
Commentary

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How to Connect Technology and Passion in the Service of Learning

By JOHN SEELY BROWN

The digital age has vastly expanded people's access to all sorts of information and resources, including educational materials. The Internet has also fostered a new culture of sharing, one in which content is freely contributed and distributed with few restrictions. Indeed, the latest evolution of the Internet, Web 2.0, is creating a new kind of participatory medium that is ideal for encouraging multiple types of learning.

Web 2.0 has blurred the line between producers and consumers of content and has shifted attention from access to information toward access to other people. New kinds of online resources — social-networking sites, blogs, wikis, and virtual communities — have allowed people with common interests to meet, share ideas, and collaborate in innovative ways.

Two of those ways involve social learning, based on the premise that our understanding of content is socially constructed, through conversations about that content and through interactions around problems or actions. The focus is not so much on *what* we learn as on *how* we learn. In addition, social learning concerns not only "learning about" the subject matter but also "learning to be" full participants in the field. That involves acquiring the practices and norms of established practitioners in that field or acculturating into a community of practice, such as an open-source community, where you are required to assimilate the sensibilities and ways of seeing the world embodied within that community.

That culture of sharing and participation usually starts with the students themselves, as we see vividly in the complex, multiplayer game worlds and in the power of study groups, whether conducted face-to-face or virtually. Such a culture must also involve content. The Massachusetts Institute of Technology was a pioneer when it developed its OpenCourseWare project. Other universities quickly followed MIT's lead, and both the content and the means of accessing class materials and remixing and repurposing them for different audiences grew.

But it's time that we in higher education move beyond considering only content. We must begin to determine how that content can encompass multiple kinds of instructional or learning activities. It is, after all, the combination of things we do with content that creates learning platforms.

Two ways that technology can now transform our learning landscape are immersion and intelligent tutoring systems. Immersion is a concept that has received too little attention. Consider, for example, how every one of us has learned the immensely complex system that is our own native language: through immersion and desire. Immersion comes from being surrounded by others talking and conversing with us and is further encouraged by our deep desire to interact, to be understood, and to express our needs. Nearly everyone is a teacher for us — albeit an informal teacher — urging us to say new things, correcting us, and extending our vocabulary.

In today's high-tech, graphically rich world, we now have almost limitless opportunities to teach and learn through immersion. We can build simulation models of cities, historic events, atomic structures, biological and mechanical systems, to name just a few. Our challenge becomes how to share such vast simulations and databases so that other people can extend, remix, and recompose them, thus expanding both their scope and their reach.

For example, I still dream of a virtual human system that would allow me to explore any aspect of how our bodies — organs, cells, membranes — function. There are promising signs, but as yet we have no real framework for constructing and sharing modules of such a system. Perhaps we could entertain a vast and interconnected web of simulations. No one group can build it all, but many people could contribute, including students themselves.

Such richly visual, immersive, three-dimensional simulations will help students master complex topics. But they will not be enough. We need to augment those systems with computer-based intelligent tutors. Intelligent tutoring systems have a long history, stretching back to the 1970s, when our most advanced systems required a million-dollar computer for each student. Now we have machines 10,000 times more powerful and much less expensive. That means that our past dreams for building intelligent tutoring systems that could offer open-ended learning under the skillful eye of a tutor, coach, or mentor are becoming realistic. Indeed, the work of Carnegie Mellon University and now its Open Learning Initiative — which employs virtual labs, group experiments, and cognitive tutors — have demonstrated the power and utility of such systems.

For decades we have worked to create better theories of learning and successful models of teaching, but no one pedagogical or technical approach will ensure that students are engaged and prepared. We need to be catholic in our point of view. We must think about how technology, content, and knowledge of learning and teaching can be creatively combined to enhance education and ignite students' passion, imagination, and desire to constantly learn about — and make sense of — the world around them. And we need to collect and share good models in which various professors' and students' experiences are commented on and tried out in new contexts.

How might we begin? How can we start gathering massive amounts of data about what is working and what is not, and why? Take the OpenCourseWare project. Millions of students may be using the material, but we need to ask what they are learning. What sequence of materials appears to be working best? Are there particular paragraphs or problems (in a problem set) that are routinely misinterpreted? How are test questions being misinterpreted? Are any systematic error patterns showing up? Those queries barely scratch the surface of the information that we need to collect.

We should extend our thinking around open education to include more of a Learning 2.0 perspective, based on Web 2.0, for two key reasons. The first turns on a question that John King, associate provost at the University of Michigan at Ann Arbor, first posed to me. He asked how many students I thought the university taught each year. I knew that it had approximately 40,000 students, give or take a few thousand, so that was my answer. He responded that, while I had the enrollment right, 250,000 was closer to reality. What you forget, he told me, is that each year the incoming students bring their social networks with them. Those networks reach back into the students' communities and schools. Using the social-software and social-network tools of SMS, IM, Facebook, and MySpace, they extend the discussions, debates, bull sessions, and study groups that naturally arise on a campus to encompass that broader constituency — thus amplifying the effect the university has across the country.

That phenomenon draws attention to the broader learning milieu or learning landscape we must consider, as well as to the extended forms of participation that the Internet offers. Those extended forms start to merge tools for doing research with tools for learning — a boundary that needs to be blurred ever more.

As a simple example, consider how many students pick up the practice of writing software by joining an

open-source community of practice like Linux and Apache. There may be small groups on a campus, but generally such communities of practice are highly distributed. Joining one of them entails first becoming a legitimate peripheral participant who works on a small project and improves or extends some piece of code — slowly building up a reputation before moving on to more-central tasks and challenges. Participants learn new techniques about software practice from watching the work of their peers, defending their own work, and participating in community discussions about emerging problems. That peer-based learning process is about *learning to be a practitioner* rather than just *learning about software*. Today's students don't want to spend years learning about something before they start to learn to be practitioners in that knowledge domain.

Of course, such peer-based learning happens to some extent on today's campuses in the form of laboratory exercises and studio activities, but they are usually labor-intensive for the instructor, requiring much time and effort. They are also labor-intensive for the student. But time spent on learning is a funny commodity. If the student is passionately engaged in acquiring the practice, then time seems to disappear. Passion is the key.

Today the Web offers students incredible opportunities to find and join niche communities that ignite their passions. That sets the stage, through productive inquiry and peer-based learning, for such students to acquire both the practice of and knowledge about a field.

In the end, the millions of niche amateur communities — from the Latin word *amator*, meaning lover of — could provide a powerful learningscape for lifelong learning that is grounded in the learning practices that students acquire on campuses. That would be a major step toward creating a culture of learning for the 21st century.

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