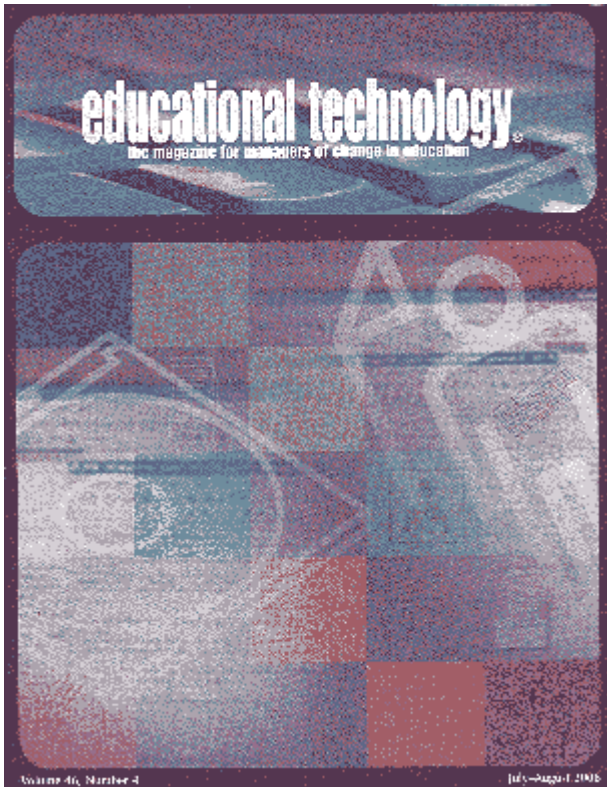


<http://goldenswamp.com/articles/edTech8.06/edTechP1.html>



WHY IS EDUCATION NOT IN THE UBIQUITOUS WEB WORLD PICTURE?

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By Judy Breck

In February 28, 1996, eighth grader Yinton Bantor presented his science project to his class at school. It was an interactive periodic table of chemical elements displayed on an Internet browser — a new tool that Yinton had coaxed out of the connecting digital world. At the time there were only a handful of periodic tables on the World Wide Web. In the months that followed his class presentation, Bantor's project took first place in his school science fair's brand new Computer Science/Mathematics category and won the "Navy/Marines Distinguished

Achievement Special Award" at the 40th Piedmont Region, Illinois Science Fair. These are commendable achievements for an eighth grader, but school recognition was just a beginning.

The [project Yinton Bantor put online a decade ago](#) is still there and he still hosts it and tinkers along with improvements. Two other period tables of elements, one from [Los Alamos National Laboratory](#) and another from the [University of Sheffield](#), along with Bantor's, nearly always are the top three periodic tables listed in a search for "periodic table of elements" on Google.

Order of learning that emerges from the chaos

The three websites are examples of the Internet's bountiful nuggets of free, open content for learning. This sort of open and free digital online content is the superior content for learning in the 21st century and is now available for any subject expected to be learned at school from pre-K-20. As the table of elements example illustrates, open content for learning is produced from many kinds of sources, in that example by a single individual, a government laboratory and a university.

What is a serious educator to make of subject content created by non-pedagogues bouncing around Google instead of coming up through the channels of vetting, publication and pre-selected Internet links that have been the tradition? A more timely question for that educator to confront is why the education/learning sector does not appear in the Ubiquitous Web World shown in Figure 1 on this page. Why are visionaries not including education in the *seamless, ubiquitous experience*?



-1- 표준연구센터 서비스융합표준연구팀 권중홍 ©2006 ETRI

Figure 1. This image is a slide dated March 2006 from a presentation prepared for the Next Generation Web Conference by Jonghong Jeon, a member of the research staff the ETRI, Protocol Engineering Center in South Korea. (Used with Mr. Jeon's permission.)

My answer to these questions, as this article explores, is that education practice today does little more than toy with the emerging innovation of digital connectivity—when, in fact, a new knowledge ecology it causes will have to become central to global learning for education as an institution to remain relevant into the future.

You may believe that education does not belong in the open chaos of the emerging Internet. But thinking that misses a wonderful new cognitive order of learning that emerges from the chaos of connected knowledge. Education should be right in there with the other major elements in the ubiquitous mix of the Web world. The openness of the content within the Internet is a change for learning that is as complete as the invention of phonetic symbols was for language. But that is getting ahead of our story.

If not in the picture, where?

If education is not in the Web world picture today, where is it? A review of the responses to the Internet that educators have made sheds some light. In the earlier days of the Internet it seemed natural for educators to think of using the new medium as a way of teaching at a distance. Distance learning implied reaching outward through digital networks to connect students to the campus instructors and resources where knowledge was traditionally offered and archived.

A second wave of educational response to the Internet was for publishers and campuses to import raw virtual knowledge for piecemeal packaging by the pedagogical experts into the usual education textbooks and curricula to be offered by their institutions (both on campus and by distant outreach to students). For example, many old time lesson plans would have a few suggested reference links to selected websites plugged in here and there.

Both of these older approaches — distant learning and link cherry picking — are now out-of-date ways of engaging knowledge content for the simple reason that both of them miss the benefits to knowledge of its online interconnectivity. Because what is known has moved online, primary access, aggregation and amplification of what we learn must occur online to be current and in timely context. The primary learning environment where that now occurs is the global virtual knowledge ecology.

The new global virtual knowledge ecology is the theme of my new book *109 IDEAS for virtual learning*.* My explanation there consists of three main points, followed by some commentary and action suggestions. The first main point is something of a rant about the delay the education establishment has managed in engaging the content in its new primary

location. The second describes the cascade of what is known by humankind into the Internet over the past decade. The third, and I think by far the most novel and interesting, is about the networking phenomena of the new ecology of open content for learning. In the remainder of this article, I will highlight the first two points briefly and then turn to the serendipitous new venue of knowledge aggregation that has formed our global, virtual ecology.

The Attitude of education

If, in fact, the Internet holds the primary power to deliver knowledge, why is that not being shouted from the education institutional rooftops? The answer, I think, is the institutional inertia of the education establishment.

A similar institution that may well have persisted by a similar inertia in ancient Egypt was the scribal caste. The training to master hieroglyphics to become a scribe was long and difficult. The scribal caste maintained its high status for thousands of years, during which some much less sophisticated neighbors in Phoenicia invented a simpler writing system where only 22 characters could be written to represent the sounds of language. Wikipedia explains what happened:

The Phoenicians are credited with developing the Phoenician alphabet. The Phoenician alphabet arose around 1400 BC from a need to communicate with the diverse languages of their trading partners that encircled the Mediterranean Sea. Their 22-letter alphabet based on sound was widely received, as opposed to the myriad of symbols in cuneiform or hieroglyphics prevalent at the time. The Phoenician alphabet served as the origin of the Hebrew, Aramaic, Greek, and Arabic alphabets. Phoenician traders disseminated the concept along Aegean trade routes, to coastal Anatolia (Turkey), the Minoan civilization of Crete, Mycenaean Greece, and throughout the Mediterranean. Classical Greeks remembered that the alphabet arrived in Greece with the mythical founder of Thebes, Cadmus. See [Wikipedia](#)

Although the Egyptian scribes imbedded some phonetic symbols into their much more complex writing system, they never made a fundamental shift to using the few sound symbols primarily. Why, for example, did the travels of Ramses II "the Great," who led broad Egyptian conquests through phonetic language lands in the 1200s BC, not lead to the importation of the phonetic system into Egypt?

Was the inertia that caused the scribes to persist in their old ways of writing protecting their high caste status? The answer is unknown. It is known that Egypt drifted from world dominance in the centuries during the rise of what became known as Western Civilization. Languages of the West used essentially phonetic alphabets. The Arabic language, which platformed the post-pharaonic golden ages of Islamic north Africa is, as well, a phonetic language. The simple key the scribes missed was the liberation from complex pictures of ideas to representing just sounds of words. The scribes, instead, mixed in a few phonetic symbols with their old way of writing based on pictures. The echo of a few Internet links mixed into old curricula is eerie.

The simple key the educators have not grasped is the connectivity among nuggets of open Internet content that forms context and lets fresh thoughts emerge dynamically from on the fly connections. Until open (connectible) content is used in schools in this way, education will not take its place in the *seamless ubiquitous experience* of the Web world.

So far, like ancient Egyptian scribes, establishment education continues only to toy with tokens of the great change. The readers of this article are at the center of deciding whether that will continue.

The new Access to knowledge

I will not linger long here because this is the point at which most educationist discussion — and thinking! — about the new virtual status of academic knowledge muddles and stops.

There is an assumption — which ranges from tacit to cavalier — that online is essentially another place to access some learning subject content. That assumption lets educators who make it dismiss Internet learning as "just another means of access to knowledge." That dismissal is usually reinforced by comments along the lines of "I prefer books" or "we must not deny teachers to our children." Both lines of dismissal are red herrings, and in this small space do not merit pursuit.

The assumption is factually wrong. Access to a high and increasing percentage of the

freshest and most complete knowledge can, in fact, only be achieved openly online. The latest versions of genome sequences are only there. New scientific knowledge routinely first appears online and there in context with related ideas. The same is true for news and historical discoveries. Increasingly, literature is arriving on the Internet before it is distributed in print. Classic literature is richly interfaced online with interactive comparative tools not possible in print. Music and other artist work will soon pour forth through widened broadband with stunning richness. Blogging has made the Internet the first choice medium to interface more and more opinion.

Another specious twist educators have used to block student online research is the dismissal of Internet knowledge as too easy to get, thereby dumbing down learning and stopping deep inquiry. Easier than what? Easier than a few textbook paragraphs disembodied from context beyond the classroom? Easier than investigation of myriad printed resources of the typical 21st century school library? In the late 1990s finding quality links could be daunting, but search engines today are certainly the most effective way to find the finest knowledge resource, short only of asking Socrates in person.

Although the access to the best knowledge is a forceful, and I think irrefutable, argument for making online knowledge resources primary for education, there is a much more vibrant and elegant reason for doing so than access — than using open content just because the stuff is there. The scribes worked a few phonetic symbols into the hieroglyphics but missed the liberation of a sound-based system. Just accessing content from the Internet misses the cognitive power of network knowledge aggregation.

The new *Aggregation of open content for learning*

Open is a trendy word in the Internet world and refers to several matters. *Open source* pertains to software, and not to the content that the software may platform. *Open networks* are networks with certain unimpeded functional technical connectivity. *Open Internet*, as the term is used here, is the network outside the firewalls of intranets of universities, subscription journals, for-profit education sources and other closed off digital locations.

Open content for learning is not school administrative content like attendance records, and it is not communication among faculty and students such as email and managing distance classes. The content that is open is the nuggets of knowledge itself: algebra, mitosis, Plato and tables of elements.

Open content for learning, which is the substance of the global virtual knowledge ecology, is free, reusable, connectable learning subject content within the open Internet. It is easy to assume open content is applauded because it is altruistic for content creators to let what they produce be used charitably, for free. A much more fundamental advantage is the openness in the sense of being connectable to all other open content. Any content that is closed in the connective sense will atrophy in a withering that will ultimately punish those who sought proprietary profit.

The source of open content for learning's revolutionary importance for education is the connectivity potential that can be seen in the Ubiquitous Web World in Figure 1. Within each of the sectors — automotive service, mobile, office, shop, outdoor and home — any and every element can connect to any and every other element. Not only is connectivity open within each sector; connectivity exists openly among the sectors. The mobile device can be used to shop and the outdoor connectivity can locate your automobile. It is this connectivity that creates the *seamless, ubiquitous experience*.

The global virtual knowledge ecology — the online environment where open content for learning abounds — looks just like the other sectors in Figure 1 except the content is different. The open content of the ecology is subjects like mathematics, physics, history and literature. The interconnectivity within and among the subjects is what is new. Like the phonetics were to the ancient world that could only write in pictures, the open connectivity is a new intellectual mechanism. I would argue that this shift of knowledge into a virtual ecology is at least as epochal as the change that occurred post-Gutenberg to printed content. Rand Spiro has described his columns. Perhaps that discussion can continue in these pages in future issues.

Within the global virtually knowledge ecology, the learning engages two types of network connectivity. First, there are static networks which are the Web pages containing the open learning content and the links among those pages. Second is the dynamic networking that emerges as students click connecting content in patterns of research and thought. Figure 1 calls what it presents a *seamless, ubiquitous experience* which describes the experience of studying a subject within open content for learning. Everything is connected and those connections are, for the subject matter of the pages, among related

ideas.

Traditional grade level curricula is aggressively disconnective. Students might learn about cell structure in the fourth grade, mitosis in the sixth grade and DNA chemistry as high school juniors. In the open online virtual ecology, cell structure, mitosis and DNA richly interconnect so that precocious students can move through cognitive relationships to more complex ideas and kids who are unclear on a subject can move through cognitive relationships to simpler ideas and linger there until they understand. Traditional pedagogy chops ideas into separate units; the virtual ecology formed by open content for learning interrelates ideas in context and allows learners to explore and learn freshly connecting meaning dynamically.

Grateful digital natives

What would it take for established education to embrace the global virtual knowledge ecology so that learning will take its place in the Ubiquitous Web World? In terms of our historical example, it would mean education would abandon hieroglyphics and adopt phonetics. Printed textbooks, curricula with its parts related by grade level and standards would no longer be used, and every student's connection to knowledge would be through his or her personal mobile Internet device. Students would connect their knowledge education directly into the cognitive relationships within the open content ecology. Their learning would become a *seamless, ubiquitous cognitive experience* within the Web world that now awaits education.

The inertia of established education has diminished little over the ten years during which the other sectors of the Ubiquitous Web World have morphed into the *seamless ubiquitous experience*. There has been some engagement of the global virtual knowledge ecology within some universities and colleges, especially by small and specialized academic disciplines. But traditional curricula and textbooks march on to campuses with a barely disturbed cadence year after year.

At the K-12 levels little has changed even though those classrooms are now populated by students who were born into the Internet age.

The Egyptian scribes show us that it is possible to go on doing something the old way when a new way is right there in your midst. That has been happening for a decade with the response of established education to Internet open content for learning. The scribes showed non action can continue for a very long time. The readers of this magazine are among those who can follow the scribes or can act on the emergence of open content.

There are people within the education world who agree with what I have been writing. To them, and any other reader who is interested in the course of action I suggest, here it is: On a subjective level, it would mean for the readers of *Educational Technology* to become adopters of (not adapters to) the ecology. That means focusing your creativity and advocacy concerning the use of knowledge in learning into the Internet. If you are doing that already, the digital natives in your education venue are fortunate and undoubtedly grateful for the cool friend that you are.

*Breck, Judy. (2006), foreword John Seely Brown. *109 Ideas for virtual learning: how open content will help close the digital divide*. Lanham, MD: Rowman & Littlefield Education.

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