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Author

Matkin, Gary

Publication Date

2007-08-01

Research & Occasional Paper Series: CSHE.11.07

CSHE | Center for Studies in Higher Education
UNIVERSITY OF CALIFORNIA, BERKELEY
<http://cshe.berkeley.edu/>

**INTERNET AS TEENAGER IN HIGHER EDUCATION:
Rapid Growth, Transformation, Uncertain but Bright Future**

August, 2007

Gary M. Matkin

Dean, Continuing Education
University of California, Irvine

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ABSTRACT

This is a personal reflection on the impact of Internet technologies on higher education around the world over the last 13 years. It chronicles my observations of differences between perceptions and realities, of enthusiasm and disappointment, and the changes that have taken place in learning, teaching, and the structure of higher education during this period. Based on the work of others, this reflection also includes a prediction of the near term introduction of new instructional technologies and draws implications for higher education from these predictions and this history. I conclude with an assertion that the Internet has already transformed higher education and that we can expect more rapid changes in the near future, changes that will alter not only learning, but the consciousness of all learners.

The Beginning of Online Education and Its Study at Berkeley

My involvement with online education began in 1994 when the Sloan Foundation approached UC Berkeley with an offer to fund the development and delivery of online courses. The Vice Chancellor for University Relations and Development at that time, Professor Daniel Mote, quickly determined that there would be no support (perhaps even active resistance) for this project among the “regular” instructional units of the University and referred the Sloan Foundation’s representative, Frank Mayadas, to Mary Metz, Dean of University Extension. Dean Metz was responsible for the Center for Media and Independent Learning (a combination of the previous Extension Media Center and the Center for Independent Learning—previously Correspondence Instruction). CMIL was ostensibly a statewide unit having responsibility for all UC distance education; although this charter had not been supported by the administration in the Office of the President since the mid 1980s as various UC campuses began to develop small distance learning programs of their own. Despite this lack of support, CMIL was offering a significant number of correspondence courses at both the high school and university level. Some utilized telephone (including fax) and video (but not television) technologies. With Sloan funding, which eventually totaled over \$2 million, CMIL converted many of its correspondence courses to an online delivery format.

This Sloan-sponsored project pushed me (at first, reluctantly) into what was to become a major involvement with both the practical aspects of starting up and managing online and distance learning at the University of California (eventually at both the Berkeley and Irvine campuses) and a study of the effects of the Internet on the teaching and learning that goes on in our university and other universities around the world. I became a participant/observer at the start of what I claim will be a transformative period in higher education in the US and around the world.

By 1994, while very few universities were engaged in any meaningful way with online education, the subject of online education was featured at most academic conferences and was frequently reported in the contemporary press. Stimulated by what promised to be a major change agent in higher education, Dr. Diane Harley, a research associate at the Center for the Study of Higher Education (CSHE), Professor Martin Trow, professor of public policy and a former director of CSHE, and I began discussions about how we might systematically study the “technological imperative” which seemed potentially so disruptive and positive at the same time. While we were never able to actually find funding for the original notion of our study, those early discussions, which quickly involved many more of our colleagues, became, for me at least, the framework for many observations and funded activities trying to chronicle and make sense out of what was actually happening in higher education as a result of this new Internet technology.

The Lessons of History about the Prediction of the Future

Now, some 13 years after first being drawn into both the practical use and intellectual consideration of the effect of the Internet on teaching and learning in higher education, I am asked to predict its future. In facing this task, I am fettered by my knowledge of the fate and consequences of such efforts in the past. Following the well recognized pattern of predictions about technology’s effects, short-term consequences have been systematically overestimated, while long- term consequences have been underestimated. Such predications seem to fall into two categories. One deals with the financial and market aspects of the new technology and what they portend, and the other deals with the potential transformative and positive effects on learning.

Some of the most prestigious institutions of higher education in the country made some large bets based on predictions of rapid market acceptance of online education. These bets have met with much less success than most bets placed in Las Vegas. By now, the consequences of the dot.com bust in the late 1990’s, particularly with regard to elearning and university-sponsored online learning, are well chronicled. For instance, our colleague, Professor David Kirp, in his book *Shakespeare, Einstein, and the Bottom Line: the Marketing of Higher Education* tells the story of some of these lost wagers. The promise of an Internet- based gold rush simply did not happen.

With regard to the Internet’s potentially transformative effect on learning we have been steadily visited with opinion-based “scholarship” criticizing the prediction that the Internet will positively transform education of all kinds and particularly higher education. Recently Professor Robert Zemsky’s boldly asserted and carefully qualified notion that the history of the application of Internet technology over the last 13 years is a story of “thwarted innovation” is an example of this trend. (Massey, Chronicle) Based upon “research” consisting in part of interviews with leaders in higher education, Massey and Zemsky propelled themselves onto the lecture and speaking circuits with what seemed to be a challenge to the notion that the Internet is a truly transformative, revolutionary technology in higher education. (A careful reading indicates that

these authors are making a comment on what has happened so far, but are relatively positive about what the future might bring.) Of course, there are others, equally attractive on the lecture circuit, who predict some quite remarkable changes that will be brought about by the Internet. (see Maeroff).

This bi-polar approach to the study of the effects of online and distance learning has, over the last 13 years, obscured what is actually happening. In fact, for instance, many of the early projections about the growth of online education have come true, although not rapidly enough for the venture capitalists to realize a quick three-fold return on their investments. The Sloan Consortium annual survey of the growth and dispersion of online education reports that in 2006, 3.2 million students were taking at least one online course during the fall of 2005, up from 2.3 million the previous year. The same study reports that two-thirds of the largest higher education institutions offer fully online programs. Even with this rapid growth over the past few years, the percentage of formal higher education carried on entirely at a distance is relatively small. However, the Sloan statistics leave out much of the online continuing education done by these institutions and certainly do not and cannot report in any meaningful way the extensive use of the Internet and related technologies that are employed to enhance and support “classroom” learning.

Not only were early predictions about the growth rate of online education wrong, but so were the predictions about how it would be distributed among institutions. The notion that a major university with a big “brand” (say, Harvard) or a newly created university formed with courses from prestigious universities (Cardian/Unext) would dominate online education were way off the mark. The few attempts at such a business model not only failed to “eat the lunch” of supposedly hidebound traditional higher education institutions, they failed even to get to the table. Today a bewildering array of colleges in all the Carnegie classifications offer online education and early big players, especially for-profit universities (University of Phoenix) are in trouble. Also, an early assumption that online education would be used predominantly in so called distance education proved quite wrong. For instance, proprietary course management systems (Blackboard, WebCT), even today, are used primarily to support residential or classroom instruction.

Just as early projections about the market attractiveness and financial promise of online education proved overblown or premature, so did projections from the early zealots for online education as a revolutionary and transforming learning/teaching phenomenon. Indeed, the record of predictions about new uses of Internet-based education is populated with the kind of failures that prompt the backlash of disappointment expressed by professors Massy and Zemsky.

In the face of this history of misadventure in predictions about online education (and, indeed my own rather poor record over the years of building business plans on future scenarios), I will, in what follows, express strongly the opinion that the Internet has already profoundly changed learning and teaching in higher education and that it will be a continuing source of positive change in the future. In describing both the current state of the effects of the Internet and its future influence, I will take the perspective first of the student (the context of learning), then the teacher (the context of teaching) and, finally, world society (the context for education).

The Context of Learning

Learning always takes place in both a general context (language, country, geographical location) and a context created specifically for the learning process (classroom, technological infrastructure, course design). The introduction of the Internet has revealed the huge significance of the influence of both the general and the specific contexts in which learning takes place. For instance, at UCI we have recently received funding to use already existing, high-quality, openly available learning assets to create open courseware (OCW) courses to help California's K-12 teachers pass the state-administered examination to become qualified to teach science and mathematics in high school. Despite the huge supply of openly available learning-directed material available in science and math, our subject matter experts and instructional designers have had serious difficulties in adapting these materials for our specific audience and purpose. Despite the fact that these materials are available from such well-recognized universities as MIT, Carnegie Mellon, and Rice, or from well utilized general repositories such as MERLOT, these individual pieces just don't seem to fit very well for our audience and the purpose that motivates their learning. If this difficulty is more widely experienced, the predictions of the positive influence of open course ware on the cost of OCW will have to be modified.

When learning materials cross national, language, and cultural borders, the issue of context becomes even more clear. Now, there is the increasing realization that materials produced in one country (or even hemisphere) must undergo extensive "localization" (and/or translation) in order to be useful. For instance, at UCI, our Extension online Certificate Program in Project Management was recently altered for a program in Brazil. We estimate that the cost of translating our program into Portuguese and redesigning the program for Brazilian culture well exceeded the original production cost. The implications of this difficulty are serious for those who hope for the rapid and easy transfer of knowledge and skills from developed to underdeveloped countries.

But beyond what might be called these intentional and identifiable interconnections between context and learning are the more subtle, profound, and wide-spread influences of the Internet on the context of learning. In my field, continuing education, online enrollments are growing rapidly. Studies have shown that this rapid growth is primarily within the geographical area already served by the institution with its classroom-based programs, probably because the online delivery method is so much more convenient for working adults. Continuing ed students are increasingly choosing the online context over the classroom context. Whether the experience they receive online is better or worse for the learning they hope to achieve is, for my argument, beside the point. The context is shifting.

Such profound shifts are not limited to part-time adult continuing education students. We all recognize the ubiquitous use of laptop computers among our full-time residential undergraduate students. Until recently I was an advocate on my campus for the notion that all UCI undergrads should have some experience with an online course to prepare them for the world of learning they would encounter when they graduated from the university. I changed my mind after talking with about 30 UCI faculty members who described how they were using Internet technologies in their classes. It was clear to me that, by the time they graduate, most UCI undergrads will have had to utilize all the skills needed to be successful in a fully online Extension course.

It is hard to look back 13 years without concluding that the Internet has transformed the context for learning in higher education. A simple stroll through what has been and what continues to be the heart of any campus, the library, will provide clear evidence of the profound changes that

have taken place. Students are likely to be studying in places specially designed to provide Internet access and they all have their laptops open and ready to access information from around the world and able to send and receive instant messages. They are likely to have their cell phones at the ready (on silent mode, hopefully) and actively engage their friends (several of whom may be sitting across from them) in text messaging. It is also clear that the pace of change in that context will accelerate. The *2007 Horizon Report*, which “seeks to identify and describe emerging technologies likely to have a large impact on teaching, learning, and creative expression within higher education,” lists six technologies to watch. In the near term (one year or less), user created content and social networking will become much more widely used in teaching and learning. New tools and sites such as *Flickr*, *Odeo*, *YouTube*, and others allow students to find, classify, evaluate, and add to content created by others, opening new dimensions for student to teacher and student to student interactions and collaborations. This ability to create, distribute, and alter content is closely associated with new communication and networking utilities such as *MySpace* and *Facebook* which allow students, for instance, to share opinions. These tools and websites are already available; the immediate challenge is to integrate them into the learning process.

In the intermediate term (two to three years), the *Horizon Report* projects that mobile phones and virtual worlds will become widely adopted technologies for teaching and learning. Of course, we already see hand-held devices in the form of Ipods in use on some campuses, including UCI where a popular course in biology is available to students on pod-casts. Hand-held devices are expected to evolve to the point that, while the function of the telephone will be present, many other functions, well beyond the current list, will be available in a small device. Soon, these devices will include projection systems that will remove the barrier of the small screen, be able to record and store massive amounts of data, and interact with many other technologies including university library and registration systems. Virtual worlds are “richly immersive and highly scalable 3D environments” which “are growing in popularity because they combine many of the elements that make Web 2.0 really exciting: social networking; the ability to share rich media seamlessly; the ability to connect with friends, a feeling of presence; and a connection to the community.” *Second Life*, *Active Worlds*, and *There* are current examples of early proprietary systems. *Second Life* has been used to train emergency personnel, and by librarians to build an extensive set of information resources. (Horizon).

Finally, in the longer term (four to five years), new and emerging forms of publication and massively multiplayer educational gaming (MMEG) will emerge as viable instructional technologies. Web-based publications or postings which can be commented on or altered by others and which can include many forms of media will help the teaching/learning process by including and being able to learn from new voices, control costs and reach wider audiences, and illustrate and educate using a variety of media. MMEG is developing from the huge online gaming industry, which has demonstrated the popularity and depth of engagement of games for entertainment, and the growing body of research around the use of games in teaching and learning. In addition to their potential use by thousands of individuals and the educational impact that alone would produce, “these games offer opportunities for both discovery-based and goal-oriented learning,” and can be effective in developing team-building skills. The initial use of MMEG will probably be in the study of foreign language and culture, the development of leadership and management skills, and the practice of strategy and the competitive application of newly acquired knowledge.

Together, over the next five years, these six new technologies, some of which are already in use, will accelerate the transformation in the context of learning. Students will learn in new ways, in new locations (including virtual locations), and will generate learning outcomes that will

begin to be seen as having different characteristics than the results of earlier learning processes.

The Context of Teaching

Because the context of learning is the mirror image of the context of teaching, I will not repeat the material from the preceding section here. Obviously, as learning changes, so will teaching—teachers will have at their disposal more technology and techniques to use that technology. Clearly, the adoption of new teaching/learning technology will be accelerated by the increased attention and resources devoted to it, and most institutions either willingly or unwillingly will spend more on not only new technology but the training of faculty in its use. Just as the personal context for learning has and ever will change for students, the context for teaching for faculty will also change. We can get a glimpse of this change in the experience of MIT and its adoption over five years ago of its OpenCourseWare initiative.

At the time of this writing, MIT has put up over 1550 course in an openly available format, with a goal of putting up about 1800. This effort, brought about by a voluntary faculty commitment to the OCW movement, has had some interesting consequences for faculty activity. First, it is widely recognized by MIT faculty that their course designs have improved. When an MIT faculty member realizes that his/her material will be on display literally all over the world, it is likely that more attention will be paid to all elements of the course—its design, the production quality of its presentations, and its coherency. Openly displayed course materials must be kept up-to-date as well, and MIT faculty members, often dealing in scientific and technical fields where things change rapidly, have a reputational stake in updating their material.

But perhaps more importantly for the future of faculty work is the changes OCW is making to the course authoring and course sharing processes. While it has been relatively expensive to support MIT faculty in the production of the open courses, expenses are expected to drop sharply once faculty members begin to use the developed OCW infrastructure to update and share materials. Each posted open course becomes a permanent and easily alterable record of that particular course which can be updated by its author for the next offering of the course, or shared with the faculty member assigned to teach the course in the future.. At MIT, each version of a course tends to be improved upon over time, with new and better learning objects, for instance, being substituted for those in the older version. As faculty have understood the efficiencies to be gained from this OCW infrastructure and its service in improving instruction, the course authoring function has become the core value of the OCW—its availability to the world is a kind of by-product.

Internet technology is beginning to change the way in which faculty members use their time in their role as teachers. They will probably spend less time in the classroom, less time revising already existing courses, more time designing their courses, more time interacting with students over the Internet and less in face-to-face interactions with students and, as technology develops, less time evaluating student elearning. Some faculty will decry these changes, other embrace them, but few will be able to escape being influenced by them in their daily lives.

The Context for Education

Internet technology is becoming an important technology at a time when the developing countries of the world are presenting an unprecedented and massive demand for higher

education. While Internet-based online education is playing a disproportionate role in educating the developing world's students, it is barely making a dent in the problem. For instance, India, with the largest higher education system in the world, will not hit its target of 10% participation (14 million students) for several more years, a target which is well below the participation rate in developed countries (often over 50%) and even other developing countries (Thailand, 20%). Currently, 23 percent of all higher education in India is delivered at a distance, a percentage that will have to increase to 40% by 2010 for India to reach its goal. (Daniel, et. al.)

Implicit in the above paragraph is the most strongly held notion about the use of the Internet in higher education, that the Internet will result in lower costs per student when appropriately and massively applied. There is some evidence of this—the largest universities in the world are distance education-based universities with cost structures generally at least 25 percent lower than their traditional counterparts. The Internet not only provides a low cost delivery system, it also helps in the importation across national and geographical boundaries of the education product itself. Despite the translation and localization difficulties mentioned above, educational treatments developed in one country are now more likely to be utilized in another, thus making up for gaps in resources in the host country. The OCW movement will also facilitate cross border transfers of educational products, a prediction supported by the rapid growth of the OCW Consortium which currently has 101 members in 16 countries (50 members and 7 countries of the developing world). Some knowledgeable observers of current trends see the Internet as creating the conditions for an eventual reversal of the flow of educational product, which now is from developing countries in the northern hemisphere to underdeveloped countries in the southern hemisphere. With lower costs and a critical mass of highly qualified but poorly paid academics, the offshore outsourcing seen today in manufacturing, service, and software design could well have its own expression in higher education with greater south-south and south-north importation.

There is another aspect of the context for education that the Internet will facilitate, the movement toward non-degree education. The challenges faced by India and China, and other nations in the developing world to move Western-style from elite to mass higher education are simply impossible to overcome. For instance, if we accept a goal of 35% participation in higher education of the 4 billion people in the developing world, we would have to add 150 million people to higher education, a figure which exceeds current world-wide higher education participation. (Daniel, et al) Yet, developing economies depend on people educated beyond secondary school. The development of highly focused, more concentrated curricula, sometimes called certificate programs in the US, is the only answer. The assistant beverage manager at a four star hotel in central China probably does not need a college degree to effectively carry out her duties. Rapid economic development of the kind demanded and expected in developing countries cannot wait for mass higher education to come. As a world society we will have to take what appear today to be short-cuts to competency, but what tomorrow may well appear to be the overthrown colonial-esque tyranny of the four year degree. Whether sort-cut or independence movement, the shift toward professional certificates will be aided and abetted by Internet technology. The beverage manager in central China will receive the same educational treatment as her counterpart in Istanbul, and world tourism will be better served.

The context for education will shift in its delivery methods, its flow between and among parts of the world and its peoples, its content, and its format. Over the last thirteen years, Internet technology has dramatically reshaped the context for education, and the combination of the Internet with other emerging world trends and a constant and never-ending stream of new technologies will intensify.

Conclusion

It is surprisingly easy these days to find serious people in higher education still debating whether online and distance education is better or worse than traditional classroom education, or whether the Internet and new learning technologies are simply introducing natural incremental improvements in education rather than being a transformative. These arguments are based largely on perceptions supported by anecdotal evidence. Worse, they are irrelevant in two ways. First, while it is difficult to collect information, there is a growing body of statistics and metrics that tell what is really going on and we can observe for ourselves, everyday, often in our own institutions, what is happening. More people are using the Internet to teach and learn, more technologies based on the Internet are being developed and used, and communication is improving and speeding up, and so on. The accumulation of these observable phenomena argues strongly for the transformative view, but, whatever view one takes, behaviors are being altered.

Second, there are things happening that we can't observe or measure yet, although the tools are becoming available in some respects. Take a hypothetical example in which a student has a choice of finding out some information for a paper either in the traditional way of browsing the stacks, selecting books, reading them, and then writing his paper or, alternatively restricting his search to only that information available on the web. Suppose that each search method resulted in him finding exactly the same information. It is my contention that the method of search for the material might have a more profound effect on the learning that took place than the production of the result. Different parts of the body were employed; different synapses in the brain were firing. The differences in these physiological events are likely to alter the consciousness of the student in regard to the subject under study and the process of learning. The Internet is largely responsible for this change in the context of learning, in the context of teaching, in the context for education that is having, at this moment the most profound effect.

Just as neuroscience is challenging traditional aspects of the legal system and stem cell research is challenging religious beliefs, the Internet is challenging higher education. Perhaps the most important contribution of the Internet to education to date is that it has helped us to recognize this challenge.

Notes

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