Innovating the 21st-Century University: It's Time!

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Encyclopedias, newspapers, and record labels have a lot in common. They all are in the business of producing content. They recruit, manage, and compensate capable producers. Their products are composed of atoms — books, papers, CDs, DVDs — and are costly to create and distribute. Their products are proprietary, and they take legal action against those who infringe their intellectual property. Because they create unique value, their customers pay them, and they have revenue. Their business is possible because of scarcity: quality news, information, knowledge, learning, art.

Yet today the businesses of encyclopedias, newspapers, and record labels are in various stages of collapse. They all have lost their monopolies on the creation and delivery of content. They are being decimated by the digital age that brought abundance, mass participation, the democratization of production, the rise of new digital delivery channels, the infeasibility of old notions of intellectual property, and completely new business models — all enabled by the Internet. The allegedly unassailable attributes of their age-old businesses have been erased faster than you can tap "delete" on your iPhone.

Come to think of it, encyclopedias, newspapers, and record labels are a lot like colleges and universities as well. For fifteen years, we've been arguing that the digital revolution will challenge many fundamental aspects of the

university.[1] We have not been alone. In 1997, none other than Peter Drucker predicted that big university campuses would be "relics" within thirty years.[2]

Flash forward to today, and you'd be reasonable to think that we have been quite wrong. College and university attendance is at an all-time high. The number of students enrolling in degree-granting institutions rose more than 118 percent from 1969-70 to 2005-6, while the percentage of 25- to 29-year-old Americans with a college degree rose from 16.4 to 28.4 in this same time.[3] The competition to get into the greatest universities has never been fiercer. Campuses are thriving, and attendance at college football games is holding strong. At first blush, the university seems to be in greater demand than ever.

Yet there are troubling indicators that the picture is not so rosy. And we're not talking just about the university endowment reductions caused by the current financial meltdown. A dismal 58 percent of entering freshmen actually graduate from the same college within six years.[4] More and more students are questioning the "bang for the buck" as college tuition has risen in cost more than any other good or service since 1990, leaving students with $714 billion in outstanding student-loan debt in the United States alone.[5] Students around the world are increasingly choosing alternative models of higher education. In 2007, nearly 20 percent of college students in the United States — some 3.9 million — took an online course, according to the Sloan Consortium, and their numbers are increasing. The University of Phoenix now enrolls more than 200,000 annually.[6] Annual enrollment in the University of Phoenix online MBA program is 16,000,[7] compared with 900 at Harvard. Given the huge explosion in MBA courses offered online, many of which are from Asia, it's a fair guess to say that most MBA degrees today are taken online. Yet the proportion of institutions declaring that online education is critical to their long-term strategy has actually declined.[8] There are more subtle indicators as well. Students and faculty alike are refusing to pay for academic periodicals and are file-swapping like it's 1999.[9] For many of the smartest students, it's fashionable to try to get an A without going to any lectures — meaning that the cream of the crop is beginning to boycott the basic model of pedagogy.

Universities are losing their grip on higher learning as the Internet is, inexorably, becoming the dominant infrastructure for knowledge — both as a container and as a global platform for knowledge exchange between people — and as a new generation of students requires a very different model of higher education. Many people have written about this topic, in *EDUCAUSE Review* and other publications. The transformation of the university is not just a good idea. It is an imperative, and evidence is mounting that the consequences of further delay may be dire.

Now is also a time of great opportunity, and there is a steady stream of proposals for change. Some say the web enables distance learning and the elimination of campuses. Others argue that we need more technology in higher education or that colleges should be opened up and be made free to all. There are renewed calls to abolish tenure and even to replace traditional departments with a new set of problem-focused disciplines.[10]

The trouble is that most of the ideas being bantered about don't address the fundamental problems with the university or show a way forward. Rather, change is required in two vast and interwoven domains that permeate the deep structures and operating model of the university: (1) the value created for the main customers of the university (the students); and (2) the model of production for how that value is created. First we need to toss out the old industrial model of pedagogy (how learning is accomplished) and replace it with a new model called collaborative learning. Second we need an entirely new *modus operandi* for how the subject matter, course materials, texts, written and spoken word, and other media (the content of higher education) are created.

We believe that if the university opens up and embraces *collaborative learning* and *collaborative knowledge production*, it has a chance of surviving and even thriving in the networked, global economy.

Collaborative Learning: Reinventing Pedagogy

The current model of pedagogy, which is at the heart of the modern university, is becoming obsolete. In the industrial model of student mass production, the teacher is the broadcaster. A *broadcast* is, by definition, the transmission of information from transmitter to receiver in a one-way, linear fashion. Broadcast learning may have been appropriate for a previous economy and generation, but increasingly it is failing to meet the needs for a new generation of students who are about to enter the global knowledge economy.

The notion of collaborative learning has been around for a long time, of course, predating the Internet. But it had a very limited scope. In 1992, Barbara Leigh Smith and Jean T. MacGregor argued for a shift away from the typical teacher-centered or lecture-centered milieu in college classrooms: "In collaborative classrooms, the

lecturing/listening/note-taking process may not disappear entirely, but it lives alongside other processes that are based in students' discussion and active work with the course material." Their spirit was right: "Teachers who use collaborative learning approaches tend to think of themselves less as expert transmitters of knowledge to students, and more as expert designers of intellectual experiences for students — as coaches or mid-wives of a more emergent learning process."[11]

The bottom line was simple: professors should spend more time in discussion with students. As the educator Jeff Golub pointed out in 1988: "Collaborative learning has as its main feature a structure that allows for student talk: students are supposed to talk with each other . . . and it is in this talking that much of the learning occurs."[12]

With technology, it is now possible to embrace new collaboration models that change the paradigm in more fundamental ways. But this pedagogical change is not about technology per se. This is not about distance learning. This is not about students being able to access lectures by some of the world's leading professors from free online sites like Academic Earth. Rather, this represents a change in the relationship between students and teachers in the learning process.

Collaborative Learning Is Social Learning.

In a 2008 article in *EDUCAUSE Review*, John Seely Brown and Richard P. Adler wrote: "Our *understanding* of content is socially constructed through conversations about that content and through grounded interactions, especially with others, around problems or actions."[13] They argued that that we need to focus not on *what* we are learning but on *how* we are learning. Today, universities embrace the Cartesian view of learning. "The Cartesian perspective assumes that knowledge is a kind of substance and that pedagogy concerns the best way to transfer this substance from teachers to students. By contrast, instead of starting from the Cartesian premise of '*I think, therefore I am,*' . . . the social view of learning says, '*We participate, therefore we are.*'"

Research shows that mutual exploration, group problem solving, and collective meaning-making produce better learning outcomes and understanding overall. Brown and Adler cite a study by Richard J. Light, of the Harvard Graduate School of Education: "Light discovered that one of the strongest determinants of students' success in higher education . . . was their ability to form or participate in small study groups. Students who studied in groups, even only once a week, were more engaged in their studies, were better prepared for class, and learned significantly more than students who worked on their own." It appears that when students get engaged, they take a greater interest in and responsibility for their own learning.

Brown and Adler argue that the web provides powerful new tools and environments for collaborative learning — everything from wikis to virtual worlds like Second Life. However, the web enables social learning in other ways as well. First, interactive computer-based courseware can free up professors from lecturing and allow them time to collaborate with students. Second, the web enables students to collaborate with others independent of time and geography. Finally, the web represents a new mode of production for knowledge, and that changes just about everything regarding how the "content" of college and university courses are created.

Collaborative Learning Embraces Discovery.

As Seymour Papert, one of the world's foremost experts on how technology can provide new ways to learn, put it: "The scandal of education is that every time you teach something, you deprive a [student] of the pleasure and benefit of discovery."[14] Students need to integrate new information with the information they already have — to "construct" new knowledge structures and meaning.

Today, every college and university student has at his or her fingertips the most powerful tool for discovery, for constructing knowledge, and for learning. Like Guttenberg's printing press, the web democratizes learning. Rather than seeing the web as a threat to the old order, universities should embrace its potential and take discovery learning to the next step.

Collaborative Learning Is Student-Focused and Self-Paced.

When educators shift from mass production to mass customization of students' learning, outcomes improve. Indeed, some leading educators are calling for this kind of massive change. Richard Sweeney, university librarian at the New Jersey Institute of Technology, says that the education model has to change to suit this generation of students. Smart but impatient, today's students like to collaborate, and they reject one-way lectures. Although some educators view making this change as pandering to a generation, Sweeney is firm: "They want to learn, but they want to learn only what they have to learn, and they want to learn it in a style that is best for them."[15]

There are shining examples of collaborative learning. Maria Terrell, who teaches calculus at Cornell University, used a collaborative method that was part of the GoodQuestions Project, funded by the National Science Foundation (http://www.math.cornell.edu/~GoodQuestions/). One project strategy, called "just-in-time teaching," combines the benefits of web-based assignments with an active-learner classroom where courses are customized to the particular needs of the class. Warm-up questions, written by the students, are typically due a few hours before class, giving the teacher an opportunity to adjust the lesson "just in time," so that classroom time can be focused on the parts of the assignments that students struggled with. This technique produces real results. An evaluation study of 350 Cornell students found that those who were asked "deep questions" (questions that elicit higher-order thinking) with frequent peer discussion scored noticeably higher on their math exams than students who were not asked deep questions or who had little to no chance for peer discussion.

Indeed, the research evidence dates back years. In a 1997 article published in *Educom Review*, the authors wrote: "Compared with students enrolled in conventionally taught courses, students who are provided regular access to well-crafted computer-mediated instructional (CMI) materials generally achieve higher scores on summary examinations (improved learner effectiveness), learn their lessons in less time (increased learner efficiency), like their classes more (greater learner engagement), and develop more positive attitudes toward the discipline under inquiry (enhanced learner interest)."[16]

Collaborative Knowledge Production: Opening Up the University

Universities need an entirely new *modus operandi* for how the content of higher education is created. The university needs to open up, embrace collaborative knowledge production, and break down the walls that exist among institutions of higher education and between those institutions and the rest of the world.

To do so, universities require deep structural changes — and soon. More than three years ago, Charles M. Vest published "Open Content and the Emerging Global Meta-University" in *EDUCAUSE Review*. In his concluding paragraph, Vest offered a tantalizing vision: "My view is that in the open-access movement, we are seeing the early emergence of a meta-university — a transcendent, accessible, empowering, dynamic, communally constructed framework of open materials and platforms on which much of higher education worldwide can be constructed or enhanced. The Internet and the Web will provide the communication infrastructure, and the open-access movement and its derivatives will provide much of the knowledge and information infrastructure." Vest wrote that the meta-university "will speed the propagation of high-quality education and scholarship. . . . The emerging meta-university, built on the power and ubiquity of the Web and launched by the open courseware movement, will give teachers and learners everywhere the ability to access and share teaching materials, scholarly publications, scientific works in progress, teleoperation of experiments, and worldwide collaborations, thereby achieving economic efficiencies and raising the quality of education through a noble and global endeavor."[17]

We like the direction of Vest's thinking. For universities to succeed, we believe they need to cooperate to launch what we call the Global Network for Higher Learning. This network would have five stages or levels: (1) course content exchange; (2) course content collaboration; (3) course content co-innovation; (4) knowledge co-creation; and (5) collaborative learning connection.

Level 1: Course Content Exchange

The lowest level in the Global Network for Higher Learning is simple content exchange: colleges and universities post their educational materials online, putting into the commons what would have traditionally been viewed as cherished and closely held intellectual property. MIT pioneered the concept with its OpenCourseWare initiative (http://ocw.mit.edu), and today more than 200 institutions of higher learning have followed suit.

In addition to helping students study, materials from OCW and similar projects are being reused by teachers around the world. Consider what a change this offers to a typical professor's life. Before, faculty were isolated in the content creation process. Imagine you were a psychology professor assigned to a second-year course on behavioral psychology. You chose a textbook written by an isolated author and published by a traditional publishing company. You created your own course outline and then painstakingly went through each module, filling in the blanks and slowly building up the lecture presentation materials, reading lists, and so on. You developed material such as essay topics, tests, and exams. Sometimes you could rely on the work of other professors, but in general this was discouraged as being unoriginal. You might run your course idea by a few colleagues, but the only people who really benefited from all your tough and diligent hard work were the students who took your course. Once you had the whole package ready, you upgraded it every year or even every semester (if you were a good professor),

adding new research and examples and discarding ideas that no longer worked. If you were very conscientious and wanted to develop good discussions and have students work in teams on problems, you needed to invent a framework, a methodology, and of course, the content. Heaven forbid if you wanted to use multimedia in your lectures and tutorials. And if you decided to create computer-based learning modules for certain sections of the course, the effort and cost required for finding the right technology and hiring programmers to develop the courseware would likely be prohibitive. OCW and other course content exchange initiatives solve the problem of isolation.

Level 2: Course Content Collaboration

Sharing materials is an important first step. But the course materials available freely online could also be constructed as a platform for users to collaborate and share experiences with the materials. As the Global Network for Higher Learning gains momentum, the volume of material being posted will become overwhelming, comprising not only text but also lecture notes, assignments, exams, videos, podcasts, and so on.

Much of the logistics of true collaboration should be built into the platform itself. During the academic year, for example, professors could record online the results of tests gauging the students' retention and understanding of the material taught. Professors could compare the effectiveness of the different learning materials. By pooling this data, professors around the world could determine the best material for their own particular use.

What higher education desperately needs is a social network — a Facebook for faculty. But it shouldn't be a standalone application; it should be integral to the Global Network for Higher Learning. One such project, part of the Portuguese education system, is creating an online community of teachers across the country. The system will use collaborative methods for creating, managing, sharing, and deploying curricula and for tracking the results via a sophisticated learning management system. There are many benefits, including much greater collaboration among teachers and a more consistent measurement of students' progress.

Higher education also needs to hold some academic jams. In September 2006, IBM undertook an experiment in collaborative and democratic decision-making that set a bold new course for the company. Employees from more than 160 countries — along with their clients, business partners, and even family members — were invited to join in a massive, wide-open brainstorming session called the InnovationJam. Over the course of two 72-hour sessions, IBM engaged more than 100,000 participants in a series of moderated online discussions. Their combined insights surfaced breakthrough innovations.

A little effort can yield large returns. For example, in early 2009, Don Tapscott was part of the Net Gen Education Challenge. He asked students to submit a video explaining "How can we change the learning experience?" Students from countries such as Australia, India, Qatar, and the United States collaborated via the Internet, writing a wiki report, creating videos, and discussing trends on a network that had been set up for the project. They put forth dozens of tremendous ideas.

Level 3: Course Content Co-Innovation

The next level in the Global Network for Higher Learning goes beyond sharing and collaborating on course content to actually co-creating content. Professors can co-innovate new teaching material based on work already available and can then make this newly synthesized content available to the world.

Used properly, wikis are tremendously powerful tools to collaborate and co-innovate new content. Tapscott wrote the foreword for a book called *We Are Smarter Than Me* (2008). The book, a best-seller, was written by Barry Libert, Jon Spector, and more than 4,000 people who contributed to the book's wiki. If a global collaboration can write a book, surely one could be used to create a university course. A professor could operate a wiki with other teachers. Or a professor could use a wiki with his or her students, thereby co-innovating course content with the students themselves. Rather than simply being the recipients of the professor's knowledge, the students co-create the knowledge on their own, which has been shown to be one of the most effective methods of learning.

Taking this a step further, the Wikimedia Foundation organized Wikiversity (http://en.wikiversity.org/wiki/Wikiversity:Main_Page). Wikiversity participants set out what they want to learn, and the Wikiversity community collaborates to develop learning activities and projects to accommodate those goals. Imagine what a platform like Wikiversity could do if it had the muscle of the world's universities behind it. These are the sorts of projects that should be invigorating the worldwide academic community.[18]

For the ultimate course, teachers need more than course materials, of course. They need course software enabling

students to interact with the content, supporting small group discussions, facilitating testing, and so on. Such software can be developed using the tried-and-true techniques and tools of the open-source software movement. If thousands of people can develop the most sophisticated computer operating system in the world (Linux), they can certainly develop tools for individual courses.

There are many well-known open-source software projects under way in the academic community. One of the most popular is Sakai. Built by educators for educators, Sakai facilitates collaboration in and across courses, research, projects, administrative processes, and multi-disciplinary and multi-institution efforts. Creation of the software itself is a product of content co-innovation, and the product in turn helps co-innovate content that can be taught to students. More such projects are needed.

Level 4: Knowledge Co-Creation

In the next level of the Global Network for Higher Learning, scholars move beyond course materials and collaborate to co-create all subject-matter-appropriate knowledge.

Knowledge from university-based research should be a public good. This is not a radical idea — it is the rationale, dating back one hundred years, for government subsidies to libraries for purchasing academic journals. But today a "journal" should simply be an instance in time of research output, developed collaboratively on the global network by appropriate researchers. In addition, there should be no "journal," let alone one owned by a corporation, that expropriates the result of research for its own profit.

Universities and academics need to embrace the Global Network for Higher Learning as the platform for collaboration in research, creation, communication, and exploitation of new knowledge. With the Global Network for Higher Learning, the current problems of academic journals would go away. The traditional peer-reviewed academic journals would adopt a much more dynamic online process. This needn't obviate peer review, but the process could be accelerated to Internet-time speed. Students could watch this process unfold, giving them a much more compelling relationship with their discipline.

In October 2009, the National Center for Research Resources awarded a $12.2 million grant to the University of Florida and collaborators at Cornell University, Indiana University, Weill Cornell Medical College, Washington University in St. Louis, the Scripps Research Institute, and the Ponce School of Medicine in Puerto Rico. Over the next two years, researchers will put in place a new type of networking system at the seven schools. To begin, each institution will establish its own network of researchers. Librarians will then implement the software and will offer support to researchers once they begin using it. Within two years, the team hopes to have the network connected across the country. If it proves successful, the goal will be to eventually link researchers across the world to like-minded peers and potential collaborators.[19]

Level 5: Collaborative Learning Connection

How can we network the world's higher education institutions to go beyond the production of knowledge to the consumption of that knowledge by learners? The digital world, which has trained young minds to inquire and collaborate, is challenging not only the lecture-driven teaching traditions of the university but the very notion of a walled-in institution that excludes large numbers of people. Why not allow a brilliant ninth-grade student to take first-year college math, without abandoning the social life of his or her high school? Why not encourage a foreign student majoring in math to take a high school English course? Why is the university the unit of measurement when it comes to branding a degree? In fact, in a networked world, why should a student have to assign his or her "enrollment" to a given institution, akin to declaring loyalty to some feudal fiefdom?

Luis M. Proenza, president of the University of Akron, asks exactly these questions, challenging the notion of the ivory tower itself as the fundamental unit of higher education. True, students can obviously learn from intellectuals around the world through books or via the Internet. Yet in a digital world, why shouldn't a student be able to take a course from a professor at another university? Proenza thinks colleges and universities should use the Internet to create a global center of excellence. In other words, an institution should choose its best courses and link them with the best at a handful of other institutions around the world to create an unquestionably best-in-class program for students. Students would get to learn from the world's greatest minds in their area of interest — either in the physical classroom or online. This global academy would also be open to anyone online.[20]

In this vision, a student receives a custom learning experience from a dozen universities. The student enrolls in his or her primary college and is assigned a "knowledge creator," who works with the student to customize a learning experience, the journey, and outcomes. The student might enroll in the primary college in Oregon and register to

take a behavioral psychology course from Stanford University and a medieval history course from Cambridge. For these students, the collective syllabi of the world form their menu for higher education. Yet the opportunity goes beyond simply mixing and matching courses. Next-generation faculty will create a context whereby students from around the world can participate in online discussions, forums, and wikis to discover, learn, and produce knowledge as networked individuals and collectively.

Proenza is right. The 21st-century university will be a network and an ecosystem — not a tower — and educators need to get going on the partnerships to make this work for students.

Reinvention or Atrophy

The combination of the Internet, the new generation of learners, the demands of the global knowledge economy, and the shock of the current economic crisis is creating a perfect storm for universities, and the storm warnings are everywhere. The seemingly hyperbolic and apocryphal predictions of Peter Drucker and others from years ago now seem less shrill, even prescient.

Some institutions and some faculty are more vulnerable than others. Many liberal arts colleges with big endowments and small class sizes are doing a wonderful job of stimulating young minds because students can have more of a customized, collaborative experience. A son of one of the authors graduated from Amherst College, a small undergraduate university with a student-teacher ratio of 8-1. His teachers included a Pulitzer Prize winner, a Nobel Laureate, and professors whose primary focus is student learning. But the same cannot be said of many of the large universities that regard their prime role to be serving as a center for research, with teaching being an inconvenient afterthought and with class sizes so large that the only way to "teach" is through lectures.

As the model of pedagogy is challenged, inevitably the revenue model of universities will be too. If all that the large research universities have to offer to students are lectures that students can get online for free, from other professors, why should those students pay the tuition fees, especially if third-party testers will provide certificates, diplomas, and even degrees? If institutions want to survive the arrival of free, university-level education online, they need to change the way professors and students interact on campus.

Many will argue: "But what about credentials? As long as the universities can grant degrees, their supremacy will never be challenged." This is myopic thinking. The value of a credential and even the prestige of a university are rooted in its effectiveness as a learning institution. If these institutions are shown to be inferior to alternative learning environments, their capacity to credential will surely diminish. How much longer will, say, a Harvard undergraduate degree, taught mostly through lectures by teaching assistants in large classes, be able to compete in status with the small class size of liberal arts colleges or the superior delivery systems that harness the new models of learning?

Others will argue: "What about the campus experience? That will never be replaced." Again, if campuses are seen as places where learning is inferior to other models or, worse, as places where learning is restricted and stifled, the role of the campus experience will be undermined as well. The university is too costly to survive as simply an extended summer camp.[21] Conversely, campuses that embrace the new models will become more effective learning environments and more desirable places. Even things as simple as online lectures do not undermine the value of on-campus education. Video lectures enhance education by allowing students to absorb course content online — whenever is convenient for them — and then get together to tinker, invent new things, or discuss the material. The OCW experience has shown MIT that the real value of what it offers is not the lecture per se but rather the whole package — the content tied to the human learning experience on campus, plus the certification. Colleges and universities cannot survive on lectures alone.

How, then, can universities reinvent themselves, rather than atrophy? What are the steps to be taken?

Adopt Collaborative Learning As the Core Model of Pedagogy.

Professors who want to remain relevant will have to abandon the traditional lecture and start listening to and conversing with students — shifting from a broadcast style to an interactive one. In doing so, they can free themselves to be curators of learning — encouraging students to collaborate among themselves and with others outside the university. Professors should encourage students to discover for themselves and to engage in critical thinking instead of simply memorizing the professor's store of information. Finally, professors need to tailor the style of education to their students' individual learning styles.

The Internet and the new digital platforms for learning are critical to all of this, especially given the high student-

faculty ratio in many universities. But most faculty do not have the resources to develop the required courseware. This must be co-innovated globally through new partnerships.

Collaboratively Produce Higher Education Content and Knowledge by Launching the Global Network for Higher Learning.

Right now, universities around the world are embracing level one — course content exchange — of the Global Network for Higher Learning. But they need to move further in the next four levels.

As part of this, the academic journal should be disintermediated and the textbook industry eliminated. In fact, the word *textbook* is an oxymoron today. Content should be multimedia — not just text. Content should be networked and hyperlinked bits — not atoms. Moreover, interactive courseware — not separate "books" — should be used to present this content to students, constituting a platform for every subject, across disciplines, among institutions, and around the world. The textbook industry will never reinvent itself, however, since legacy cultures and business models die hard. It will be up to scholars and students to do this collectively.

Build New Revenue and Collaboration Models between Higher Education Institutions to Break Down the Silos between Them.

How do we transform the university from a standalone ivory tower into a node on a global network? To achieve a Global Network for Higher Learning, where students can benefit from the capability of any university in the world, we will need to build a collaborative revenue model and a new structure of transfer pricing. In this structure, students would enroll with their "primary" institution, which would handle the disbursement of their tuition fees depending on what other courses they study. The value of, say, a second-year psychology course at Stanford would be determined by market forces, not by some central bureaucracy.

Change Incentive Systems to Reward Teaching, Not Just Research.

Why are universities judged by the number of students they exclude or by how much they spend? Why aren't they judged by how well they teach and at what price?

If universities are to become institutions whose primary goal is the learning by students, not faculty, then the incentive systems will need to change. Tenure should be granted for teaching excellence and not just for a publishing record.

How can this be done? Student input is important. Websites such as RateMyProfessors.com can provide helpful input. Though they are not simply a popularity contest, as some suggest, they also cannot serve as the only basis for rewarding professors. Peer review can provide helpful input as well, and administrators often have a view on teaching effectiveness. In addition, measures of economic success may make sense. If a professor at Stanford has an enormously popular psychology course that is subscribed to by thousands of students from around the world, shouldn't he or she share in the revenue created for Stanford? Such measures would be insufficient alone, however, since they reorient professors to be profit centers rather than learning curators. Ultimately, we will need more objective measures centered on students' learning performance.

Build the Infrastructure for 21st-Century Higher Education.

While governments are investing in "shovel-ready infrastructure" to turn around the current economic crisis and global recession, a new kind of infrastructure is required to realize the University 2.0. Some of this is technological. Initiatives like the Wikiversity from the Wikimedia Foundation represent a good start in creating a national and global platform for all scholars and learners to build the content required. But we need more entrepreneurs building interactive courseware for all disciplines and categories of human knowledge. Governments could help by investing in networks to build the access and broadband capacity required to close the global digital divide. The world needs a "Digital Marshall Plan."

Governments should terminate their subsidization of academic journals in libraries and shift funding to building the digital infrastructure. David W. Lewis, dean of the University Library at Indiana University-Purdue University Indianapolis (IUPUI), argues that scholarly communication is a public good and, as such, requires subsidy. But because subsidies have been routed through libraries, corporate publishers figured out that science journals had inelastic prices and began to suck the subsidy out of the system. "The economics of the internet turn all of this on its head," Lewis says. "The most effective way to use the subsidy is to support open access, which funds the infrastructure and gives away the works to everyone." Lewis argues that this will cause a battle: "There are many established institutions who get left out of this picture, libraries for one, and also much of what academic publishers

do. These institutions are doing what established institutions always do — stay alive."[22]

Universities in the United States typically lack the broadband infrastructure necessary for everywhere multimedia access and use. They also need to invest in building the applications and courseware for collaborative learning.

Conclusion

So why haven't these changes happened yet? Where is the University 2.0? "It's the legacy of established human and educational infrastructure," says Proenza. The analogy is not the newspaper business, which has been weakened by the distribution of knowledge on the Internet, he notes. "We're more like health care. We're challenged by obstructive, non-market-based business models. We're also burdened by a sense that doctor knows best, or professor knows best."[23]

The Industrial Age model of education is hard to change. New paradigms cause dislocation, disruption, confusion, uncertainty. They are nearly always received with coolness or hostility. Vested interests fight change. And leaders of old paradigms are often the last to embrace the new.

A powerful force to change the university is the students. And sparks are flying today. A huge generational clash is emerging in our institutions. The critiques of the university from fifteen years ago were ideas in waiting — waiting for the new web and for a new generation of students who could effectively challenge the old model.

Changing the model of pedagogy and the model of knowledge production is crucial for the survival of the university. If students turn away from a traditional university education, this will erode the value of the credentials that universities award, along with the position of these institutions as centers of learning and research and as campuses where young people get a chance to "grow up." The Global Network for Higher Learning is not a pipe dream. Leading scholars are beginning to implement elements of all five of its levels today. They know that universities and their faculties cannot continue to operate as separate ivory towers but must work toward collaborative learning and collaborative knowledge production. It's time!

Notes

1. Don Tapscott, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence* (New York: McGraw-Hill, 1996).

2. Robert Lenzner and Stephen S. Johnson, "Peter Drucker: Seeing Things As They Really Are," *Forbes.com*, March 10, 1997, <http://www.forbes.com/forbes/1997/0310/5905122a.html>.

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It's not how many it's how you interact.

SUBMITTED BY SHARON TONNER (UNIVERSITY OF DUNDEE) ON APRIL 7, 2010 - 12:31PM.

 I am in agreement with Tapscott in that is is how we use technology is the key to interaction not always just 'the technology'. As a primary school teacher and now a lecturer in technology to student primary teachers, the 'sage on the stage' method of delivery was taking over my teaching style whilst in the lecture scenario. This style of pedagogy went against my trained model of teaching where student engagement, collaboration, active learning and meeting children's needs were the key areas that I focused on. At University, this style of teaching was becoming one to many where I would meet the needs of few through the content I thought all should acquire.

Over the past year my pedagogy has changed dramatically where engagement, interaction and meeting students' needs are at the heart of my pedagogy. The use of Polleverywhere™ is a fantastic tool to let student's voices be heard through their handheld devices. Wallwisher™ provides another avenue to engage students in discussion and share their views with others. Google Docs™ allows true collaboration and sharing of learning. What was a one way street is now an every changing highway where interaction, questioning and responding enable lectures to meet the needs of our 'fingertip knowledge' consumers.

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Credentials, Growing Up, and Change Agents

SUBMITTED BY ALLEN LIND (KENTUCKY COUNCIL ON POSTSECONDARY EDUCATION) ON MARCH 3, 2010 - 10:30AM.

"Changing the model of pedagogy and the model of knowledge production is crucial for the survival of the university. If students turn away from a traditional university education, this will erode the value of the credentials that universities award, along with the position of these institutions as centers of learning and research and as campuses where young people get a chance to "grow up."

A few thoughts. In Kentucky public postsecondary education, as in most places, a third of undergraduate students are 25 years or older and 40 percent are part-time so probably do not need the institution to help them "grow up." Also the value of the credential is often determined by the employer. When the employer begins accepting alternate forms of credentials they will likely become a stronger influence for change than the students.

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But what's the solution?

SUBMITTED BY TONY BATES (TONY BATES ASSOCIATES LTD) ON FEBRUARY 14, 2010 - 10:13PM.

Tapscott and Williams touch on several themes that I (and many others) have been advocating, such as the need for universities to move from a lecture-based system to a more constructivist approach, to re-design courses around open content, and to move to what the authors call collaborative knowledge construction.

However, maybe because I have been saying these things for so long, the article really annoyed me, and I've been trying to work out why. I think the first reason is that Tapscott and Williams write as if they have discovered something that has in fact been known by many people for some time. Yes, we know the current system is under stress, yes, many people like myself believe the system must change, and yes, the Internet does change everything. Yes, we should be moving to more constructivist teaching and collaborative learning and using the Internet and web 2.0.

The interesting question is not what universities should be doing, but why it isn't happening. The Tapscott and Williams analysis of this is trite, to say the least:

"It's the legacy of established human and educational infrastructure," says Proenza. The analogy is not the newspaper business, which has been weakened by the distribution of knowledge on the Internet, he notes. "We're more like health care. We're challenged by obstructive, non-market-based business models. We're also

burdened by a sense that doctor knows best, or professor knows best."

I'm sorry but it is more complicated than that. We have seen a major enlargement of the higher education system, but basically we have not increased the number of tenured professors or even adjunct instructors to maintain the elite system of teacher:student ratios of 1:20, except in the most expensive Ivy League institutions. Using lectures and increasing the number of students per lecture is an exceedingly cost-efficient way of dealing with larger numbers with less resources. The extra student added gets exactly the same education as all the others, at no extra cost. (Note that I said cost-efficient, not cost-effective.) Also the investment in technology has actually taken away resources that could have been spent on teaching.

The basic problem is that you cannot use constructivist learning approaches with classes of 100 students or more. I know, I've tried. No matter how much you divide the students into self-managing groups, it becomes an impossible task for the instructor to manage, and the quality suffers.

Also, Tapscott and Williams write about the 'new' constructivist way of teaching. I'm sorry, but this is not new. It's been around for over 100 years and has been used in elite universities from the middle of the 19th century. (It was called in Oxford and Cambridge the tutorial method). Why universities don't use it now is not because they don't understand the technology of the Internet but because it doesn't work well with very large numbers.

And this brings me to my next point. Academic knowledge is not the same as everyday knowledge. It is as Diana Laurillard puts it, a rhetorical activity, which requires movement between the concrete to the abstract and back again, and a constant questioning of what we know. Just putting students into social networks will not automatically lead to the development of academic knowledge. It needs mediation from a highly skilled and knowledgeable teacher. This takes time and requires manageable numbers of students.

Lastly, the suggestion that the privatization of the universities or 'market forces' are needed to bring about change also misses the point. The large research universities have no need to change. As Tapscott and Williams themselves acknowledge:

College and university attendance is at an all-time high. The number of students enrolling in degree-granting institutions rose more than 118 percent from 1969-70 to 2005-6, while the percentage of 25- to 29-year-old Americans with a college degree rose from 16.4 to 28.4 in this same time. The competition to get into the greatest universities has never been fiercer.

There is an important role for private, for-profit universities, but this is at the margin, because there are aspects of higher education that will be lost by institutions operating purely for profit. In particular the pursuit of new knowledge is costly and a return on investment approach based on short-term gains will not benefit society over the long run. We need both public and for-profit institutions, but their co-existence of itself will not cause the large publicly funded research universities to change. Indeed, there are aspects of public universities that I don't want to change, such as autonomy, allowing them to freely criticise government and business as appropriate, and their pursuit of new knowledge. I fear Tapscott and Williams' solution (at least as they have expressed it) would throw the baby out with the bathwater.

What we need to look at is what forces or pressures could make the large, publicly funded research universities change, and it's not going to be the threat of Facebook. We need to look in particular at how best to use the limited teaching time of top research professors. They need, as I have argued before, to work smarter, not harder. So, yes, I agree with Tapscott and Williams that having top professors lecturing – on a regular basis – is not the best use of their time. Using open content can help. But if they are to spend more time online or in face-to-face in discussion with students, we will have to find ways to keep the students numbers down. Although technology can help, this is much more a funding, organizational and 'vision' problem. Also, we will not get tenured research professors to change if they have no training in educational methods and so-called 'new' pedagogy – but there is no requirement for this at the moment.

So , yes, thank you, Don and Anthony, for pointing out the obvious, but next time, could you please provide more helpful and constructive solutions on how to solve the problem?

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Tony Bates is wrong on a number of points

I'm delighted that Tony Bates took the time to reply to our article, as I always find that the best ideas and learning come from discussion, even conflict. Having said that, I'm sorry to say that Mr. Bates makes a number of mistakes in his reply.

Some of what he argues is contradictory and therefore hard to address. He writes "The interesting question is not what universities should be doing, but why (the new approach to learning) isn't happening." Yet he chides us, "Thank you, Don and Anthony, for pointing out the obvious, but next time, could you please provide more helpful and constructive solutions on how to solve the problem?" So which is it?

For the record, the second half of our article laid out a 5-part strategy on what universities should be doing to transform themselves – focused on a new idea, The Global Network for Higher Learning. We'd be interested in receiving feedback on this series of proposals.

Mr. Bates also argues that: "The suggestion that the privatization of the universities or 'market forces' are needed to bring about change also misses the point." He must be confusing our piece with some other article. We never suggested anything of the sort. Privatization would be a disaster to education.

Mr. Bates also writes "The large research universities have no need to change. They are doing just fine." As we explained, appearances can be deceiving. There are many storm warnings that universities are headed into the same crisis that newspapers, broadcast television, encyclopedias or record labels are facing. As we said, all of these institutions are losing their monopolies on the creation and delivery of content. "They are being decimated by the digital age that brought abundance, mass participation, the democratization of production, the rise of new digital delivery channels, the infeasibility of old notions of intellectual property, and completely new business models — all enabled by the Internet."

Sorting through all his arguments Mr. Bates has one central objection. He writes: The basic problem is that you cannot use constructivist learning approaches with classes of 100 students or more. … Why universities don't use it now is not because they don't understand the technology of the Internet but because it doesn't work well with very large numbers."

This assertion misses the main point of our article. Of course it's always best to have small class sizes. My son Alex went to Amherst College with a teacher-student ratio of 1-8. His undergraduate history course had a handful of students interacting with a Pulitzer Prize winner, who got to know Alex as a student and a person. Alex received a wonderful collaborative education with hardly any technology in the classroom. But Amherst is the exception and class sizes are not going to drop from, say 300 to 8 any time soon at most universities. Which is where technology comes in.

Because of technology it is now possible to embrace new models of collaboration that change the paradigm in more fundamental ways – especially when the student to teacher ratio is large. As we explained, this is not fundamentally about technology per se. Rather it represents a change in the relationship between students and teachers in the learning process.

I saw this myself back in the mid-1970s when I was taking a statistics course for my graduate degree in educational psychology at the University of Alberta in Canada. It was one of the first classes conducted online--an educational groundbreaker from Dr. Steve Hunka, a visionary in computer-mediated education. This was before PCs, so we sat down in front of a computer terminal that was connected to a computer-controlled slide display. I could stop at any time and review, and test myself to see how I was doing. The exam was online too.

There were no lectures. Just as well: the statistics lecture is by definition a bust. There is no "one-size-fits-all" for statistics – everyone in the lecture hall is either bored or doesn't get it. Instead, we got face-to-face time with Dr. Hunka, who was freed up from being a transmitter of data to someone who customized a learning experience for each of us, one on one. Back then, online learning was expensive, but today the tools on the Net make it a great way to teach and free up the teacher to design the learning experience and converse with the students on an individual and more meaningful basis. The model of pedagogy worked well with a class size of several dozen, and Professor Hunka had no TA's.

Mr. Bates writes: "Just putting students into social networks will not automatically lead to the development of

academic knowledge. It needs mediation from a highly skilled and knowledgeable teacher. This takes time and requires manageable numbers of students."

Of course. But given the power of new technologies, such "mediation" can be embedded in interactive and collaborative software -- as was the case in my statistics course over 3 decades ago. The technology enables in increase in the number of students that are "manageable."   Virginia Tech uses the same approach today for all mathematics. Lectures have been replaced by this model, even when there are hundreds of students.

The same model is applicable to a wide range of courses, not just math. But it required educators to collaborate themselves to embed their knowledge and teaching know-how into software.

Of course the optimal approach is to combine computer-based instruction and collaboration with small group discussion, and lobbying and fighting for better student-teacher ratios is something we should all continue to do.

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