrastructure and bring their national education system into the 21st century (Mereness, 2006).

“Eighteen of India’s 28 states either are using Linux or have pilot projects for its use in various government departments and schools” (Lakshman, 2006, p. 40). Computer science classes based on Linux software will be mandatory in some of the states’ high schools.

“It is clear that the U.S. and other rich nations will have to transform their educational systems so as to produce workers for the jobs that will actually exist in their societies.... In the future, *how* we educate our children may prove to be more important than *how much* we educate them” (Binder, cited in Friedman, 2005, p. 302).

Thus, it is important to ask: Who will be prepared for the new world? Who will have the technological and thinking skills needed for the 21st century? And how can we help them prepare?

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Change is not based on technology alone. For example, Japan is “remaking its vaunted education system to foster greater creativity, artistry, and play. The Education Ministry has been pushing students to reflect on the meaning and mission of their lives, encouraging what it calls ‘education of the heart’” (Pink, 2006, p. 53).

Intel’s World Ahead Program will help emerging nations to become competitive. It will invest more than a billion dollars globally over the next five years, beginning in the Amazon rain forest, where it installed networking infrastructure and computer labs and has trained teachers. The project plans to extend wireless PC access to millions of citizens in Latin America and train more than a million teachers about the effective use of technology in the classroom. From there, project plans include such installations in other isolated communities in Africa, Asia, and the Middle East (Davis, 2006).

The United States recognizes the need to improve education. In the fall of 2006, the Business Roundtable urged Congress to pass legislation that promotes U.S. competitiveness and helps maintain the United States’ science and technology leadership. Among its suggestions were to strengthen K–12 math and science education and expand undergraduate and graduate science and engineering programs.

Universal access to broadband is very important. South Korea leads all countries with 83% broadband penetration, followed by Hong Kong with 80.98%, Iceland at 74%, Israel at 69.08%, and Taiwan at 64.65%. The U.S. is in 20th place at 44.45% (WebSiteOptimization.com, 2006).

At the home and school levels, students have to take advantage of the new tools available on the Web, and teachers have to guide them with new ways of learning. Let’s take a step back to see how we arrived at this technological crossroads.

new web

What we know today as the Internet (and the visual component of the World Wide Web) evolved from military to academic to commercial interests. In the 1970s, the U.S. Department of Defense wanted a secure communications system that could survive disasters. In the 1980s, the National Science Foundation (NSF) funded a network so that scientists at major universities could communicate and share research. In 1990, NSF announced a plan for privatization.

Browser software and commercialization changed the text-based Internet into the graphical World Wide Web that has become so familiar. People with access could create pages and show relationships among items; they could lead readers to follow their links. By the early 2000s, the notion of interactivity went from linking and clicking to creating and sharing. Now individuals not only find and read information but also create and share their own in real time. It is a new Web, known as Web 2.0.

Web 2.0 is an invented term, coined in 2004. (See appendix A, Web Timeline.) It encompasses the growing collection of new and emerging Web-based tools. Many are similar in function to desktop applications, with people using their browsers for access rather than installing the software on computers. Many tools are free and available to all, a change from applications that are purchased or licensed annually. Others are social in nature and promote self-expression, such as the community networks, blogs, wikis, and photo and video sharing sites.

As part of the open-source movement, programmers freely provide their source code for the sheer enjoyment of seeing their creation used. Others often add to it, improve it, and customize it. Much of this programming is built on Ajax, which stands for Asynchronous JavaScript and XML. Unlike traditional sharing on mainframe computers, today's programmers can work from any location. No one is tied to a specific workplace anymore.

Intellectually, Web 2.0 signals a transition from isolation to interconnectedness—not just for programmers but, more important, for end users. The tools allow multiple users to participate: editing, commenting, and polishing a document collaboratively rather than working alone. In some ways, both the software and the products created with it can be considered works in progress, available for anyone to contribute to, ad infinitum. Imagine a book that the author updates monthly, that others add to, edit, and correct, and that readers routinely receive a new version of each time changes occur.

Wired magazine writer Kevin Kelly (2005) sees the Web 2.0 era as one in which:

People have come to realize that it's not the software that enables the Web that matters so much as the services that are delivered over the Web.... The net has replaced the PC as the platform that matters, just as the PC replaced the mainframe and minicomputer... and the key to success in this stage of the Web's evolution is leveraging collective intelligence. (n.p.)

These tools are effective for business success as well as for personal enjoyment. Let's take a brief look at some of the tools and then see how they've become effective for forward-looking businesses that are tapping into the technologies and strategies to succeed.

The new Web is open and democratic. There are no gatekeepers; most content is available without charge, and anyone may add to its volume of knowledge. The best example is Wikipedia. Developed by Jimmy Wales, Wikipedia is a collaborative encyclopedia that includes more entries on more subjects than the *Encyclopedia Britannica* (with about as good an accuracy rate), and the entries are created and updated by more people than you can imagine.

The United States has become a nation of bloggers, expressing ourselves as never before. According to a 2006 Pew Internet & American Life Project national phone survey, almost 40% of the approximately 147 million adult Internet users in the U.S. say they read blogs. Eight percent write blogs too. "The majority of bloggers cite an interest in sharing stories and expressing creativity. Just half say they are trying to influence the way other people think" (Pew Internet & American Life Project, 2006, p. iii). Table 1.1 shows the results of the survey.

Bloggers often have an effect on their readers. They often write about their lives, and their personal stories are compelling and bring return visitors. However, bloggers also discuss politics, media, government, and technology and some have distinguished themselves as a force for honesty and political action. Malcolm Gladwell (2002) in his analysis of change, *The Tipping Point*, identifies "connectors," people who spread the word as they see it to others. That message spreads "virally" through readership and syndication. Bloggers are connectors.

During the 2004 American presidential campaign, bloggers took on fund-raising as well as consciousness-raising roles for the Democratic primary-election candidate Howard Dean. Later, in the general election campaign, bloggers questioned the authenticity of documents offered by CBS News anchor Dan Rather, causing embarrassment for both that network and for Democratic presidential nominee John Kerry. In August 2006, bloggers "outed" a Lebanese photographer working for Reuters whose doctored photographs made events seem worse than they really were.

Table 1.1 | **BLOGGER SURVEY RESULTS**

The reason you personally blog	Major reason	Minor reason	Not a reason
To express yourself creatively	52%	25%	23%
To document your personal experiences or share them with others	50%	26%	24%
To stay in touch with friends and family	37%	22%	40%
To share practical knowledge or skills with others	34%	30%	35%
To motivate other people to action	29%	32%	38%
To entertain people	28%	33%	39%
To store resources or information that is important to you	28%	21%	52%
To influence the way other people think	27%	24%	49%
To network or to meet new people	16%	34%	50%
To make money	7%	8%	85%

► Source: Pew Internet & American Life Project Blogger Callback Survey, July 2005–February 2006. N=233. Margin of error is $\pm 7\%$.

Bloggers are quick to state their likes and dislikes about products and services too, and companies are watching consumer-written product reviews carefully. According to a report from Jupiter Research, “The growing phenomenon of consumer-generated content has become disruptive to online businesses, but many are studying the reviews and finding ways to use the content to their advantage. The research found 77 percent of online shoppers read consumer product reviews and ratings and are increasingly loyal to the stores that feature product feedback” (Sullivan, 2006, n.p.). This is a force to be reckoned with.

On the new Web, people can select from among a seemingly endless supply of content that addresses their needs instead of having information or entertainment delivered that someone else has picked for them. They can search for content online, read it, analyze it to decide what’s important, interact with the author,

and post the resulting knowledge. The work they post online could have as much impact as the work of any known author or expert on the topic, and the potential audience may be large and international. This is power that was unheard of before.

Given that the Web is democratic, and because Web 2.0 tools are free and available to anyone with a browser and Internet connection, everyone can have access to the sophisticated tools they need for almost any task. Because the tools themselves are adaptable, the programmers among us will rework and refine them and offer newer and even more improved models.

As broadband becomes cheaper and local communities set up wireless access from parks and other gathering places, everyone with a laptop will have access to the same sophisticated tools that professionals use. A browser is the only software needed.

new corporations

Businesses are adjusting to new realities.

For all its appeal to the young and the wired, Web 2.0 may end up having its greatest impact on business. And that could usher in more changes in corporations, already in the throes of such tech-driven transformations as globalization and outsourcing. Indeed, “what some are calling Enterprise 2.0 could flatten a raft of organizational boundaries—between managers and employees and between the company and its partners and customers” (Hof, 2006, n.p.).

Nimble corporations use technology and Web-traffic information to track customers and commodities, but there are even greater advantages from Web 2.0 tools and services. Some companies use wikis, or group-editable Web pages, for collaboration. Others use them instead of e-mail to create meeting agendas and post training videos. Some corporate executives even post on their own blogs to communicate directly with customers.

Some firms are using social-networking services. According to Rachael King (2006) of *BusinessWeek*:

Recruiters at Microsoft and Starbucks, for instance, troll online networks such as LinkedIn for potential job candidates. Goldman Sachs and Deloitte run their own online alumni networks for hiring

back former workers and strengthening bonds with alumni-cum-possible clients. And companies such as Intuit and MINI USA have created customer networks to build brand loyalty. (n.p.)

Social network mapping helps business leaders to understand and harness the dynamics of their own workplace. “Managers are mapping informal collaborative relationships that foster creativity. Accenture created a graphic Web of social networks within client companies to analyze management. Seimans made a social network chart to show how its global software development team would work” (Jana, 2006, p. 4).

New tools are also being used to solve technology problems. For example, “companies struggle to overcome problems with current online communications, whether it’s e-mail spam or the costs of maintaining company intranets that few employees use. So they’re now starting to experiment with collaborative services, such as wikis” (Hof, 2006, n.p.).

As businesses and employees adopt new practices, their expectations for the next generation of employees will evolve into an assumption about technology skills and collaboration and communication skills that the new Web tools embody. Will our students be ready?

21st-century skills

As society and the world of work change, the skills that students need to live and thrive in it also change. The competition will be fierce and can come from anywhere in this flat world. In some ways, students today are ahead of their elders. Technology is second nature to them and they accept and use it without question. Schools lag behind.

The Partnership for 21st Century Skills (2004), a group that represents business and education in the United States, makes the case:

- ▶ Education is changing. We can no longer claim that the U.S. educational results are unparalleled. Students around the world outperform American students on assessments that measure 21st-century skills. Today’s teachers need better tools to address this growing problem.

- ▶ Competition is changing internationally. Innovation and creativity no longer set U.S. education apart. Innovators around the world rival Americans in breakthroughs that fuel economic competitiveness.
- ▶ The workplace, jobs, and skill demands are changing. Today, *every* student, whether he/she plans to go directly into the workforce or on to a 4-year college or trade school, requires 21st-century skills to succeed. We need to ensure that *all* students are qualified to succeed in work and life in this new global economy. (p. 1)

Using collaboration and communication tools with educational methods that also promote these skills—such as project-based learning—will help students acquire the abilities they need for the future.

The Partnership for 21st Century Skills (2006) also points out that:

- ▶ Standards that reflect content mastery alone do not enable accountability and measurement of 21st-century skills.
 - ▶ An expanded approach to assessment, involving measurements that assess 21st-century skills, is necessary to ensure accountability of schools in the 21st century.
 - ▶ Students cannot master 21st-century skills unless their teachers are well trained and supported in this type of instruction.
- ▶ Information and communications technology (ICT) literacy is the ability to use technology to develop 21st-century content, knowledge, and skills.
 - ▶ Twenty-first century content areas like global awareness, financial literacy, civic literacy, and health awareness are critical to student success in communities and workplaces, and these should be taught.
 - ▶ Targeted, sustained investment in research and development initiatives is required to promote 21st-century skills and craft teaching practices and assessment approaches that more closely convey and measure what students need to excel in the 21st century. (n.p.)

The North Central Regional Educational Laboratory (NCREL; 2003) has identified the following four categories of skills:

DIGITAL-AGE LITERACY

- ▶ Basic, scientific, economic, and technological literacies
- ▶ Visual and information literacies
- ▶ Multicultural literacy and global awareness

INVENTIVE THINKING

- ▶ Adaptability and managing complexity
- ▶ Self-direction
- ▶ Curiosity, creativity, and risk taking
- ▶ Higher-order thinking and sound reasoning

EFFECTIVE COMMUNICATION

- ▶ Teaming, collaboration, and interpersonal skills
- ▶ Personal, social, and civic responsibility
- ▶ Interactive communication

HIGH PRODUCTIVITY

- ▶ Prioritizing, planning, and managing for results
- ▶ Effective use of real-world tools
- ▶ Ability to produce relevant, high-quality products

(NCREL, 2003, n.p.) © 2003 North Central Regional Educational Laboratory. All rights reserved. Reprinted with permission of Learning Point Associates.

The Partnership's 2004 report *Learning for the 21st Century* identifies six key elements of 21st-century learning: “emphasize core subjects; emphasize learning skills; use 21st-century tools to develop learning skills; teach and learn in a 21st-century context; teach and learn 21st-century content, and use 21st-century assessments that measure 21st-century skills” (p. 6).

Further, it reports, “Today’s education system faces irrelevance unless we bridge the gap between how students live and how they learn” (p. 5). They live with Web 2.0 tools, but schools must help them use the tools to acquire new skills, not just play with them. Even more, today’s education system faces irrelevance unless we bridge the gap between how well American students achieve and how well students in the rest of the world are doing.

The role of teachers will be to guide students in using the new tools for academically rigorous investigations and presentations. Which tools students choose to create with won't matter. Teachers will be able to let students with specific learning styles use the tools that address their particular needs. Students will be able to create a serious paper or video of robust content, great sophistication, and real depth.

Using collaboration and communication tools with educational methods that also promote these skills—such as project-based learning—will help students acquire the abilities they need for the future. They will also require access to a new generation of online educational software that can help them acquire and maintain needed skills. Providing access to the tools is essential.

Some U.S. federal policymakers agree. Alan Greenspan (2004), former chairman of the Federal Reserve System, says, “We need to be forward looking in order to adapt our educational system to the evolving needs of the economy and the realities of our changing society. Those efforts will require the collaboration of

policymakers, education experts, and—importantly—our citizens. It is an effort that should not be postponed” (n.p.).

To be literate today involves acquiring new skills, including those of using technology, understanding science, having global awareness, and most important, having the ability to keep learning.

However, action must follow rhetoric. Countries have to do more than test students on basic skills. China is revising textbooks and South Korea is developing a technology infrastructure. If education doesn't help today's students learn the skills they need, major advances will happen elsewhere.

We used to talk about reading, writing, and arithmetic as the essential skills for literacy.

To be literate today involves acquiring new skills, including those of using technology, understanding science, having global awareness, and most important, having the ability to keep learning, which involves gathering, processing, analyzing, synthesizing, and presenting information as well as communicating and collaborating. Free, online tools can play a large role in helping students acquire these skills.

Businesses today focus on communicating, collaborating, and optimizing their use of data. According to David Wallen, business development director for the DataLan Corporation, “Collaboration is the key to successful innovation” (personal

communication, 2006). To succeed, according to *BusinessWeek*, “Companies are finding new ways to differentiate themselves and create entirely new markets.... Many are finding that in an intensely networked age, cooperation works better than direct competition” (Zolli, 2006, pp. 80–81).

schools and change

The shift to Web 2.0 tools can have a profound effect on schools and learning, causing a transformation in thinking. This will happen because the tools promote creativity, collaboration, and communication, and they dovetail with learning methods in which these skills play a part. For example, when students collaborate on a project and present what they’ve learned, they’ve honed their thinking and organizational skills. New tools enable that possibility.

The old way of doing things is presentation-driven; information is delivered and tested. This approach prepares students for jobs that require simply following directions and rote skills. The new way is collaborative, with information shared, discussed, refined with others, and understood deeply. It prepares students to become part of a nimble workforce that makes decisions and keeps learning as the workplace changes. What makes the difference is preparing students with 21st-century skills using a flexible approach rather than teaching just what will be tested.

Indeed, the U.S. 2005 National Educational Technology Plan began, “Over the next decade, the United States will face ever increasing competition in the global economy.... It is the responsibility of this nation’s educational enterprise—including policymakers—to help secure our economic future by ensuring that our young people are adequately prepared to meet these challenges.” Among the action steps it suggested are encouraging broadband access and moving toward digital content (U.S. Department of Education, 2005, n.p.).

the tipping point

The Tipping Point author Malcolm Gladwell (2002) thinks of change as epidemics in which “ideas and products and messages and behaviors spread just like viruses do” (p. 7). The tipping point is “the moment within an epidemic when everything can change” (p. 191).

At what point will new tools and new methods catch on enough in schools to reach the tipping point? What forces are pushing school change? From this vantage point, it looks like the confluence of having new tools (both pedagogical and technological), the future economic need, the access to bandwidth, and tech-savvy students are driving change.

As educators, we can't sit on the sidelines watching it happen. We have to recognize that students' use of technology is stronger and work from our own strength, which is pedagogy. This means that we harness the technology and use it to help students learn thinking and analytical skills. They may know the tools better, but we have to help them use them wisely. As Jeff Utecht, a teacher in Shanghai, says, "If we want to engage students in learning, we need to first understand their world. This world is without borders, boundaries, and is limited only by the speed of one's Internet access" (personal communication, 2006).

What will make change happen? Gladwell (2002) identifies three factors necessary for change to occur: exceptional people who drive change by their own habits, stickiness or memorable qualities of the ideas that move others to act, and the power of context, which includes the skillful use of groups and the power of communities. Educators are agents of change.

They include people such as David Warlick, who speaks out on these issues and creates new tools for education; Miguel Guhlin, who creates change within a school district and generates blogs, podcasts, and articles to spread the word; Tim Lauer, who as a school principal uses and encourages new technologies for everyday practices for his staff, students, and parents; and David Jakes, who as a school district technology coordinator, presents workshops that use the tools, not as an end in themselves but so that teachers, and thus their students, will learn the power of communicating.

David Jakes (2006c), in a conference keynote presentation, described the "characteristics of school culture that are required for an innovation to become seamless and transparent" (n.p.). In other words, to become "sticky." Here are his thoughts:

MAKING IT STICK

1. There must be a high degree of organizational readiness for the innovation.
2. The innovation must have multiple entry points for a spectrum of usership; each of these entry points must support effective use by teachers and students.

3. The innovation must clearly address an instructional need, with benefits for both teacher and student.
4. The innovation must add value to an instructional process.
5. There must be visible and tangible results indicating that the innovation improves student learning.
6. The technology has been taken out of the technology or innovation.
7. The teacher has become a confident, active, and visible user; use becomes seamless and transparent. (n.p.)

new tools and learning

One exciting aspect of Web 2.0 tools is that they are free programs that could replace the traditional application suites for which schools ordinarily must pay. Some perform the familiar functions, such as word processors, spreadsheets, and presentation tools. While they may not have every single feature of Microsoft Word, Excel, or PowerPoint, there is an advantage to having software that is Web-based: people at different computers can use the software to collaborate on a single document or on sets of documents at the same time.

Web 2.0 is an ever-growing array of tools that people use to aggregate and interact with information in ways that are useful to them. Figure 1.1 shows several distinctions between the old and new ways of doing things, dubbed as Web 1.0 and Web 2.0.

Figure 1.1 | Comparison of old and new ways of working

Web 1.0		Web 2.0
Application based	▶	Web based
Isolated	▶	Collaborative
Offline	▶	Online
Licensed or purchased	▶	Free
Single creator	▶	Multiple collaborators
Proprietary code	▶	Open source
Copyrighted content	▶	Shared content

In July 2006, techLEARNING.com conducted a Question of the Week survey to find out if visitors thought that free Web tools would ever replace traditional application software. The results showed that more than 60% said yes, with people interested in the potential cost savings and believing that the free tools' features would eventually surpass those of offline tools. Nearly 20% of respondents said that getting everyone online to use the tools would pose a technical problem and 8% worried about security issues (techLEARNING.com, 2006).

One participant commented, "I think it is the wave of the future. We have to change our mindset and learn how to deal with the technical issues. When enough people are brave enough to use it, it will become the norm" (n.p.). While independent programmers write most Web 2.0 tools and make them freely accessible, some of the results are so successful that companies such as Google, Yahoo, and Microsoft are creating, acquiring, and offering them as part of their collections of free products.

taking advantage of new tools

We can take advantage of the features that new tools offer and tap into students' natural affinity for these tools in order to create learning experiences that expand their worldview and enhance what they learn. Specifically, the features are interconnectedness, immediacy, interactivity, communications, and community. These are the very features that keep global businesses competitive and workers in jobs.

Students can learn because of these features. Ideas and concepts on the Web are connected to one another through hyperlinks. Using these links, students can dig deeper to find information that stretches their ability to reason and analyze. They can interact with information online and connect instantly to relevant content that is also engaging and malleable. Students can collaborate on projects, consult experts, and share their data with the world. Most of all, they can build on others' learning by reading other students' posted work as a starting point for their own research and link back to it. The process fulfills the concept of leveraging collective intelligence in a community-building environment.

Only by learning this way and using these tools, will students be competitive for 21st-century jobs.

Web 2.0 has arrived—find out how it can transform teaching and learning!

Web 2.0: New Tools, New Schools features:

- A complete explanation of Web 2.0 tools, including weblogs, wikis, folksonomies, RSS feeds, and podcasts.
- Web 2.0 tools and their use in the classroom.
- Web 2.0's role in professional development.
- What administrators should know about Web 2.0.

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