By Chris Dede

A Seismic Shift in Epistemology

Web 2.0 is redefining what and how and with whom we learn. For example, in Wikipedia, "knowledge" is constructed by negotiating compromises among various points of view. This raises numerous questions: How do we in higher education help students understand the differences between facts, opinions, and values—and how do we help them appreciate the interrelationships that create "meaning"? In an epistemology based on collective agreement, what does it mean to be an "expert" with sufficient subject knowledge to teach a topic? Since almost any piece of information can now be found online in less than a minute (along with inaccurate and biased data), what core knowledge does every student need in order to prepare for twenty-first-century work and citizenship? Given these shifts driven by emerging interactive media, how might we reconceptualize "education"? I will not provide answers to these questions here. But I *will* suggest ways to think about the issues raised by the new, pervasive Internet tools.

The term *Web 2.0* reflects a shift in leading-edge applications on the World Wide Web, a shift from the presentation of material by website providers to the active co-construction of resources by communities of contributors. Whereas the twentieth-century web centered on developer-created material (e.g., informational websites) generated primarily by a small fraction of the Internet's users, Web 2.0 tools (e.g., Wikipedia) help large numbers of people build online communities for creativity, collaboration, and sharing. Interactive media that facilitate these Web 2.0 purposes include social bookmark-ing, wikis, podcasts, blogs, and software for personal expression and sharing (e.g., Facebook, YouTube, Twitter, Flickr). RSS feeds, sophisticated search engines, and similar harvesting tools help individuals find the needles they care about in a huge haystack of resources. And with web application programming interfaces, community-builders do not need specialized technical expertise to create new media.

At first glance, this evolution might seem to be simply a shift in agency, from publication by a few to collective contribution by many. But in fact, the implications of Web 2.0 go much deeper: the tacit epistemologies that underlie its activities differ dramatically from what I will call here the "Classical" perspective—the historic views of knowledge, expertise, and learning on which formal education is based. In the Classical perspective, "knowledge" consists of accurate interrelationships among facts, based on unbiased research that produces compelling evidence about systemic causes. For example, students learn that the shift in the color of the sky at various times of day is due to differential scattering of various wavelengths of light by gas molecules in Earth's atmosphere. In the Classical view of knowledge, there is only one correct, unambiguous interpretation of factual interrelationships. In Classical education, the content and skills that experts feel every person should know are presented as factual "truth" compiled in curriculum standards and assessed with high-stakes tests.

In this Classical perspective, experts with substantial credentials in academic fields and disciplines seek new knowledge through formal, evidence-based argumentation, using elaborate method-ologies to generate findings and interpretations. Premier reference sources, such as the *Encyclopedia Britannica,* and curricular materials, such as textbooks, embody "authenticated" knowledge as compiled by experts and transmitted to learners. Epistemologically, a single-right-answer is believed to underlie each phenomenon, even though experts may not yet have developed a full understanding of the systemic causes that provide an accurate interpretation of some situations.

In contrast, the Web 2.0 definition of "knowledge" is collective agreement about a description that may combine facts with other dimensions of human experience, such as opinions, values, and spiritual beliefs. As an illustration, the Wikipedia entry on "social effect of evolutionary theory" wrestles with constructing a point of view that most readers would consider reasonable, accurate, and unbiased without derogating religious precepts some might hold. In contrast to articles in the *Encyclopedia Britannica*, Wikipedia articles are either undisputed (tacitly considered accurate) or disputed (still resolving through collective argumentation), and Wikipedia articles cover topics that are not central to academic disciplines or to a wide audience (e.g., the cartoon dog Scooby-Doo).

The epistemology that leads to validity of knowledge in Web 2.0 media such as Wikipedia is peer-review from people seen, by the community of contributors, as having unbiased perspectives. Expertise involves understanding disputes in detail and proposing syntheses that are widely accepted by the community. Possible warrants for expertise are wide-ranging and may draw on education, experience, rhetorical flu-

ency, reputation, or perceived spiritual authority in articulating beliefs, values, and precepts.

Certainly, the contrasts between Classical knowledge and Web 2.0 knowledge are continua rather than dichotomies, and one can find web communities with epistemologies located between the sharp distinctions noted above. Still, an emerging shift to new types and ways of "knowing" is apparent and has important implications for learning and education. For example, formal schooling today remains based on the Classical view of knowledge, expertise, and learning:

■ Curriculum standards that guide the development of instructional resources (e.g., textbooks) and assessments (e.g., high-stakes tests) stem from disciplinary experts' determinations of what students should learn.
■ Presentational/assimilative pedagogies convey "truth" from content experts to students, who learn by listening.
■ Students who have mastered large amounts of factual material and are fluent in academic skills are believed to be well prepared for a successful, prosperous, fulfilling life.

Advocates for a Web 2.0 view of knowledge, expertise, and learning would challenge each of these three precepts of formal education. Many have documented politically motivated inaccuracies in textbooks, including biases against minorities and women, interpretations that privilege the perspective of the dominant subculture, and omissions of material about the contributions and interpretations of diverse groups, such as people of color. Experts may sometimes "speak truth to power," but too often "experts" are anointed, funded, and rewarded to provide rationales for politically expedient actions. Curriculum standards frequently reflect a hodgepodge of what students might need in order to become experts in the various disciplines rather than what they might need in order to assume roles as effective workers, citizens, and self-fulfilled people in the twenty-first-century global civilization. Presentational/assimilative pedagogies typically result in learning that is ephem-

eral, unmotivating, and unlikely to transfer into life situations.

In part because of the weaknesses noted above, many students who excel academically do not fare well later in life; the challenges of work, citizenship, and daily life do not resemble the multiple-choice items on high-stakes tests. But can a Web 2.0 view of knowledge, expertise, and learning overcome these problems? Based on the communal creation and sharing processes described above, an educational system oriented around Web 2.0 perspectives might posit the following:

■ Curriculum includes considerable variation from one community to another in what constitutes "socialization," "expertise," and "essential" knowledge, based on the types of content and skills valued within a particular geographic or online subculture.
■ Active learning pedagogies emphasize constructivist and situated teaching approaches that scaffold students' co-creation of knowledge.
■ Assessment is based on sophisticated performances showing students' participation in peer review.

Many of those now involved in formal education might see Web 2.0 perspectives both as a desirable evolution in pedagogy and assessment and as a troubling "Dark Ages" reversion in terms of content. Many communities have made poor decisions about what constitutes factual knowledge, such as when the House of the 1897 Indiana State Legislature unanimously recommended to the Senate a bill that would have established "a new mathematical truth" and changed the value of pi. Most decisions involve a complex mix of facts, beliefs, and values in which accuracy about the factual component is important. This is exemplified in policies about personal choices, such as whether people in an automobile should be forced to wear seatbelts or whether all pornography should be banned from the Internet. A detailed discussion of the potential impact of Web 2.0 epistemology on society is beyond the scope of this column; overall, like many other technology-driven shifts, Web 2.0 aids with some problems but exacerbates others and creates novel challenges.

At present, the response of most

educators is to ignore or dismiss this epistemological clash. Many faculty force students to turn off electronic devices in classrooms; instead, students could be using search tools to bring in current information and events related to the class discussion. Some faculty ban the use of online sources and deride the validity of any perspective that does not come from a disciplinary scholar. Many see social networking sites as useless or dangerous and do not recognize the diagnostic value of folksonomies for understanding the language and conceptual frameworks that students bring to the classroom. This refusal to acknowledge the weaknesses of the Classical perspective and the strengths of Web 2.0 epistemologies is as ill-advised as completely abandoning Classical epistemology for Web 2.0 meaning-making.

In considering this seismic shift in how students learn and what they know, I find the following analogy, of the contrast between three systems of governance, to be helpful:

1. In a hierarchical meritocracy, experts selected on the basis of intelligence run the country.
2. In a pure democracy, the entire population makes collective decisions about every aspect of governance.
3. In a representative democracy, a small group of people selected by the entire population makes decisions.

Any one of these three systems could work well if all participants were well informed, rational, and of good will—so the fundamental issue is which system works best given the human condition, which includes ignorance, irrationality, and the lust for power. The United States is a representative democracy, a synthesis that attempts to offset the weaknesses of the other two. Perhaps some similar synthesis about the nature of education can likewise bridge the Classical and the Web 2.0 views of knowledge, expertise, and learning—providing a smooth transition over this seismic shift in epistemology.

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