Keynote Presentation:
Thwarted Innovation: What Happened to *e-learning* and Why?

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This symposium occurs at the junction of two of the most important educational innovations of the last quarter century. The first was pedagogical, resulting from the linking of a set of rapidly maturing information technologies to new insights into how, when, and why people learn. Best described as electronically mediated learning—but dubbed *e-learning* because of the innovation's close association with e-commerce and the dot.com boom—the new learning and teaching modalities offered a truly student-centered approach to education, one that was design rich, that could be delivered anywhere-any-time, and that could be customized to take full advantage of each individual's personal style of learning.

The second major educational innovation of these last two decades was geographical. While too often dismissed as a kind of political slogan, globalization in fact describes a real process in which economies become linked, market forces triumph, and, as a result, national cultures feel threatened. The educational result is that everyone is on the move. Students are being dispersed across national boundaries, most scholars now adhere to disciplinary definitions that reflect international standards, those ranked at the top of their disciplines have increasingly defined their futures in terms of an international labor market remarkably akin to the kind of international free-agent market now characteristic of professional sports. *E-learning*, with its promise of anywhere-any-time educational offerings was to be globalization's handmaiden, creating educational communities that literally spanned the globe thus allowing the rapid—and at times instantaneous—transmission of ideas as well as feelings across a cyber space in which everyone could have equal voice. It is, I suspect, this promise of instantaneous linking that leads to the convening of this symposium under the title, "Networks without Borders".

E-learning, precisely because it combined the promise of technology, the new realities being imposed by globalization, and the renewed interest in how people learn, has proved the educational innovation that garnered the most venture capital, the most press, and, not surprisingly, the most grandiose promises. Among these claims made for *e-learning* three are worth specific notice. First and probably foremost, the marriage of the new, electronic based technologies and newly accepted theories of learning promised a revolution in pedagogy itself. Learning would be customized, self-paced, and problem based. Designers and facilitators would replace course instructors—"the sage on the stage" would become "the guide on the side". Students would be able to model outcomes, conduct experi-

ments based on well-documented laboratory simulations, rapidly exchange ideas with both fellow students and the teaching faculty, and, where appropriate, join international learning communities not unlike the international contract bridge networks that were springing up on the Internet.

Nor would this pedagogical revolution be limited to a learner's years of formal education, kindergarten through higher education. Corporate *learning* programs would be transformed as well. Entirely new batteries of skill-based learning sequences—covering everything from introductory accounting to advanced router maintenance and repair—and accompanying assessment and certification mechanisms would be developed. Just-in-time *learning* would become the norm with the individual employee-learners assuming primary responsibility for adding to their own portfolio of skills. There was even the possibility that the boom and bust cycle of corporate training that had traditionally tracked the ups and downs of the business cycle would have less impact on how and why employees acquired new skills.

E-learning's second promise derived from its ability to be delivered any time anywhere there was a computer and a connection to the Internet. Independently, analysts were already projecting a boom in adult education as more people sought to both start and finish baccalaureate and post-baccalaureate programs and to acquire the new kinds of skills on which a learning economy depended. For many, *e-learning* and distance education would become synonymous as both governmental agencies and private providers brought new programs to market. Life-long learning would become an electronic reality.

E-learning's third, and in many ways its most radical promise, was that the market would provide the financial wherewithal to fund the necessary innovations. Initially that funding would come in the form of substantial venture capital with which to launch the panoply of products a learning revolution would require. Thereafter tuition and other forms of product revenues would fund the expansion of the *e-learning* market. Predictions of *e-learning*'s likely bounty literally knew no limits. Probably the most quoted projections, those by Michael Moe for Merrill Lynch's 2000 white paper, *The Knowledge Web*—boldly proclaimed:

- Our estimates for the U.S. online market opportunity for knowledge enterprises will grow from $9.4 billion in 1999 to $53.3 billion in 2003, representing a CAGR [Compound Annual Growth Rate] of 54%.

- At an estimated $105 billion, the spending power of college students is huge. Not surprisingly, a growing percentage of their spending is moving online. Currently, students spend $1.5 billion online, an amount that is expected to almost triple to $3.9 billion by 2002.

- We estimate that the U.S. market for online higher education alone will grow from $1.2 billion in 1999 to $7 billion in 2003.

Moe, M., (2000) *The Knowledge Web*. New York, New York. Merrill Lynch and Company.

With that level market anticipation at hand, a uniquely American stampede began. Columbia University launched Fathom; New York University nearly matched those efforts with NYU. online. Cardean University became the model of a for-profit / not-for-profit collaboration in which some of my country's and Europe's best known universities partnered with UNext to launch a high cost-high prestige model of international business education. Individual states made similar investments, choosing to focus instead on providing low-cost, but ready access to the educational assets already available on publicly funded university campuses. California's brief fling with its own electronic university and the better known Western Governors University were probably the two best known examples, though efforts in Massachusetts, Maryland, and Missouri in the end demonstrated more staying power.

Not surprisingly, perhaps, the reality never matched the promise—not by a long shot. There has been no pedagogical revolution—though there has been a noticeable shift in corporate training spurred in part by the economic downturn that once again reduced training budgets and training staff. Fathom and NYU.online are gone—Cardean U and UNext are in the process of their third or fourth makeovers. There has been no real burgeoning of distance education—the limited number of successes owe more to their past market triumphs—as in the case of both University of Maryland's University College and the University of Phoenix—than to the effectiveness of the new technologies.

E-learning's altered fortunes have occasioned considerable comment. More often, now it is the butt of bad jokes—as in, "Can you imagine telling your children to go to their rooms and study college for four years?" In general the cynics have had a field day, pointing out that *e-learning* was just one more fad, more hype than substance whose demise proved to be little more than an echo of the bursting of the dot.com bubble.

For the last three years, William Massy and I have been engaged in a major effort, funded by the Thomson Corporation and sponsored by the University of Pennsylvania, to track the market for *e-learning* in order to understand what happened and why. We called our efforts the *Weatherstation Project* because to collect the necessary data we established interview panels (the project's weather stations) in six corporations and on six university campuses. What we discovered, in a nut shell, was that *e-learning* had come to have all the hallmarks of an innovation that stalled-out because it took off too quickly and because, ironically, it misunderstood the kind of educational experiences learners wanted and overestimated their eagerness to achieve those ends electronically.

We have come away from this project with two principal convictions about *e-learning*. First, the story is still unfolding—no one really knows what tomorrow will bring though we suspect that computer based learning technologies will continue to be a major source of innovation. The underlying information technologies on which *e-learning* depends are themselves too ubiquitous and the people attracted to having them serve as learning platforms are too smart for us not to take seriously the prospect that major changes will flow from their efforts.

Our second conviction is that it is important to understand what happened to *e-learning* over the last decade, both as a means of better gauging what is likely to happen in the future and as a means of better understanding how and why technologies can shape as well as not shape educational processes. What made *e-learning* such an attractive investment, both in terms of those who invested their time and energy and those who invested venture capital? While all innovations over promise, why were the claims made on *e-learning*'s behalf so extravagantly wrong? Did *e-learning* simply flame out on take off? Or is it possible that once the hoopla has died down that *e-learning* will now follow the same path as other innovations that begin with the first experimenters and champions, move through the group of early adopters before becoming common place and expected? Given that *e-learning* will be judged by its capacity to win a place in an increasingly competitive education market space, how should one gauge the likely size of *e-learning*'s share of that market—both now and prospectively?

What Happened?

Probably the most productive way of deciphering what happened is to examine the three basic assumptions that defined *e-learning*'s potential—and the extent to which those assumptions proved to be less than accurate.

○ If we build it, they will come.

As in most innovations, those responsible for the experimentation that yielded the first products simply assumed "if we build it, they will come". Almost all of *e-learning*'s first applications began in precisely that way—individual experiments whose interesting results, *e-learning*'s first innovators believed, would attract the attention of other experimenters and eventually the interest of the practice community. Not surprisingly, then, most descriptions of both the spread and the potential of *e-learning* derive either from catalogs of interesting experiments or collections of successful applications.

The best catalog tracking the rise and sometimes fall of *e-learning* experiments is Carol Twigg's *The Learning MarketSpace* which describes itself as "A quarterly electronic newsletter . . . highlighting ongoing examples of redesigned learning environments using technology and examining issues related to their development and implementation". Because *The Learning MarketSpace* funds as well as

reports on experiments using *e-learning* in American collegiate classrooms, its electronic pages provide a unique glimpse of the growing sophistication of strategies and programs as well as the development of the course or learning objects—the principal building blocks of any program offering electronically mediated education whether on the Internet or through some other form of electronic distribution.

The best collection of those course or learning objects has been assembled by MERLOT—an acronym that stands for Multimedia Educational Resource for Learning and Online Teaching. What MERLOT wanted to become was a readily available, low cost, web-based service to which individual experimenters could post their individual learning objects and from which interested practitioners could down load objects to use in the courses. A key part of the original design was the notion of a user community whose members would regularly rate and evaluate the quality and usability of the learning objects available through MERLOT. While the latter goal proved illusive in practice, MERLOT nonetheless became a unique depository that allowed the *Weatherstation Project* to track the changing composition of *e-learning*'s user community as well as the shifting emphases of *e-learning*'s subject matter.

What perhaps unintentionally both *The Learning MarketSpace* and MERLOT documented, however, was the fact that *e-learning*, at least on American college campuses, was not taking off. The learning objects posted to MERLOT were not becoming more sophisticated. Users continued to share what they had produced without evidencing much interest in rating or evaluating what others were offering. There was no loop in the sense that there was no evident connection between the suppliers and consumers of learning objects. Indeed, if one follows MERLOT's postings over nearly two years as the *Weatherstation Project* did, one comes away with the feeling that there really weren't any consumers at all—only innovators and inventors eager to show what they had accomplished—no fault of MERLOT's but rather another indication of a market that has yet to develop. Here a quantification of the excellent data MERLOT provides helps. Through the Spring of 2003, the total number of faculty members registered with MERLOT were less than 10,000—out of a total of more than 1,000,000 total teaching faculty in the US and more than 500,000 fulltime faculty in the US. MERLOT's total market penetration amounted to less than one percent.

Tracking MERLOT revealed a second important aspect of *e-learning*'s trajectory. There is yet to emerge any sense of a dominant design—the kind of dominant design that is almost universally characteristic of successful innovations that actually take off, first becoming widely distributed and then actually ubiquitous. In the realm of technology there are at least three dominant designs that can be cited as examples. The first is the evolution of spreadsheet software—beginning with VisiCalc, proceeding through Lotus-1-2-3, and ending with Microsoft's Excel. Different products, different internal designs, but all adhering to the basic design of a spreadsheet consisting of rows and columns. The second example of a dominant design is the emergence, ironically, of the Apple pioneered use of icons for

desktop navigation—a dominant design that every designer of user-friendly software employs as a matter of course. The third is the kind of web-crawl GOOGLE pioneered and which ultimately provided that service a dominant market position.

Nothing like that has occurred with *e-learning*. Even the course management tools—BlackBoard and WebCT being the best known—have not established a dominant design. And in the realm of learning objects, anything goes. The range of modalities remains so broad as to be wholly confusing. There is still no sense that if "I know how to use one *learning* object I basically know how to use all or most learning objects in my field". But that is what most users want and expect largely because they know that the user-interfaces of most of the software applications they use have achieved that kind of transparency through the application of a dominant design.

Carol Twigg in the most recent issue of *The Learning MarketSpace* offers an important summation of what The *Weatherstation Project* has now documented. Wistfully listing her comments under the header "Build It, But Will They Come?" she writes about MERLOT and MIT's OpenCourseWare Project,

> This approach has several drawbacks. Entries are selected and mounted by interested individuals, but the materials are not tied to improved student learning outcomes. Many of the included learning objects are intended for specific (and possibly unique) upper division courses that are not necessarily part of the curricula at other institutions. Other materials are designed for sophisticated students and may not be relevant to a more diverse student body at other institutions. In addition, these projects tend to assume that more options are always better. MERLOT cites "links to thousands of learning materials" as one of its benefits, yet only a tiny subset has been evaluated by anyone other than the contributors. Most importantly, these projects lack a methodology for transfer to other institutions. Their strategy of hope-for-the-best has been tried many times in the past and failed (e.g., programs supported by Apple and IBM in the 1980's and 1990's, and attempts by national organizations like Educom).
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> Twigg, C. (July, 2003) *The Learning MarketSpace*.

What Twigg refers to as a "hope-for-the-best strategy" of transfer and dissemination is a good description of *e-learning*'s current predicament—and an explanation as to why this innovation's champions have built a field of dreams that, for the most part, has proved attractive only to them.

○ The kids will take to *e-learning* like ducks to water.

Talk to most faculty or staff members at a university community two years ago and they would be nearly unanimous in their assessment as to whether students would be in a position to utilize com-

puter based learning—either a course on the Internet or a in-class course that used a course management system or learning objects—and they would be incredulous that you made such an inquiry. When *Weatherstation* interviewers posed this question in the fall of 2001 they were told, "Not a problem—the kids take to *e-learning* like ducks take to water. After all, they love games and love the technology, and are dismissive of professors who seem to have trouble navigating BlackBoard and think that PowerPoint is state of the art".

When asked, however, how comfortable students would be if, for a particular course or program, *e-learning* were substituted for in-class instruction, the members of *Weatherstation's* campus panels were less sure. Eighteen months ago, just over half the administrative staff surveyed—for the most part administrators with responsibility for supporting faculty in their role as teachers—said students would have little or no trouble if *e-learning* was substituted for in-class instruction. One third of the group said students would have some, but not a lot of trouble with the substitution; and just 15% said most students would likely have a lot of trouble accepting *e-learning* as a substitute for in-class instruction. A year later the distribution of opinion among the administrative staff in the *Weatherstation's* panels was roughly the same: 46% said there would be no problem; 11% said most students would have difficulty; and 41% said most students would have some but not a lot of trouble substituting *e-learning* for in-class instruction. The similarity of the two distributions, however, hides the fact that one out of every four members of these administrative panels changed their opinion over the course of a single year—with 15% of the panel saying they now believed students would have more trouble and another 10% saying that students would actually have less trouble. What is important to note here is the volatility of the responses. Among administrators, only the questions about *e-learning*'s market position and institutional priority generated a greater degree of change over the course of a year.

Faculty responses generally mirrored those of their administrative colleagues, though in more muted tones. When first asked if they thought most students would have trouble substituting *e-learning* for in-class instruction, the faculty members of *Weatherstation's* campus panels broke into near thirds: 37% said students would have little or no trouble; 32% said most students would have some, but not a lot of trouble; and 31% said most students could have a lot of trouble with the substitution. As is in the case of their administrative colleagues, one of the characteristics of faculty opinion on this issue was noticeably volatile. How many faculty changed their mind over the course of the year? —nearly one in five, though again the overall distribution of opinion remained about the same.

In the spring of 2003 the *Weatherstation* team visited three of the campuses that had participated in the project—Foothill College in California, Hamilton College in New York, and the University of Texas-Austin. In sessions with panel members the team asked why so much volatility in opinion on the issue of whether or not students would have trouble substituting *e-learning* for in-class instruction. The answers reflected a growing appreciation of the fact that initial assumptions about *e-learning*

were being modified by experience along with a sense that no-one had ever asked the students whether they actually liked *e-learning* or not.

Several weeks after the team's visit to Austin there appeared in *Daily Texan* an opinion piece by one of the University of Texas' senior honor students. Her column is worth quoting in some detail, not because in and of itself it proves that students are becoming distrustful of what she called "teaching technology", but because it gives voice and language to those doubts.

> The fairy tale of *e-learning* assumes that classroom technology enhances the *learning* experience for both the professor and the students. The reality of such educational technology is far from ideal. Often poorly integrated into a course, its use skews the balance of content and technology and lessens dynamic interaction among students and between students and faculty. . . .
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> The use of teaching technology can quickly transform into a pedagogical crutch. In an upper-division linguistics course last fall, the daily lecture consisted of no more than a PowerPoint presentation and printed handouts of the same display. This un-innovative approach reduces the role of the teacher to a mere conduit that transmits ideas into student depositories.
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> Particularly troubling are the choices of lower-division language classes to implement technology that might allow for a greater quantity of students but lessens the quality of the education. . . .
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> A prime example of the increasing pervasiveness of classroom technology is the electronic textbook. The e-book makes technology the primary educational tool, even though many students seem to prefer to use technology as a secondary source. Consider the case of Management 320F last fall when the chosen text was electronic. Professor Victor Arnold initially ordered enough print copies of the textbook for less than a quarter of the class. Students could buy a download version of the e-book or purchase a password that would allow a page to be viewed a maximum of four times. Yet one-third of the class opposed the e-book and lobbied for more print copies to be ordered.
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> Isensee, L. (January 28, 2003) *The Daily Texan*. Austin Texas

The University of Texas also provided an important clue as to why the students' interest in games and their quick adoption of most computer-based technologies did not translate into an interest in *e-learning*. One of the senior managers of the University CO-OP, the university's mega bookstore, told the *Weatherstation* team to check out "the kind of software the kids were buying". The team did, checking with the bookstores on each of the campuses participating in the *Weatherstation Project* and then turning to the *Chronicle of Higher Education's* monthly tracking of the "Best-Selling Software at College Bookstores". The results were fascinating. Last June, for example, basic Microsoft products accounted for five of the ten best sellers. Number seven on the best-seller list was the leading anti-virus software, Norton, reflecting the heightened concern over a raft of viruses and worms then infecting machines worldwide. The remaining four? In order, Adobe Photoshop, Adobe Acrobat, Macromedia Studio MX, and Macromedia Dreamweaver MX. Photoshop is for editing, arranging, enhancing,

and distributing photographs. Acrobat allows the reader to read and prepare PDF files. Dreamweaver allows the user to construct sophisticated web-sites. And Macromedia Studio MX, to quote the product's web-site, "provides professional functionality for every aspect of web development and includes the newest versions of Dreamweaver, Flash, Fireworks and FreeHand". What this last set of software products have most in common is their capacity to allow the user to prepare and distribute complex presentations. Or, as the manager of the Texas CO-OP reminded the *Weatherstation* team, this software is principally about showing off.

The implication, borne out in subsequent interviews, is that student fascination with computers and software has three major components. They want to be connected, principally to one another. They want to be entertained, principally by games, music, and movies. And they want to present themselves and their work. As most faculty in the U.S. have learned, students have become almost obsessively adroit at "souping-up" their papers which they submit electronically and which they festoon with charts, animations, and pictures. As one frustrated professor who had just spent a half-hour down loading a student's term paper was heard to remark, "All I wanted was a simple 20 page paper—what I got looks suspiciously like the outline for a TV show".

All of this devotion on the part of students to complex presentations of self, most promoters of *e-learning* simply missed. The students they saw in their mind's eye were gamers who would love simulations, who would see in the computer a tool for problem solving, who would take to *e-learning* like ducks take to water. And in fact there are some students just like that, though, for the most part, they are concentrated in engineering schools. The most successful *e-learning* experiment was Studio Physics developed by Jack Wilson then at the Rensselaer Polytechnic Institute (RPI). Studio Physics is taught wholly on the computer in especially designed "studios" in which students work in two person teams on upwards of 25 computers. There are faculty who circulate through out the studio giving help and instruction as needed as each student pair works through a complex set of problems and computer simulations designed to teach the basics of introductory physics. The program worked at RPI and more than a dozen other institutions because the curriculum itself was problem-based, simple graphics could be used to simulate physical properties and rates of change, and the students themselves saw Studio Physics an example of the kind of system they had come to this engineering school to learn to develop.

It is a set of characteristics that is hard to match for other curricula. It is also important to point out that Studio Physics remained a group activity. The students came to class, worked directly with their partners and with the faculty assigned to the Studio. No one was isolated—no one was off in a room by him— or herself with just a computer and a set of *e-learning* exercises.

The importance of an actual, physically intact learning community can be demonstrated in anoth-

er way. Three of the universities participating in the *Weatherstation Project* had launched extensive programs of distributive instruction that used web-based *e-learning* modules as the principal means of instruction. By intention and design they were to be programs of outreach capable of enrolling part-time adult learners distant from the campus. What each of these universities discovered, however, was that better than 80% of those enrolling in the *e-learning* courses were full-time students living on campus. Some apparently took these *e-learning* courses because they were interested in or curious about computer based instruction. Most students enrolled in these *e-learning* courses because they were "convenient" and because they were on campus the *e-learning* experience was neither remote nor detached, but simply there.

○ *E-learning* will force a change in how we teach

One of the more hopeful assumptions guiding the push for *e-learning* was the belief that the use of electronic technologies would force a change in how university students are taught. Only bureaucratic processes have proved more immutable to fundamental change than the basic production function of higher education. Most faculty today teach as they were taught—that is, they stand in the front of a classroom providing lectures intended to supply the basic knowledge the students need. Those who envision a changed, more responsive *learning* environment have argued that the most effective instructor is not the "sage on the stage", but rather the "guide on the side". Learning, they have argued, works best when it is participatory. Students can become effective problem solvers only once they have mastered the art of critical thinking and have acquired the discipline to be self-paced learners. Constant assessment and feedback are critical so that both student and instructor can know before it is too late if the student is mastering the necessary material.

Each of these goals *e-learning* seemed more than ready to satisfy. As Studio Physics at RPI demonstrated, in fully integrated *e-learning* courses, the faculty are in fact guides—and designers and mentors and conveners. They are not presenters unless they happen to have filmed themselves doing an experiment or conducting a simulation and then made those images available on their students' computers. The student pairs were exactly the kind of interactive *learning* groups the reformers envisioned. The feedback was immediate and continuous. Students knew if they got the right answer or were at least proceeding in the right direction just as soon as they submitted their answers to the problem sets they were working on. What the designers of Studio Physics also learned is that there could be no hidden assumptions—no relying on one's intuition or past experience to know when and how to introduce new topics. For the first time many of the faculty involved in Studio Physics had to spell out their teaching strategy as well as think through what kinds of learning strategies their students were likely to bring into the Studio.

Alas, Studio Physics is the exception, not the rule. For the most part, faculty who make *e-learning*

a part of their teaching do so by having the electronics simplify tasks, not by fundamentally changing how the subject is taught. Lecture notes are readily translated into PowerPoint presentations. Course management tools like BlackBoard and WebCT are used to distribute course materials, grades, and assignments—but the course materials are simply scanned bulk packs and the assignments neither look nor feel different than in the past. Even when the text book comes with an interactive CD or when the publisher makes the same material available on a proprietary web-site, most faculty do not assign those materials. Where there have been modest breakthroughs is in the use of email to communicate rapidly and directly with students and in the adoption of computerized testing materials, many of which provide a more robust, but still static means of evaluation.

A number of people are coming to believe that the rapid introduction of course management tools have actually reduced *e-learning*'s impact on the way most faculty teach. BlackBoard and WebCT make it almost too easy for faculty to transfer their standard teaching materials to the web. While BlackBoard's promotional materials talk about enabling faculty to use a host of new applications, what the software promises upfront is the ability for faculty "to manage their own internet-based file space on a central system and to collect, share, discover and manage important materials from articles and research papers to presentations and multimedia files". All that is really needed are the rudimentary electronic library skills most faculty have already mastered. BlackBoard and WebCT allow the faculty who use them to respond, when asked, "Are you involved in *e-learning*?" by saying, "Yes, my courses are already on-line!"

Even the most adventurous and committed faculty members often approach the use of *e-learning* in ways that lessen its general impact on the curriculum. On each of the campuses participating in the *Weatherstation Project* faculty were initially recruited to experiment with *e-learning* by offering them technical support, summer salaries, and the ability to make their *e-learning* course on any subject of interest to them. With this level of support, most of the courses were well designed, technically sophisticated, and, given the faculty member's total freedom to teach what they wanted, idiosyncratic. Once the course had been offered for two or three years, faculty member often moved on to other topics and different experiments, having satisfied the faculty member's own interests and curiosity. Then the courses died simply because no one wanted to teach someone else's *e-learning* syllabus. What these universities began to discover is that they constantly had to make extra incentives available to the faculty they wanted to involve in *e-learning*. When the expenditures of those funds became too expensive, the institutions dropped the incentive programs and witnessed a general flattening of *e-learning* adoptions and experiments. All but forgotten, by then, was the idea that *e-learning* might lead to a more general reformation of both teaching and learning styles.

A Fourth Assumption

Actually more hope and anticipation than assumption was the belief held by many of *e-learning*'s early proponents that electronically mediated learning would lead rapidly to the development of international networks linking both scholars and learners. This conference, and its central theme of networks without borders, draws on those hopes and that sense of anticipation. On the scholarly side, many of those networks now exist, leading to lively exchanges, shared research, and cooperative investigations. On the *e-learning* side, however, the big news at any moment concerns what is about to happen rather than what has actually been accomplished.

What is now better understood is that most *e-learning* takes place within national borders and contexts, reinforcing the fact that place remains of paramount importance. Little is actually known in one country about the *e-learning* capacities of other nations unless those products are advertised on the web in English. Over the last two years, Professor Kaneko of Tokyo University and his colleagues, principally Naoki Ottawa of Todai and Fujie Yuan here at NIME, have employed some of the same search-probes to analyze Japanese *e-learning* web sites as the *Weatherstation Project* uses to analyze *e-learning* web-sites primarily tailored for American audiences. Two conclusions are possible. First, Japanese *e-learning* on the web is just beginning and the products remain both limited in variety and rudimentary in style and design. At the same time, the Japanese web-probes make clear that in some very important ways what has market appeal in Japan can be of little interest to the American market. For example, one of the largest product categories among the Japanese web-sites is language instruction and acquisition—a subject that is simply not present on the American web-sites. When *e-learning* products begin to penetrate the market they usually do so by appealing to immediate, often very local needs. Eventually, no doubt, there can be a merging of interests and products. In the beginning, however, it is differentiation and specialization along lines defined by national cultures and local proclivities that matter most.

There are two important exceptions to this generalization. The first involves tests and examinations that students require if they seek admission to an American or international university—principally the SAT and TOEFL. Prometric and its Japanese affiliate R-Prometic do have internationally configured networks spawned by the need to insure the fair and efficient administration of these exams. But Prometric—and similar electronic based testing organizations—serve rather than link their customers. To the extent there is a network it is of providers rather than learners.

The second exception is the development of a variety of high cost, high prestige programs of business education, usually leading to the MBA, involving some of the western world's best known universities and business schools. Initially the most visible as well as the first to launch a well-conceived

and well-financed set of products designed to serve a world-wide market for business education was Cardean University, a joint venture of five major business schools—Stanford, Columbia, Carnegie Mellon, Chicago, and the London School of Economics—and UNext, a major Internet education company. The problem was that the web-based products, despite the prestige and visibility of Cardean's sponsors, never attracted the volume of students it required to be a successful business enterprise.

More recently Universitas 21 has sought to make a web-based, but nonetheless top-end business education available to students in developing countries, offering MBAs at roughly 20% of the price of the in-residence programs the sponsoring universities offer. A different set of institutions—for the most part either present or former British Commonwealth universities—forged a joint venture with the Thomson Corporation, the single largest economic enterprise with major investments in programs of *e-learning*. Launched just this past August, it is too early to tell if Universitas 21's educational offerings will attract students in sufficient numbers to sustain the enterprise. Already, however, the skeptics have cast their doubts. The *Chronicle of Higher Education's* news story noted,

> at least one online-education expert says that the consortium may have set its expectations too high. "What sells in education is price and name", says A. Frank Mayadas, director of the Alfred P. Sloan Foundation's grant program for online education. A new entity like Universitas 21 Global may not be needed, he says, now that many well-known public and private universities offer distance-education degrees that students anywhere in the world can take".
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> Olsen, F. (August 28, 2003). *The Chronicle of Higher Education*. Washington, D.C.

What Mayadas should have added, however, is that while readily available, such courses also have problems enrolling sufficient numbers of students to recoup their initial investment.

The promise of an international community of learners accessing a common set of educational products and thus becoming a true network without borders is not less appealing—but fulfilling that promise remains a somewhat distant goal.

Not the end of the story

As part of his work for the *Weatherstation Project*, my colleague William Massy has been examining the thwarted nature of the *e-learning* revolution, asking, "Why did the boom go bust?" His answer goes something like this. *E-learning*, particularly in the United States, attracted a host of skilled entrepreneurs and innovators who saw as their most immediate goal establishing early prominence in an industry that had yet to be defined. They sought to achieve market position quickly, lest others get there sooner and close the door behind them. In seeking that advantage they were aided by two phenomena peculiar to postsecondary education and to the times. First, the boom in commercial investments in *e-*

learning enterprises followed more than a decade of experimentation by faculty with the use of computers in teaching—a good example was the development of "Virtual Shakespeare" at Stanford University. A few experiments even flowered into commercially successful products like Maple and Mathematica, applications designed to teach students calculus using electronically mediated instruction. While such work involved only a minority of faculty, they were enough to advocate the new technology and assure university leaders that the expertise needed for *e-learning* ventures was available. As it turned out, however, that experimentation proved to be too narrow to feed the *e-learning* boom that followed.

The dot.com boom provided a second major impetus. It spawned rosy estimates of the market for Internet-based services—Michael Moe's extrapolation of a trillion dollar market was actually but one of a dozen or more highly publicized claims. Assured by the technology's advocates that the necessary expertise was in hand or soon would be, entrepreneurs both inside and outside traditional post-secondary education rushed to market with *e-learning* ventures. A veritable feeding frenzy ensued, with large amounts of time, effort, and capital being committed to *e-learning* development and marketing.

In retrospect, the rush to *e-learning* produced more capacity than any rational analysis would have said was needed. Fundamentally the boom-bust cycle in *e-learning* stemmed from an attempt to compress the process of innovation itself. The entrepreneurs' enthusiasm produced too many new ventures pushing too many untested products—products that, in their initial form, turned out not to deliver as much value as promised. Some successes were recorded and certain market segments appear to be robust and growing, but overall the experience was disappointing.

There were lots of after-effects to e-learning's inevitable crash, though perhaps the most dangerous was that the experience jaundiced the academy's view concerning the actual value of technologies promising electronically mediated instruction and the market's willingness to accept new learning modalities. The hard fact is that *e-learning* took off before people really knew how to use it—before anything like a dominant design was even on the horizon. What was missing in the first instance was a proven knowledge base of sufficient breadth to persuade faculty that adaptation was necessary. As a result, *e-learning* entrepreneurs assumed a much higher level of risk than they bargained for—and not surprisingly, most ended up paying the price.

Through it all, *e-learning* has retained a core of true believers who argue, still forcefully and often persuasively, that a revolution is at hand—that the computer will do for learning today what printing did for scholarship in the 15th century. Don't be fooled by the failures and false steps, they proclaim, the best is yet to come.

More quiet and also more numerous are the pragmatists in the middle. They point out that *e-learning* is alive and has, in fact, spurred a host of important educational changes. Money is being spent, smart classrooms are being built everywhere, and collegiate faculty and corporate trainers are successfully integrating electronically mediated learning into literally thousands of courses focusing on both traditional and non-traditional subjects. What these pragmatists have come to understand is that *e-learning* has and will continue to evolve in ways few initially predicted.

The story of *e-learning* is now far enough along to venture an informed guess as to what must happen for *e-learning* to achieve its full potential. The first set of the necessary conditions concern changes within the academy itself.

- The future of *e-learning*, particularly for full time students on campuses, is linked to the pace of educational change and reform. *E-learning* will not be adopted as a standard mode of instruction unless there is a sense that there needs to be a systematic improvement in educational quality especially for undergraduate education—and the sense that *e-learning* can make a major contribution in terms of more effective as well as more efficient learning. What is required is a commitment to organized quality processes that transcend curricular innovation, stress technology as an important tool for improvement, and do not assume things are going well absent evidence to the contrary.

- Once a significant number of institutions, including a fair share of market leaders, have determined that *e-learning* provides educational advantages, these institutions will find themselves addressing questions of costs and efficiencies. What adopting institutions will require is a methodology that allows for the calculation of the economic contributions as well as the costs of on-campus *e-learning*—and how those contributions and costs compare to those of more traditional forms of on-campus instruction.

- With the necessary educational incentives and costs analyses in place, the final step in this on-campus process will be for institutions to better understand—and hence be able to talk about and make a central feature of their strategies and plans—how *e-learning* can allow for a less rigid set of trade-offs between costs and quality. What is required is a fundamental change in a mind-set that heretofore assumed that education's production functions are largely fixed—that is, a change to one part requires corresponding changes to all the other parts because the relationship between inputs and outputs is fixed. What the widespread adoption of *e-learning* requires, in the final analysis, is a broad willingness on the part of adopting institutions to search for more flexible combinations of inputs: people, facilities, technology.

The next set of necessary conditions for the growth and expansion of *e-learning* focus on the technologies that make electronically mediated learning feasible.

- First, there needs to emerge a dominant design, particularly for the *learning* objects that are *e-learning*'s building blocks. It is not just a matter of making them more easy to create—though that is important—but making them more interchangeable and more easily linked with one another. Here it helps to think of a railroad marshalling yard in which the railroad cars are the learning objects that are being assembled behind locomotives that are the user-interface drivers of an efficient *e-learning* system. The marshalling yard only works if the cars all have the same gauge and have common couplers.

- At the same time it is important that *e-learning* designers resolve questions of what students expect from *e-learning* as an extension of their interest in other technologies. Here, what is required is finding ways to motivate students to learn using the technologies, and to bring human interaction into the equation in optimal ways.

Finally, because *e-learning* was presented as an innovation that could be financed through venture capital and market revenues, there will have to be some market successes as well.

- More specifically, there will have to be a few showcase ventures that generate revenue growth sufficient to sustain continuing innovation without continuous infusions of capital. In this arena, nothing will succeed like success.

- At the same time there will have to develop a robust and growing "market" among providers for *e-learning* objects. Economies of scale in *e-learning* depend critically on the ready importation of learning objects. Finding, acquiring, and using such objects in courses needs to become an accepted element of faculty effort.

These, then, are the conditions necessary for *e-learning* to expand and flourish. I count myself among the optimists who believe electronically mediated learning will become a standard, perhaps even dominant mode of instruction. But I also understand that progress over the next decade is likely to be slow, probably best described as plodding. The technology's skeptics, emboldened by the fact that to date *e-learning*'s failures have been much more prominent than its limited successes, will challenge each new product and innovation. Ultimately, however, the lure of anywhere-any-time *learning* will prove irresistible—educationally as well as financially. The next, and I think equally likely step, will be to use the power of *e-learning* to establish the networks without borders that an increasingly fractured global community desperately needs. There are three practical steps that we need take now to start the process.

First, we need a catalog of lessons learned. My hope is that this keynote represents a start in that direction.

Second, we will need a more realistic mapping of the obstacles that must be overcome—in terms of the technology itself, in terms of insuring that universities in particular become platforms of adoption as well as sources of innovation and invention, and in terms of the market conditions that must change before *e-learning* truly takes off. I have also tried to provide an initial enumeration of those conditions this morning.

Finally, we will require a set of realistic strategies for developing the dominant designs and the networks that all of us want. My hope is that the discussions and papers at this Symposium will help launch that process.