Web Based Education: Problem or Panacea?

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Being the last presenter on a panel reminds me of sitting in third base in a blackjack table--its a position where you don't have to commit until all others have shown their hands. Accordingly, I have listened with interest to the arguments made in the presentations thus far. However, I believe they are substantially off target. Whereas educational psychologists and labor economists may endlessly debate the merits of web-based education and the cost benefits associated therewith. we as sociologists must be vigilant in maintaining the larger view. That view begins with the fundamental assumption that behavior takes place in context. That context is socially defined and is regulated by group norms. Therefore, the question is not whether web-based instruction is pedagogically sound and / or cost effective but, rather: 1) what are the social prerequisites for it to exist at all; and 2) given that it comes to exist, what are the sociological implications for transforming group behavior.

To that end, I would like to examine three of the conventional critiques launched against web-based instruction and assert that each is a version of the classic circular argument against technology which, for example, would reason that the automobile, circa 1900, would never catch on, because it was not cost effective; and it was not cost effective because there was not sufficient highway infrastructure to allow it to be purchased and driven by the masses. Hence, it languished as a toy for the rich, with no practical significance, for more than a decade.

Moreover, I would like to offer several reasons why institutional changes are creating what Kuhn would call the pre-paradigmatic cultural shift necessary to encourage widespread diffusion of Internet technology. Finally, I would like to offer some insight into the unintended consequences of this technology and its effect on social patterns, with emphasis on recommendations for the implementation of this venue.

II. Conventional Critiques:

Access:

The most often cited critique against Internet based pedagogy is the restricted access argument. This deficiency is voiced on multiple levels. On the one hand, it is argued that there is a restricted supply of courses and professors to conduct them, without sufficient motivation on the part of existing instructors to solve this problem. On the other, it is reasoned that the number of students willing and motivated to participate in such technology is a small in proportion to the total number of students. Finally, even if sufficient supply and demand are present, the technology is restricted, both by the commitment of the university to support faculty and students and even given that motivation, the deficiency in current technology.

Typical support for the first point, concerning supply, is the demographic argument demonstrating senior faculty being more resistant to adopting new technology than are junior faculty. At CSUN, for example, there is a high correlation between number of years faculty have been at the institution and their resistance to adopting new teaching technologies. The entire CSU has an inverted faculty age distribution (i.e. the majority the faculty are over age *50).* Similar trends have been documented at other universities such as the University of California. Thus, the argument goes that such an age distribution is a natural barrier to the creation and implementation of web-based courses. As evidence of such an assertion, less than 1% of all courses offered at the CSU have online equivalents.

The second part of this argument, concerning demand, is supported by the demonstrated evidence that there are natural barriers for student participation in this technology. One is the lack of student knowledge about computers. As late as last year, the majority of students at the CSUN

responded that they do not feel qualified to use computers as the exclusive means to access a course, despite their reported desire to do so. Moreover, while only recently have the majority of students come to have access to a PC in their home, less than one in three have considered taking a course on-line. Finally, despite the flexibility of taking courses online, spending more and more time to graduate is becoming a generally accepted norm (at CSUN the norm is approximately six years). Thus, it would appear that students are neither knowledgeable of, nor motivated to, computerize their learning environment.

Although these demographic arguments are compelling, they are transitory. Through the combined effect of faculty retirement and Title Wave II enrollment, during the next 10 years, not only will the inverted faculty age pyramid reverse itself, but a new cohort of high school graduates with considerable knowledge of, experience with, and access to, computers and the Internet, will become the norm. That universities have failed to generate the support for increasing supply and demand is indicative of the second most cited conventional argument against web-based instruction.

Cost

The second conventional, and correlated, critique of web based instruction is that it is too costly, for the student and the university. Obviously, since students pay significantly more for computers than textbooks, the typical student is priced out of the market for taking web-based classes. This is accelerated by the fact that increasingly greater percentages of entering freshman are minority and lower income students, particularly at the community college and CSU level. Lower income students are more sensitive to price points; ergo they are more likely to be priced out of this technology.

The presumed response to this arguement is that institutions of higher education should compensate for this price barrier by supplying sufficient lab facilities to their student population so that no one is without access to a machine. There are three reasons why this does not work, so the argument goes. First, the technology itself is not mature enough to accommodate such a potential demand, were it there. Thus, no university, for example, can compete as an Internet Service Provider. At CSUN, we can accommodate some *500* port connections for 23,000 students. Dial in is, therefore, unavailable *50%* of the time through our university server. The result is to force students to engage their own ISP's at a cost of some $20 per month. This $240 per year means the cost of education (on a capitalized basis) is $2400 more expensive than without using this technology.

Second, even given unlimited motivation on the part of universities to build computer facilities, the state of the technology does not allow even the most fundamental access. Bandwidth is such that at best a *56K* modem with allow no more than text based interaction. Such a bandwidth limitation precludes meaningful audio or video transmission. To attempt a current solution to the bandwidth problem (e.g. ISDN, DSL) is cost prohibitive for most students.

Third, there is ever decreasing public funding for higher education. Notwithstanding the propensity for universities to spend a larger percentage on technology infrastructure, this shrinking support implies smaller absolute expenditures. This problem is compounded by the fact that most support is in the form of capitalized, not operational, dollars. From the funding source perspective, capital dollars for new infrastructure and equipment are harder to rationalize, on a reoccurring basis, than are operational dollars, which are used to maintain, not build, such infrastructure. Hence funding web based instruction, both from the institutional "server" side and from the student "client"

side, is more expensive than funding traditional classrooms.

Although the cost argument appears infallible, there are two inconsistencies in the reasoning. First, the cost of this technology is an exponentially decreasing curve. The power of computing and speed of the Internet is doubling while the cost of participating is being halved each new technology cycle. The period of these cycles is shrinking, currently about two years. Thus, full participation and insufficient bandwidth is eminent. Moreover, as campuses morph these expenditures from capitalized to operational dollars (as has CSU San Marco), they will become more easily funded on a reoccurring basis.

Effectiveness

Perhaps the most controversial conventional critique is that web-based pedagogy is simply ineffective. Whether the implication is that it fosters collaboration, increases the time-space flexibility, or encourages more student participation, critics are quick to point out that these are learning outcomes that can be fostered as easily in the classroom, as in virtual space, within a vastly less expensive budget.

That proponents of web-based curriculum are content to demonstrate there is "no significant difference" between virtual and real classrooms only strengthens their critic's argument, in that web-based education is sacrificing the traditional test of a statistical hypothesis, to reject the null hypothesis, in favor of actually attempting to accept it. The logic is that if web-based educational outcomes show no difference from traditional classroom based learning, then the flexibility of the virtual environment should be enough to win the day and lead to adoption. This FDA mentality simply supports what critics assert is the obvious, that there is nothing going on in this venue.

The fallacy in the proponent's argument is that one can never "prove" the null hypothesis. But since most all of the empirical evidence for these outcomes are descriptive case studies, or based on self-selected samples, the comparison are only quasi-experimental at best and, therefore, inconclusive.

This is the trickiest of all the conventional arguments. That a new field is slow to accumulate causal inferences in the form of experimental outcomes is not the same statement as asserting the evidence is conclusively negative. My own experimental study in 1996 and others that have followed demonstrate there is a significant positive learning outcome gain in virtual experimental conditions vs. traditional classroom control conditions. Thus, a growing body of experimental evidence asserts that students can be measurably more effective in learning environments with a web-based delivery venue than they can with a traditional classroom delivery.

III. The Real Issues

While the conventional critiques are appealing, they obviously can be countered argued. Moreover, like all new technologies that require infrastructure to take hold, they 'are time bound and, therefore, their criticisms are spurious with respect to cause and effect. Therefore, the more important questioning should not be whether there is sufficient ratios of supply / demand, or cost / benefits, but rather whether the cultural climate will evolve to ever allow for widespread acceptance. And if so, how will it happen? And if it does happen, how will change social behavior?

To look at these sociological questions, one needs to distinguish between the symptoms of systemic change and the systemic change itself. While patterns of supply and demand and cost effectiveness are necessary conditions for cultural acceptance, Kuhn's paradigmatic cultural shift

must take place before widespread acceptance of this technology will occur.

While I do not have time to discuss all these prerequisite for cultural shift in this setting, I would like to bring up one example. This example of the manifestation of cultural shift in the educational environment involves the breakdown of traditional university boundary definitions. Because virtual classrooms, by definition, transcend time and place, theoretically a student at, say, Santa Monica City College could take a virtual class from Berkeley or CSULB just as easily as from his own campus. Is the cultural ethos such that the educational establishment is ready to permanently alter its stratification system? That is, are we ready to throw out the Higher Education Act (in California for example) which mandates this stratification system. And if not, at the course level, is a Nobel prize winner's class in chemistry at Berkeley to be equally accessible to a freshman at Orange Coast college as it is to a student on his own campus? Is the virtual G.E. Course at College of the Canyons to be universally transferable to all U.C. Schools? Is a student from out of state taking a virtual class from UCLA to be charged out of state tuition, even after a year of doing so? Until these questions, and those like them, are answered, thus redefining the existing education institution boundaries, web-based education, like the automobile, in 1900, will be no more than an exercise in creative energies on the part of selected faculty and students.

On the other hand, if these cultural changes are to occurring, how will we recognize them? I offer three indicies. First, we will see a change in faculty peer relationships, both within and across academic campuses. At the most basic level it will involve anticipatory socialization. Like Lazerfeld's two step flow from opinion leaders, or Roger's diffusion of innovation from early adopters, there will be a transition period in which a segment of the faculty population who will experiment and pass their results on to larger segments of their peers, not only in their department,

but more importantly, across departments. Early efforts will manifest itself in a type of dissonance reduction leading to stronger commitment and greater desire to proselytize. Such an effort is manifest at CSUN in the form of the Campus Web Project. Each faculty member is seduced into organizing a web based course for a summer stipend of $500. Thereafter, they are encouraged to "invite" other faculty to join in the Project. By sponsoring faculty "show and tell" seminars, instructors present their work product and, therefore, rationalize their commitment.

These early adopters are reinforced to go forth, not only to their campus peers, but to other campuses, as well, via such support as, for example, the CSU's AOF grants. This contact promotes cultural integration and evolving consensus. Beyond contacting others to form a "community" of interests in web-based curriculum, there is an information organizing function. Consolidation of information serves to cultivate group boundaries (e.g. witness the formation of the California Virtual University) in that it promotes common activity, defines interactions and, therefore, encourages group cohesiveness.

Second, we will see a change in professor-student relations within the educational environment. The paradigm of professor as mentor is no longer operative in a virtual setting. Student access the Internet implies that they are able to control the same information resources (or more, for that matter, as discretionary time weighs in favor of the student). Thus, the professor finds himself in the role of a guide or coach, as much as lecturer. By the way, this necessary systemic change is not unique to the educational world. Similar manifestations are occurring in other social institutions as well. In the economic world, as online day trading becomes the dominant force in the stock market, increasingly stock brokers are having to redefine their role. In the educational world, such fundamental change in faculty-student identity will, in all like lihood not happen intra-individually,

but rather most likely through junior faculty socialization, combining with the time necessary to get them to senior ranks.

Third, we will see a redefinition in organizational control. If this sound like a grass roots revolution, it is (as are most revolutionary changes in cultural standards). Analysts at the State Legislature in California are the first to admit that they look for direction on technology issues from the Chancellors and Presidents of the UC and CSU system. However, paradoxically, these administrators are only equipped to develop tactical, not strategic plans, for this technology (as a sidebar, the one notable attempt two years ago by the CSU to strategically partner with GTE, Microsoft, etc. failed when the UPC and others directly contacted the State Legislature, thus rendering the traditional Weberian model of organizational control, moot).

Moreover, as campuses begin to adopt this "bottom-up" form of strategic planning, their administrators will be forced to do social comparisons with their peer campuses. Thus, a type of circular reaction will take place as IT directors, provosts, and university presidents trade information about what is happening on their respective campuses. This form of collective consciousness takes on magnitudes for beyond their universities or even states, as administrators compete for their share of the zero-sum enrollment pie. One notable example is the formation of the Western States Virtual University and Wilson's premature carve-out of the California Virtual University.

IV. Latent Micro Functions of Macro Change

Although we have spoken of several of the more macro manifest changes indexing the cultural shift to widespread acceptance of virtual teaching technology, I would like, in conclusion, to speak of some of the more micro and perhaps unintended functions of such a cultural shift.

Because of this redefinition of the professor-student relation, and the opportunity (if not the obligation) to rethink how we conduct classes, there are perhaps three unintended consequences of this technology shift. First, we are granted a new way of organizing and presenting material. No longer is the content of our class limited to what we hand-out and what we present within the confines of the classroom. All manner of things can be organized and linked in virtual space both as a priori organized presentations, as well as provided as self-induced stochastic findings spawned by the student in search of material found in subsequent links.

Second, we are in a position to exponentially encourage exchange and collaboration in ways that are not constrained by classroom attendance (parenthetically, I am here today and not at my Saturday class because of my ability to conduct a moderated Internet relay chat from my hotel room this morning, in which I conducted the discussion for the first two hours, and the student continued the discussion amongst themselves for the next two hours. All of this interaction being "recorded", stored and linked for further review by students in preparation for examinations.

Third, we are given expanded techniques for assessment and evaluation. We are no longer limited to the class room for testing (yes web testing can be monitored). Moreover, we are not constrained to our office but can conduct office hours virtually (a fact that CSLTN has institutionalized as a requirement this semester).

As for students, some of the consequences should be obvious. Clearly, there is an expansion of the time space continuum. No longer does the student have to commute to campus, with all the attendant costs of travel, parking, childcare, etc., but their choices for classes are not limited to any one campus anymore. Every transfer student coming into CSUN today, for example, can have fulfilled all of their lower division G.E. requirements without every attending there own physical

community college campus location. Rather, they can choose to virtually fulfill them at any one of over forty community colleges around the state. This consequence also expands the normative age and goal for college attendance. Truly, from the comfort of your own home, you can pursue course (with or without the goal of a degree) throughout one's lifetime.

If time and space considerations were the only consequence, the list would not be impressive. However, in much the same way that instructors are forced to rethink the course experience, so must the student take a more active role in their experience. This is a fundamentally different model of pedagogy than has been in existence for the past two thousand years. Students are forced to confront a virtual classroom in an aggressive mode, if for no other reason than to assuage the anxiety created by the conspicuous absence of a live body at the lectern. My research shows that such anxiety manifests itself in increased interaction among students, a perceived better understanding of the material and better performance in testing situations.

Can such an experience be simulated in the classroom? Yes, but not as well. Again, my experimental research indicates that the strongest learning outcome is the interaction effect between virtual instruction and collaborative assignments. Although collaboration in the classroom setting also seems to improve test scores, it is not as statistically significant as the aforementioned interaction effect.

V. Conclusions:

Although students my virtual classes experience varying degrees of these latent consequences, they are by no means universally experienced by the student population in general, for precisely the cultural shift reasons argued earlier. Therefore, until such a shift is in place, I would

admonish the players to remain vigilant in assessing the implementation of this technology.

To the university, I would suggest that no onl ine course be offered without a corresponding classroom version. Moreover, do not try to be the technology leader, either as an ISP or as a strategic planner of the medium (e.g. buying a site license from Blackboard, mc).

For the instructor, I would caution you to distinguish between the use of the web as a supplement, compliment, or substitute for you current class. Begin slowly to see the broadening effects of supplementing your lectures with web based material. Only if it works for you would I venture into a partial or total replacement of the face to face contact of the classroom.

And for students, do not be seduced by the gaming experience or your need for a quick fix course, or your intrinsic interest in computers. Online proactive learning should not be an exercise in surfing the web; rather it takes considerably more time to play the though than the traditional classroom, abeit more your structured time than the university's.

If all of us place this technology in perspective and afford it the time necessary to play out this cultural shift, we will be in a position to embrace its utility. And if such a shift does not occur, we will not have jumped headlong into a financial and educational quagmire, from which the institution cannot escape.