A Learning Alliance Report

Thwarted Innovation

What Happened to e-learning and Why

by Robert Zemsky and William F. Massy

A Final Report for
The Weatherstation Project of The Learning Alliance at
the University of Pennsylvania
in cooperation with the Thomson Corporation

THE LEARNING Alliance FOR HIGHER EDUCATION

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Acknowledgements

The Weatherstation Project was first broached one night at a dinner of the executive committee of the National Center for Postsecondary Improvement (NCPI). Eventually the conversation turned to discussions of what each of us was planning to do once work for NCPI had been completed. Our suggestion that we were thinking about studying the market for e-learning was met immediately with guffaws—"The ink will be hardly dry on your report when it will be out of date!" Not the case, we responded: We wouldn't be writing a report but establishing *Weatherstations* to track the changing climate for e-learning both on college campuses and across corporate America." In the end, we did both—and in each case, our debts to others are substantial.

First and foremost we thank the leaders on the six campuses who allowed us to establish *the Weatherstations* that made this project possible. More often than not, it was they who explained e-learning to us rather than vice versa. In many ways, this report is theirs: Vivian Sinou, Dean, Distance and Mediated Learning, Foothill College (CA); David Smallen, Vice President for Information Technology, Hamilton College (NY); David A. Gift, Vice Provost for Libraries, Computing and Technologies, Michigan State University; Dean L. Hubbard, President, Northwest Missouri State University; James O'Donnell, then Vice Provost, Information Systems and Computing at the University of Pennsylvania and Peter Conn, Penn's Deputy Provost who took over for Jim when he left to become Georgetown's Provost; and Judy C. Ashcroft, Associate Vice President and Director, Division of Instructional Innovation and Assessment, the University of Texas at Austin.

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The tracking of e-learning across the Web and the management of the *Weatherstations* was done by three accomplished graduate students at the University of Pennsylvania: Jesse Lytle, now of Mt. Holyoke College, Aimee Tabor, and Liza Herzog. They, quite literally, made the project work by making the work fun.

Our final debt is to the Thomson Corporation. The officer with whom we worked most closely was Michael Brannick, President of Prometric. As Michael would be the first to say, our results proved "quite a bit different from what. . . [he] envisioned" when we launched the project three years ago. Despite his misgivings, he helped at every turn, sharing his experiences as well as his contacts with us.

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Report Summary

Thwarted Innovation is a major new study from the University of Pennsylvania in collaboration with the Thomson Corporation, which answers the question: "Why did the boom in e-learning go bust?" Researchers Robert Zemsky and William F. Massy used e-learning Weatherstations at campuses across the country to decipher precisely what happened and why. In the end, they trumped three of e-learning's most troubling assumptions.

- **If we build it they will come—not so**; despite massive investments in both hardware and software, there has yet to emerge a viable market for e-learning products. Only course management systems (principally BlackBoard and WebCT)—and PowerPoint lectures (the electronic equivalent of clip-art) have been widely employed. At the institutions participating in the study, more than 80 percent of their enrollments in "online" courses came from students already on their campuses.
- **The kids will take to e-learning like ducks to water—not quite**; students do want to be connected, but principally to one another; they want to be entertained, principally by games, music, and movies; and they want to present themselves and their work. E-learning at its best is seen as a convenience and at its worst as a distraction—what one student called "The fairy tale of e-learning."
- **E-learning will force a change in the way we teach—not by a long shot**; only higher education's bureaucratic processes have proved more immutable to fundamental change. Even when they use e-learning products and devices, most faculty still 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. Hence, we see the success of course management systems and PowerPoint—software packages that focus on the distribution of materials rather than on teaching itself. What is *Thwarted Innovation*'s conclusion? E-learning will become pervasive only when faculty change how they teach—not before.

Thwarted Innovation refocuses the debate over the success or failure of e-learning because it has:

- **Tracked the changing attitudes about and perceptions of e-learning by faculty and technical staff** over 18 months across a wide sample of colleges and universities each with substantial investments in e-learning.
- **Mapped the changing supply of e-learning** providers and products.

Thwarted Innovation makes sense of these data by supplying a strategic story that explains what happened to e-learning and why. As Zemsky and Massy point out in their report: " In retrospect, the rush to e-learning produced more capacity than any rational analysis would have said was needed. In a fundamental way, 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. . . .The hard fact is that e-learning took off before people really knew how to use it."

Introduction

Three innovations have dominated the educational arena over the last two decades. The first is the development of high-stakes testing, in which educational providers are held accountable for the performance of their students on a host of national, standardized—and, in the case of the Trends in International Mathematics and Science Study (TIMSS), internationally normed—exams. The second innovation is the development of national, and occasionally international, ranking systems designed and marketed to inform the public about which institutions, firms, and programs represent the best providers of education.

The third major educational innovation—and the only one of the three that actually focuses on educational content—derives from the linking of rapidly maturing information technologies to a renewed interest in how, when, and why people learn. Dubbed "e-learning" and often linked to the dot-com boom and the promise of e-commerce, e-learning offered a truly student-centered approach to education. It boasted the potential of being design-rich, being capable of delivery anywhere and at any time, and being fully customizable to take full advantage of each individual student's personal learning style.

E-learning was also the innovation that garnered the most venture capital, the most press, and, not surprisingly, the most grandiose promises. Among the claims made to support e-learning investments, three are worthy of specific note. First and probably foremost, the marriage of new electronic technologies and newly accepted theories of learning promised to yield a revolution in pedagogy itself.

Learning would be customized, self-paced, and problem-based. Course instructors would be replaced by designers and facilitators—the "sage on the stage" would become the "guide on the side." Students would have the ability to model outcomes, conduct experiments based on well-documented laboratory simulations, rapidly exchange ideas with both fellow students and teaching faculty, and, where appropriate, join global learning communities not unlike the contract bridge communities that have made tournament bridge on the Internet an exercise in international competition. Feedback on student papers would be instantaneous—or nearly so. Course materials would be rapidly distributed at substantially lower costs than the antiquated, bookstore-supplied text books and bulk packs.

Nor would the pedagogical revolution be limited to either K-12 or higher education. Corporate learning programs would be transformed as well. Entirely new batteries of skills-based learning sequences—covering everything from introductory accounting to advanced router maintenance and repair—would be developed, along with accompanying assessment and certification mechanisms. Just-in-time learning would become the norm, with employee-learners becoming more responsible for amassing their own portfolio of skills. The possibility even emerged that the boom-and-bust cycle of corporate training that had traditionally tracked the peaks and valleys of the business cycle would have less impact on whether, how, and why employees acquired new skills.

E-learning's second promise derived from its ability to be delivered any time and anywhere a computer and connection to the Internet could be found. Already, analysts were projecting a surge in the demand for adult education, as more people sought to start and finish baccalaureate and post-baccalaureate programs, as well as to acquire the new kinds of skills on which an information economy depended. E-learning and distance education would become synonymous terms, as state agencies and private providers brought new programs to market. Lifelong learning would become an electronic reality.

E-learning's third and perhaps most radical promise was that the market would provide the financing necessary for the industry to live up to its potential. Funding would come first in the form of substantial venture capital to launch the panoply of products already in the offing and then in the form of market revenues to fuel to the necessary expansion. Predictions of e-learning's bounty literally knew no limits. The most quoted projections—those made in 2000 by Michael Moe in the Merrill Lynch 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 percent.

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 which 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.

With that level of market anticipation at hand, the rush was on. Columbia University launched Fathom. New York University nearly matched those efforts with NYUonline. Cardean University became the model of for-profit/non-profit collaboration, in which some of the best known American and European universities partnered with UNext to launch a high-cost/high-prestige model of business education. Individual states made similar investments, choosing to focus on providing low-cost, 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 most widely recognized examples, although efforts in Massachusetts, Maryland, and Missouri in the end demonstrated greater staying power.

Not surprisingly, perhaps, the reality never matched the promise—not by a long shot. There has been no pedagogical revolution, although 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 NYUonline are gone; Cardean and UNext are in the process of their third or fourth makeovers. While there has been a burgeoning of distance education, the big success stories owe more to their past market triumphs—as in the case of both the University of Maryland's University College and the University of Phoenix—than to any particularly imaginative melding of learning and technology.

E-learning's altered fortunes have occasioned considerable comment. More often, e-learning is now 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, exhibiting more hype than substance, whose demise proved to be little more than an echo of the dot-coms' bursting bubble.

However, to dismiss e-learning as just another fad or, worse, a bad joke is to miss the point. Understanding what happened to e-learning and why is critical if we are to understand how and why technologies are likely to affect educational processes both now and in the future. What made e-learning such an attractive investment to both those who contributed sweat equity and those who contributed venture capital? While all innovations overestimate their promises, why were the claims made on e-learning's behalf so extravagantly off-the-mark? Did e-learning simply flame out upon takeoff? Or is it possible that, once the hoopla has died down, e-learning will follow the same trajectory as other innovations that first begin with experimenters and pioneers, then expand to a group of early adopters before becoming commonplace and taken for granted? Given that e-learning will be judged by its capacity to win a

place in an increasingly competitive higher education market, how should one gauge the likely size of e-learning's share of that market—both now and prospectively?

Where's the Data?

It is to those who have asked these and similar questions that *Thwarted Innovation: What Happened to e-learning and Why* is addressed. What we sought in this study was a conceptual understanding of this phenomenon's process of change and innovation, on the one hand, and a practical way of estimating e-learning's current and future trajectory on the other.

We first wrote about e-learning and the rapidly changing world of information technology in *Using Information Technologies to Enhance Academic Productivity*, a 1994 EDUCOM monograph that emerged from a Wingspread-sponsored roundtable. More recently, Massy returned to this subject in *Honoring the Trust: Quality and Cost Containment in Higher Education*, while Zemsky began exploring key measurement issues as part of *The Weatherstation Project*. This major effort, funded by the Thomson Corporation in partnership with the University of Pennsylvania, sought to develop tools for gauging how fast and in what direction the market for e-learning was growing.

The Weatherstation Project was intended as an antidote to those first descriptions of the market for e-learning, which were often warped by missing data and overly hopeful assumptions about how quickly new products would come to market and how receptive learners and instructors were likely to be. What we knew when launching this project in the summer of 2001 was that facts were lacking. There had been no tracking of students, products, or purchases. No one knew how many students or workers were taking e-learning courses in any given year, nor how much either businesses or colleges and universities had spent in pursuit of e-learning initiatives, nor what students or employees themselves had spent. Even less was known about the structure of the market for e-learning. How was it segmented? Who constituted the major niche players? Equally unknown was whether e-learning's promised economic efficiencies were allowing colleges and universities, in particular, to recoup their initial, often substantial investments in either hardware or software—or whether the promise of new enrollments on the part of remote learners was proving sufficient to justify continued investments in web-based distance education.

The educational data were nowhere to be found. No standard category in the surveys comprising the federal government's annual Integrated Postsecondary Education Data System (IPEDS) asks institutions to report the number of course credits they award online or the number of transfer credits they grant for online courses. No agency counts how many online courses are offered as part of an institution's regular curriculum at either the undergraduate or graduate/professional level. No survey asks institutions to report how much they are spending on their e-learning initiatives.

Similarly, there are no national sales figures for e-learning software. One of the reasons

Michael Moe's projections proved to be so transitory was that they were based on market surrogates that overestimated the actual dollar transactions involved in the e-learning market. *The Knowledge Web's* 1999 figure of $1.2 billion spent on e-learning is an estimate that includes monies spent on communications, market aids, technical support, and maintenance, as well as software, professional training, and content creation. And the 2003 projected estimate of $7 billion is largely based on what Moe and his colleagues knew about the projected growth in computers, connectivity, and the utilization of the Internet.

What's the Concept?

In part, at least, data are lacking because e-learning is still a concept in search of consistent definition. Currently, three broad domains define e-learning's principal market niches:

1. **e-learning as Distance Education**. Mention e-learning, and most people still assume the reference relates to distance education or education delivered on the Web. In fact, the most successful forms of e-learning *are* the courses delivered on the Internet—courses that teach a particular subject; courses that are part of a degree program most often at the graduate or professional level; and, finally, courses that offer certification in a vocational or technical skill. For the most part, however, what the Web provides are merely correspondence courses distributed electronically.
2. **e-learning as Facilitated Transactions Software.** E-learning's second big triumph has been in the development and expansion of course management systems—BlackBoard and WebCT are the best known—that both organize courses and present materials online. Principally used within higher education, course management systems at many institutions link teachers with students, students with each other, and students to sources. Schedules and assignments are posted on the Web. Reading materials are available for download, replacing the proverbial "bulk packs" of an earlier innovation. An important, growing subset of this market involves computerized assessments—principally the grading of tests.
3. **e-learning as Electronically Mediated Learning.** The third category of e-learning—and the one that initially attracted the greatest attention—centered on the learning materials themselves rather than their distribution. This category includes a host of products, services, and applications; computerized test preparation courses (test prep) that prepare students to take the SAT, GRE, or any of a half-dozen standardized tests; complex, integrated learning packages such as Maple or Mathematica that teach elementary calculus; course objects that simulate everything from chemical reactions to social interactions to musical compositions; and tools like Macromedia's Dreamweaver and Flash that help students build their own websites and multimedia

presentations. This component of e-learning includes the interactive CD-ROMs as well as the websites that publishers of college textbooks are increasingly making an integrated aspect of their products. Despite their seemingly diffuse nature, what all these products and resources have in common is that they involve electronically mediated learning in a digital format that is interactive but not necessarily remote.

Over the two years during which *The Weatherstation Project* operated, we proceeded along parallel tracks. We understood that we would be unlikely to develop workable tools for measuring the market for e-learning unless we had a conceptual framework defining what it was we should seek. The way to test the conceptual framework was to see if we could produce meaningful measurements and, just as important, if we could understand what the data were telling us. Could we develop a plausible and realistic story explaining what was happening to e-learning and why?

We believe that we have succeeded on all three counts: that is, in offering a conceptually concise way of understanding e-learning principally as a market-driven innovation; in providing a concrete measurement strategy for tracking the e-learning market; and in evolving a plausible storyline melding construct and data. *Thwarted Innovation: What Happened to e-learning and Why* takes up each development in order—beginning by specifying a conceptual construct; proceeding to the development of measurement instruments and an analysis of the initial data those instruments provided; and concluding with a narrative laying out a means by which to gauge e-learning's future trajectory. In a sense, each of these sections can be read separately, though we would urge a consideration of the work as a whole.

Chapter 1: The Dynamics of Innovation

The story of e-learning is fundamentally about what students of the subject call "radical technological innovation." An innovation is judged to be radical when the invading technology has the potential to deliver dramatically better performance or lower costs in what previously had been a stable industry. The operative word is *potential*. When the new technology first emerges, it often appears to be clumsy and inferior to its established predecessor. In the beginning, it is the new technology's promise rather than its performance that attracts initial adherents. A large part of that promise is the vision of an altered future—one that is not only different, but also dramatically better.

In the case of e-learning, the convergence of personal computers and ubiquitous connectivity sparked a utopian vision in which teachers taught and students learned in fundamentally different ways. Just over the horizon was a world of active learners with teachers who guided and facilitated rather than proclaimed and judged. Learning would be both continuous and exciting, while the products of such learning would tangibly reward both learner and teacher. When e-learning was first introduced, now more than 30 years ago as Computer-Assisted Instruction (CAI), it was readily acknowledged that exploration of the new technology's future capacities had only just begun. While to the faithful the potential was clear and present, few pretended to know exactly how "going digital" would actually alter the day-to-day practices of professors.

Utterback and the Emergence of a Dominant Design

In actuality, much more is known about the dynamics of innovation, particularly about what happens when a new technology enters the marketplace. For one thing, the introduction of a radical new technology creates fluidity in both markets and product designs. New entrants to the field bring novel design concepts and target new market segments. Established firms field additional

innovations as they struggle to defend their territory. MIT's James Utterback, a leading authority on technology-based innovation, points out that, in the early days of a radical innovation, "Market and . . . industry are in a fluid stage of development. Everyone—producers and customers—is learning as they move along." But the fluidity is not sustained. Ultimately, as Utterback notes, in the case of a successful innovation, "Within this rich mixture of experimentation and competition some center of gravity eventually forms in the shape of a *dominant product design*. Once the dominant design emerges, the basis of competition changes radically, and firms are put to tests that very few will pass." What emerges from this competitive process is an innovation in a newly standardized format that readily attracts new users.

The early days of automobiles were characterized by just such a cycle. The number of automobile manufacturers peaked at 75 in 1923, but then dropped to 35 in the late 1920s and to 14 in 1960, even as the market expanded. Creation of the dominant designs we know today required a period of trial and error in engineering laboratories and in the marketplace. What gelled after 1923 was a standardized conception of an effective automobile: for example, one fueled by gasoline, not steam; a self-starter, with four- to six-passenger seating; and a vehicle with the all-steel enclosed body introduced by Dodge in that year. The pace of innovation, and the number of innovating firms, slackened once this dominant design emerged. Subsequent competition turned to product refinement, cost reduction, styling, and brand positioning. The slower pace of innovation boosted the premium on capital and market dominance, which in turn produced a further shakeout in the industry.

The triumph of the automobile as the world's primary form of transportation teaches a second lesson as well. The dominant design may take a long while to emerge, and it may involve changes not directly related to the precipitating technology. For example, the automobile's dominant design did not consolidate until a paved road system came into being and gasoline became widely available.

When cast in these terms, the parallel between automobiles as the key element in an innovative transportation system and computers as potentially the key element in an equally transformed postsecondary learning system is both instructive and prophetic. On and off college campuses, e-learning could not take off until wide-bandwidth Internet access was readily available, until smart classrooms were constructed, and until all faculty and students had access to computers—investments that students, universities, and most corporations have been making and are continuing to make. Still missing, however, are many of the key elements of a dominant design. The avenues are in place; still lacking is a standardized design for the vehicles that the system will employ.

Put another way, a radical innovation for a complex process such as e-learning requires more profound changes than simply creating an

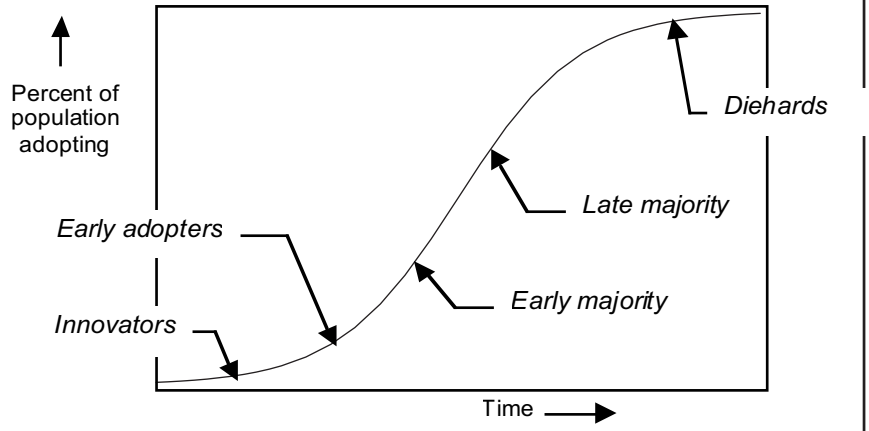
infrastructure: one's very conception of the supplying or consuming entity may have to change. When the innovation relieves one constraint, other constraints may well lurk close by. As these limits are overcome, as the innovation marches toward its dominant design, attracting the intellectual and financial capital necessary to establish a supportive infrastructure, the innovation itself becomes transformed—pushed in fewer directions, under the direct influence of fewer innovators, but all the while becoming more practical and hence attractive to a growing number of new users.

Innovation's S-Curve

E-learning's pattern of innovation, change, and adoption follows the classic S-curve shown in Figure 1a. The curve has been shown to apply to innovations as diverse as doctors' adoption of new drugs, farmers' adoption of hybrid corn, the railroad industry's adoption of diesel engines, and the emergence of the flat factory as manufacturing's dominant architecture. Adoption processes usually start slowly because of the need for experimentation. They accelerate once the dominant design emerges, and then eventually reach saturation. The actors at the various stages of adoption differ markedly. For example, innovators and early adopters are driven by different motivations and play different roles than the majority of users. Researchers usually categorize and characterize the actors in the following way:

- **The *innovators*,** who represent the first few percent of the eventual user population, seek out and experiment with new ideas—often driven by an intrinsic interest. They are the pioneers and, like other pioneers, must endure many trials and tribulations. Their role is to determine how to use the new product or service and demonstrate its potential value.
- **The *early adopters*,** roughly the next 15 percent of users, are moved to adopt once the innovators have proven the concept. They usually are tightly connected to others in the field and often are viewed as opinion leaders. Early adopters seldom consider themselves to be pioneers, but rather as hard-headed decision-makers who pursue the innovation for extrinsic rather than intrinsic reasons. But because they participate in the fluid stage of adoption, before

Figure 1a. The Stages of Technology Adoption



the dominant design has become established, they shoulder substantial risk. One of the early adopters' principal contributions to the emergence of a dominant design is their success at finding alternative ways to exploit the innovation and to test their alterations under normal conditions of use.

- **The *early majority***, roughly the next third of the population of eventual users, enters after the dominant design is established. They display less leadership than the early adopters but are open to new ideas and tend to be well-respected by their peers. They want to stay ahead of the curve, and in so doing they drive the first big wave of market expansion.
- **The *late majority***, the next third of the population of eventual users, are people who adopt after half the population has already done so. They are followers, either due to their conservatism or because their attention was focused elsewhere during the earlier adoption stages. Late-majority users drive the next wave of market expansion, which is characterized by intense competition as the innovation matures.
- **The *diehards*,** the last 15 percent or so, resist adopting the innovation despite its now-obvious advantages and the risk of becoming isolated. In the end, of course, the diehards die or retire from the field.

Innovation stages are usually described in terms of demand, but the ideas apply to the supply side as well. Innovating firms and the individuals who launch those firms conceive ideas and realize them in practice. Early adopters may be individuals, but more likely they are a part of the firms that bring the innovation to scale and test design alternatives in the marketplace. This role turns out to be critical for radical innovations such as e-learning. "Majority firms" expand the market and move it toward maturity, while "diehards" hold on by their teeth in declining markets. The same firm, or its precursors or descendents, may play all five roles at different times.

Market saturation occurs when the ranks of potential adopters have been depleted. Further growth may be limited to increases in the user population, or the stage may be set for a new breakthrough and a new adoption cycle. The breakthrough may introduce the innovation to new market segments, or it may represent new applications in current segments. Either way, it superimposes a new S-curve on the earlier model.

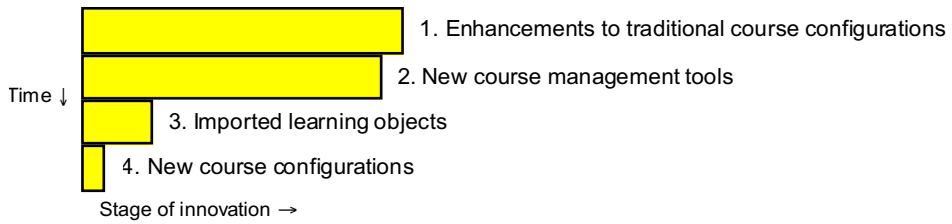
e-learning's Adoption Cycles

On occasion, new and nearly simultaneous waves of related innovations occur. The overlapping of innovations' adoption cycles produces a complex situation that is more difficult to analyze and predict, even though the underlying dynamics follow the traditional S-curve. Today's applications of technology to on- and off-campus teaching and learning present this kind of complexity, in large part because they have undergone four distinct adoption cycles, as depicted in Figure 1b.

Each cycle represents a different stage of innovation that also requires a different level of change in the existing instructional culture. In

theory, each ought to build upon the previous adoption cycle and smooth the way for the next. In fact, however, the cycles sometimes proceed along generally parallel tracks and at other times may work against each another. The cycles include:

Figure 1b. e-learning's Adoption Cycles



1. **Enhancements to traditional course/ program configurations,** which inject new materials into teaching and learning processes without changing the basic mode of instruction. Examples include e-mail, student access to information on the Internet, and the use of multimedia and simple simulations. The typical application uses off-the-shelf software, such as PowerPoint, to enhance classroom presentations and homework assignments.
2. **Course Management Systems**, which enable professors and students to interact more effectively. They provide better communication with and among students, quick access to course materials, and support for administering and grading examinations. A special subset of these activities come bundled together to enable the creation of true online courses and learning networks.
3. **Imported course objects**, which enable professors to embed a richer variety of materials into their courses than is possible with traditional "do it yourself" learning devices. Examples range from compressed video presentations to complex interactive simulations. Online entities are springing up to collect, refine, distribute, and support electronic learning objects, and a few institutions are experimenting with enterprise-level Learning Content Management Systems.
4. **New course/program configurations**, which result when faculty and their institutions re-engineer teaching and learning activities to take full and optimal advantage of the new technology. The new configurations focus on active learning and combine face-to-face, virtual, synchronous, and asynchronous interaction in novel ways. They also require professors and students to accept new roles—with each other and with the technology and support staff.

The four levels of e-learning innovation are currently in different stages of their adoption cycles. *Enhancements to traditional course/ program configurations* are moving rapidly through the early majority stage. *Course management tools* are just now moving into the early majority stage—not so much in terms of

the number of individual faculty and trainers using them, but rather in terms of the proportion of students and trainees who are enrolled in courses and programs that deploy course management software. These first two adoption cycles have largely built upon and reinforced one another. Their momentum, however, has not transferred to either the *importation of learning objects* or to the *development of new course/program configurations*. Both remain at the innovation stage still in search of the kind of acceptance that attracts early adopters.

The adoption cycles of off-campus and distance education have followed the same basic track: good use of the presentation enhancement tools represented by PowerPoint; heavy reliance on the kind of course infrastructure that a good course management system provides; computerized assessments; and threaded discussions. At best, it would include the importation and use of elementary learning objects; in reality, it has prompted almost no development of new course/program configuration beyond taking advantage of the Web's capacity to promote self-paced and just-in-time learning.

Framing Questions

Of course, the fundamental question is: "Why do the innovations associated with e-learning appear to have stalled out?" A more nuanced inquiry would further ask: "What effect did the widespread and rapid introduction of teaching enhancements and course management software have on subsequent adoption cycles? Did either or both inadvertently constrain the development of course objects or new course/program configurations? What role, if any, did e-learning's association with online and distance education play in the reluctance of more traditional on-campus programs to move much beyond the deployment of course management systems and the use of presentation tools like PowerPoint? To what extent is there a set of dominant designs that promotes the spread of learning? And, to the extent there are no dominant designs, does their absence help explain e-learning's thwarted innovation? Finally, to what extent does e-learning's adoption of the market model embedded in e-commerce and exhibited by the dot-com bubble help to explain what happened?

Chapter 2: Plausible and Implausible Measurement

When we began *The Weatherstation Project* we did not seek answers to those questions. Indeed, in the winter of 2001, we were not prescient enough to know that they were the questions that needed asking. Rather, we set out to develop a set of tools that would chart e-learning's forward progress as a major educational innovation. If we were not as sanguine as Michael Moe and his colleagues about the coming size of the market for e-learning, we were nonetheless convinced there would in fact be a market. We believed it would include much more than course enhancements and course management systems, and that it would become a large and therefore significant component of the financial structure of postsecondary education in the United States and elsewhere.

From Example to Projection

What we did understand, however, was that the measurement strategies then being employed to estimate market demand for e-learning and e-learning products were leading respected institutions and corporations to project and then invest in what they believed would shortly become a multi-billion dollar market. The first and initially dominant measurement strategy involved the collection of evidence from early successes—for the most part, stories innovators like to tell one another and anybody else who will listen. The most important analysis that began in this way was Moe's *Knowledge Web,* which collected as many of these examples as possible and then, using a compounded surrogate measure, extrapolated e-learning's anticipated rate of growth.

The compound measure Moe and his colleagues chose—the anticipated increase in computing as reflected in the sale of computers, the growth of connectivity, and the utilization of the Internet—was not bad. Had e-learning already proceeded

beyond the early adopter stage, it could be expected to grow at roughly the same rate as other innovations dependent on computing technology. The problem was that, in 1999, e-learning had relatively few innovators and almost no users who fit the classic description of early adopters. PowerPoint had yet to begin its steady advance across the educational landscape. Most course management systems were still being prototyped, while course objects were primarily curiosities more to behold than to use. The big successes—Maple in calculus and Studio Physics—were more often cited as special exceptions rather than precursors or harbingers of things to come. Given this nascent development, Moe found himself lumping together all of e-learning's early manifestations in order to establish a baseline for future projections. The net result was the most widely quoted projection of e-learning's future track, which involved multiplying an estimate of the rate at which computer usage in general would likely grow by an estimate of the monies then being spent on communications, market aids, technical support, software, professional training, and content creation.

What did Moe miss? The answer lies in the nature of the innovations he was trying to track and the fact that the adoption cycles were not only overlapping but at times competing. The coming increases in the use of course enhancements and course management systems could not be summed and then used as a baseline for estimating the growth in the importation of course objects and the development of new course/program configurations. What Moe collected and then multiplied were wisps of wind—a not unexpected compilation of hopes, nascent innovations, and the sales pitches with which experimenters and inventors have always festooned their initial achievements.

Surveying the Terrain

Five years later, there is substantially more data available with which to gauge e-learning's progress, though the strategies employed to estimate and project future growth largely fall victim to the same kind of pitfalls that Moe confronted. Today the dominant measurement strategy is the one-time survey asking university administrators and the heads of corporate training departments about their current use of e-learning, broadly defined. The most recent, best funded, and in many ways most interesting as well as revealing of these efforts is *Sizing the Opportunity: the Quality and Extent of Online Education in the United States, 2003 and 2003.* Sponsored by the Sloan Foundation and conducted by the Sloan Center for Online Education co-located at Babson College and the Franklin W. Olin College of Education, *Sizing the Opportunity* asks and affirmatively answers, "Will students, institutions, and faculty embrace online education as a delivery method?" Just as important, *Sizing the Opportunity* found that the "quality of online education [will] match that of face-to-face instruction."

It is not these findings that concern us, but the survey's means of moving from the data supplied by their respondents to conclusions of optimism and hope. All such surveys share two dominant characteristics. First they are snapshots that report frequencies at a single point in time. At the same time, getting institutions to complete these surveys is a major problem that almost always results in low response rates. In the case of *Sizing the Opportunity,* the overall response rate was 32.8 percent. The question always remains: when two out of three of those surveyed—in this case, degree-granting postsecondary education institutions—do not return the survey form, what does their non-response tell us about the subject being studied?

Sizing the Opportunity also testifies to some of the other enduring problems with broad-based, one-time surveys designed to study either an educational market or the spread of an innovation, or, in this case, both. By design, the survey was to be completed by the institution's chief academic officer. In fact, chief academic officers seldom fill out surveys—almost always designating the task to someone who reports to them, with a request to collect, scrub, and finally submit the answers. What the chief academic officer does decide is whether his or her institution will actually participate in the effort. Having a major sponsor like the Sloan Foundation underwriting the cost of the survey almost always increases an institution's willingness to participate but seldom above the roughly 33 percent achieved by *Sizing the Opportunity*.

What all such surveys produce, then, is a biased sample—an acceptable outcome, if the analysts use that bias to estimate how the non-respondents probably differed from those who did respond. One scenario reflected in the *Sizing the Opportunity's* response rate—the one we actually think is most likely—reads as follows. Provosts, deans, and academic vice-presidents at institutions that had made substantial investments in online and other forms of e-learning were more likely to have their institutions participate in the survey. Institutions with formal programs of online education and the larger technical staffs that come with such programs were similarly likely to have significantly higher response rates. There was also likely a market effect. Generally, medallion institutions and major AAU research universities are disinclined to participate, while institutions that serve the middle of the market and that are often the most eager to expand their student markets are more willing. I. Elaine Allen, a principal author of *Sizing the Opportunity,* recognized these market dynamics when she told *The Chronicle of Higher Education* that faculty at private baccalaureate institutions were the most reluctant to participate in online education programs: "They are," she noted, "a very entrenched bunch of objectors." The *Chronicle* story went on to quote Allen as observing:

> "There may be two groups emerging, with two very different strategies for moving forward."
>
> Ms. Allen said public and for-profit institutions—most of which already offer at least some online courses—would

> probably focus their energies primarily on expanding and refining their use of the Internet. But many private institutions that have not adopted online learning may steer clear of the technology, because their faculty members distrust teaching outside the lecture hall.

What may largely account for *Sizing the Opportunity's* affirmative answers to the question regarding whether students, faculty, and institutions were willing to embrace online education is simply the natural inclination of one segment of the population to respond, and the equally natural though different inclination of an even larger proportion of the population not to respond. What we can say is that *The Weatherstation Project*'s survey results, using a different methodology and theoretical framework, are sufficiently different from those reported in *Sizing the Opportunity*

There is also the problem of timing and focus associated with any survey. *Sizing the Opportunity* rightly sought to distinguish between degrees or levels of "onlineness." *Traditional* courses were those with no online content—though it is not clear whether such courses could have an in-class component that used learning objects or simply PowerPoint demonstrations not on the Web. A *Web-facilitated* course was one with face-to-face instruction as the dominant mode, but in which web-based materials and systems like Blackboard and WebCT were used to distribute assignments and collect student work. A *Blended/Hybrid* course was one that used both modes of instruction and typically included both online discussions and face-to-face meetings. Sometimes such courses are referred to as "bricks and clicks." Finally there are true *Online* courses in which at least 80 percent of the content is delivered online, and typically there are no face-to-face meetings.

What *Sizing the Opportunity* did not focus attention on was that element of e-learning that is independent of the Web—largely our two categories of imported course objects and refigured courses/programs. In our terms, *Sizing the Opportunity* deals only with our first two adoption cycles—course enhancements and course management software with a primary emphasis on the utilization of the Web to promote relatively simple online courses.

Because surveys like *Sizing the Opportunity* are temporal events, they risk being rendered out of date before their results can ever be published. By mid-2003 it was clear that those responsible for promoting e-learning initiatives on college campuses were becoming increasingly concerned about higher education's changing budget circumstances. Colleges and universities in general and public institutions in particular have a bad habit of cutting programs and initiatives with strange soundings names whenever there is a substantial reduction in funding. It is an open question whether participants in *Sizing the Opportunity*'s survey would respond today as they had done earlier in the year—or whether they would even bother to participate in the survey at all. What is missing more generally is a sense of timing and change, though *Sizing the Opportunity* did ask respondents whether they thought online education would be more or less superior to face-to-face learning three years hence. We wish they

had also asked their respondents whether they were as optimistic about online learning's promise today as they had been three years prior.

The Measurement Challenge

The Knowledge Web and *Sizing the Opportunity* are important achievements, pioneering explorations of a landscape dominated by mists and misconceptions. Moe and his colleagues established the notion that analysts should be watching and calibrating the market for e-learning and not just the frequency of the reported use of e-learning and e-learning-like experiments. Allen and her collaborators offered an important corrective at a time when much of higher education was prepared to write off e-learning as a thankfully passing fad.

What these first major explorations missed was the increasingly segmented nature of the market for e-learning—that there were at least four adoption cycles unfolding simultaneously and often in conflict with one another. In their focus on singular metrics—in Moe's case on e-learning's anticipated compound annual growth rate, and in Allen's on frequency counts—they largely ignored the changing content and the evolving nature of the innovations themselves.

Chapter 3.
A New Measurement Strategy

In designing and launching *The Weatherstation Project,* our intention was to focus on the dynamics of innovation and then collect data that we and others could use to chart how the market for e-learning was changing over time—and by extrapolation how it was likely to evolve in the future. We were struck from the outset by a dangerous irony that had emerged: the sense of disappointment in the fall of 2001 that was beginning to pervade the market for e-learning was as misplaced as the euphoria that once led the industry's optimists to celebrate an invincible revolution. The fact of the matter is that, in the fall of 2003, e-learning is alive and well. 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. That said, it is also the case that e-learning is evolving in ways few predicted and with economic consequences that even its most ardent supporters are still struggling to understand.

There is a larger lesson in the uncertainty, even confusion, that surrounds the market for e-learning today: namely, if educational institutions and corporations are to be serious about e-learning and its market, they require a data collection strategy and set of measuring instruments that can track not so much current usage and sales as the dynamic rhythms of e-learning's competing adoption cycles. That, at least, was our promise at the launching of the University of Pennsylvania/Thomson Corporation *Weatherstation Project.*

Campus *Weatherstations* and the Interview Process

Based on the premise that it was important to understand the characteristics of e-learning's emerging markets, *The Weatherstation Project* began as a partnership between a major research university and one of the nation's leading suppliers of e-learning and traditional print materials to the education market. The project's

measuring and tracking strategies are reflected in its name. Given the absence of standard institutional data reflecting e-learning usage or supplier-provided data on e-learning sales, *The Weatherstation Project* initially established 12 observation posts (the metaphorical *Weatherstations* in the project's title): six on college campuses and six within for-profit corporations. On the six campuses at which we established *Weatherstations*, our intent was to create three panels on each participating campus to be comprised of 15 faculty, 15 administrators, and 15 students who would agree to report quarterly on their attitudes toward, expectations of, and uses of e-learning.

The process began with an interview, either in person or via the telephone, that explained the nature of the project and asked panel members a set of standardized questions about their own use of e-learning; their sense of e-learning's likely rate of growth; its principal benefits; the forms of support it was receiving on campus; the products and services actually being used; and any new developments or hot prospects they had spotted. After their initial interview, respondents were sent an e-mail asking them to visit an enclosed URL to see how the project team had coded their answers to the interview's questions. Using the interactive features of the website, respondents were able to change their answers to reflect their current experiences with e-learning.

Each quarter thereafter, respondents were sent follow-up e-mails, again with a customized URL, asking them to check previous answers and tell us, via the website, how their attitudes and experiences had changed. We also regularly reported to respondents the project's preliminary findings. We recognize that such reporting ran the risk of influencing their subsequent answers to the quarterly probes, but also considered the risk to be acceptable, given that the reporting seemed to increase the likelihood that panelists would continue to respond to our e-mail probes.

In sum, then, the measurement strategy embedded in our use of campus *Weatherstations* resembled that of the Nielsen Ratings, which track TV viewing through a sample of households. In *The Weatherstation Project,* the sample of institutions reflected both the experimental nature of the project—just six campus *Weatherstations*—and our desire to have as broad a mix of institutions as possible.

All of the participating institutions had reputations for deployed well-developed strategies for the use of learning technologies and chief information officers on whom we could rely to help us recruit and motivate survey respondents. We are under no illusions about the biased nature of our sample: it reflects institutions we knew in advance were investing, often substantially, in e-learning. We also know that the respondents themselves were neither a random nor a representative sample of their administrative or faculty colleagues. The members of the faculty, for the most part, were early adopters; none could be called diehards. The administrators recruited

for the project's panels were largely mid- to upper-level technical staff responsible for supporting faculty in their experiments with and expanded use of learning technologies. The reader is cautioned to keep the nature of our sample in mind when considering responses to particular questions and events—we certainly did.

In one important respect, our sample of institutions is representative of the larger population of degree-granting institutions of postsecondary education in the United States. Among the six are a community college, a public comprehensive university, a public land grant university; a major public research university; a private liberal arts college, and a major private research university. Four of these institutions serve the Name-Brand/Medallion segment of the market for undergraduate education, one serves the Core market, and one serves the User-Friendly/Convenience market.

Two False Starts

A roughly similar strategy was to be employed at the six corporate *Weatherstations*, though only a single individual (usually a chief training officer) was to respond quarterly to *Weatherstation* inquiries. However, the rapid slide into recession that coincided with the launching of the project played havoc with this measurement strategy. At first, the participating trainers proved reluctant to report on the degree to which their use of e-learning was declining as their budgets were being reduced and consolidated. Then, the training officers with whom we had built relationships began to disappear—the victims of corporate reorganizations and downsizings.

Ultimately we abandoned our attempt to track the corporate market for e-learning using a *Weatherstation* model and turned instead to a series of indirect, web-based measures which we describe in Chapter 5.

We also abandoned our attempt to establish student panels. No matter what we tried, we could not achieve consistent participation by a group of students over an extended period of time. In fact, we often failed to gather a sufficient number of students on a participating campus to allow us even to conduct the initial interviews. We are not alone in having failed to take account of student opinion and experience—a lacuna that has warped most estimates of the campus-based demand for e-learning.

The *Weatherstation* Protocol

The interview and Web-probe protocols used in *The Weatherstation Project* were designed using two principal criteria. First and foremost, we wanted to track change over time. We thought that frequencies mattered much less than the slope of change. Accordingly, most of the questions we asked elicited answers that could and did change over time—in both the test and the actual use of the protocols.

Second, we wanted the content of the questions to track closely with the conceptual framework we were developing in order to chart both the adoption and adaptation of e-learning strategies, products, and services. We needed questions that would allow us to track faculty

responses, in particular, in terms of e-learning's principal market niches:

- **Distance education**;
- **Facilitated transactions**; and
- **Mediated learning** and its four adoption cycles:
  - + Enhancements to traditional course/program configurations
  - + Course management tools
  - + Importation of learning objects
  - + Development of new course/program configurations.

Faculty respondents were asked 17 yes/no questions, largely tracking their use of specific e-learning tools; administrators were asked 4 yes/no questions, primarily related to their support for e-learning. Both faculty and administrators were asked 14 questions asking them to rate a particular attribute in terms of a high/medium/low score. An example of the first type of question asked respondents whether they used multimedia presentations (yes/no). An example of the second type of question asked respondents to gauge the future growth rate for e-learning as high, medium, or low. Many of these latter questions focused on the respondent's perception of e-learning's importance in terms of institutional priority; availability of technical staff and other resources to support the development of e-learning; benefits that derived from e-learning; and student acceptance of e-learning as a substitute for face-to-face instruction. Appendices 1 and 2 to this report provide the full set of questions asked of faculty and administrative respondents.

We spent the first year of the project building the interactive website, writing and testing the interview protocol and subsequent follow-up probes, recruiting the participating campuses, and establishing the requisite panels of faculty and administrative respondents. In all, each respondent was contacted four times over the course of 15 months—the initial interview, the chance to correct/change how that interview was entered into the project's database, and twice with follow-up probes via e-mail. From the outset, we established two tests that had to be met: respondents would have to continue to respond; and they would have to take seriously our admonition to think carefully about how their experience with e-learning was and was not changing over time. The overall response rate from probe to probe exceeded 80 percent on all six campuses—most of the missing respondents were either faculty on leave or technical staff who had either left the institution or had taken jobs with other responsibilities.

All of the available evidence suggests they did change their responses in accord with changes in their experiences with e-learning. Indeed it is the presence and distribution of those changes that tell the real story of e-learning on college campuses. It is the story to which we turn in the next chapter.

Chapter 4: First Findings

By design, *The Weatherstation Project* was an experiment in measurement. What we ultimately sought was a reliable strategy for charting the evolution of the market for e-learning. The campus *Weatherstations* were our principal innovation—and largest success. Although we tracked campus experiences for only 15 months, involved only six campuses, and had to abandon our efforts to track student experiences, what we can report is that the strategy works. Once established, the faculty and administrative panels proved to be stable, engaged, and interested in the project's outcomes. Response rates were uniformly high. Respondents took care to report where they wanted—and, just as importantly, where they did not want—to change their responses. We can also report that the set of questions and probes successfully captured the range of experiences that respondents were having as they experimented with e-learning. The only question we now wish we had asked was a specific query about their use of PowerPoint.

One of the byproducts of our testing of the campus *Weatherstation* strategy was a set of first findings. We wanted to be sure that we could extract from the data a set of strategic stories telling us what was happening to e-learning on these six college campuses. Again, we were aware of—and we caution the reader to remember—just how small our sample is and therefore how tentative we must be in drawing conclusions. The analysis that follows is therefore meant to be illustrative of the power of a data collection strategy such as the one employed by *The Weatherstation Project.*

Tracking e-learning's Four Adoption Cycles

We begin with basic frequencies of faculty use for the principal elements of the four often intertwined and almost always overlapping adoption cycles associated with e-learning. Five of the questions asked faculty whether they

required one or more of the following e-learning enhancements to traditional course formats:

- student use of web-based materials;
- multimedia presentations;
- purchase of a textbook with a CD-ROM or access to a proprietary website managed by the textbook's publisher;
- student use or purchase of "off-the-shelf" software packages; and
- student participation in e-mail discussions.

As Figure 4a indicates, in at least one of their courses, almost all faculty members in the sample required students to use web-based materials; three out of four used multimedia presentations, principally PowerPoint; 60 percent assigned textbooks with e-learning supplements; nearly the same percentage assigned off-the-shelf software packages; and just over half required their students to participate in e-mail discussions.

Figure 4a. e-learning Course Enhancements: Faculty Respondents' Frequency of Use

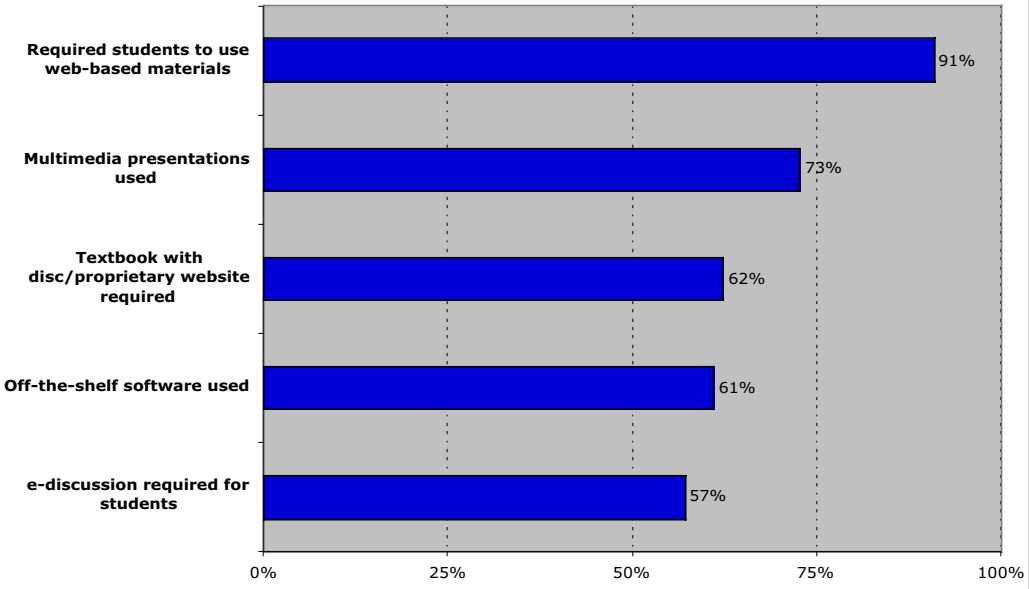
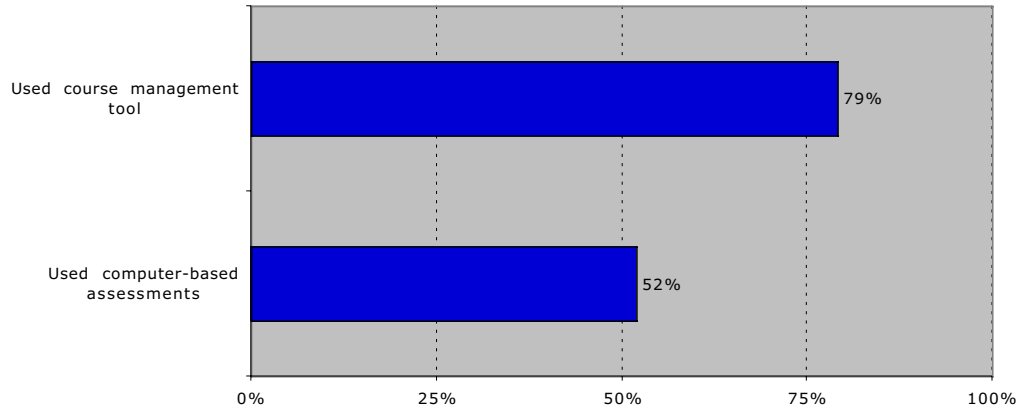
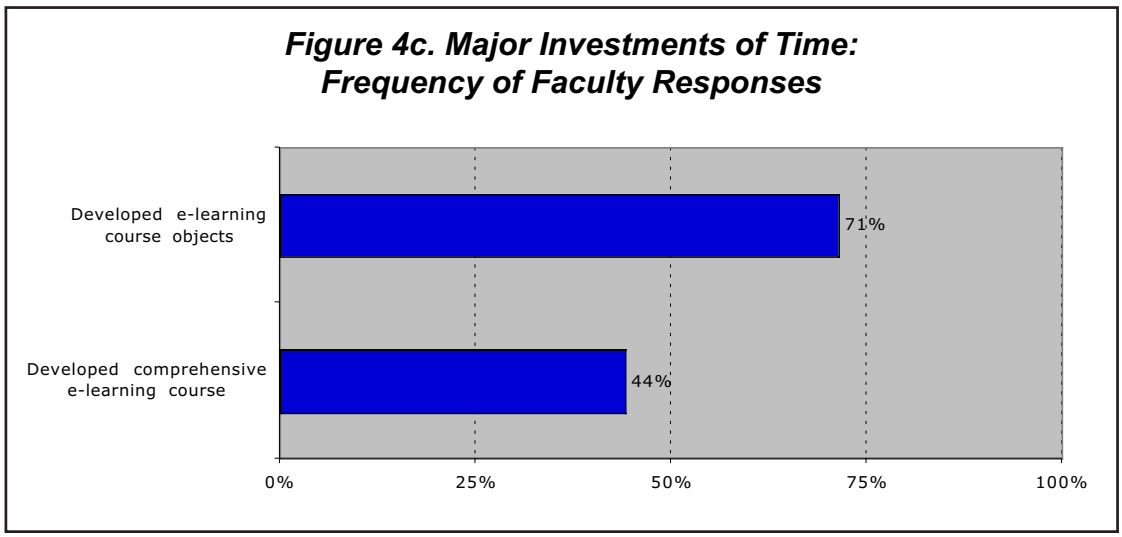


Figure 4b. e-learning Transaction Systems: Faculty Respondents' Frequency of Use



Two campus *Weatherstation* questions focused on faculty use of two core elements of an e-learning transaction system: course management tools and computerized assessments. Nearly 80 percent of the faculty respondents reported having used a course management tool, principally Blackboard or WebCT. Just over half



said that they had used computerized assessments (Figure 4b).

Finally, faculty respondents were asked whether they had developed an e-learning course object or a comprehensive e-learning course. Seventy percent reported they had developed a course object, while 44 percent reported they had developed a comprehensive e-learning course (Figure 4c). It is the answers to these questions that demonstrate just how skewed the *Weatherstation* sample is. Most faculty respondents were in fact early adopters of e-learning—not innovators and experimenters *per se*, but rather early pioneers intrigued with e-learning's potential and hence willing to be among the first to serve as institutional guinea pigs. In other words, what we have in the *Weatherstation* sample is the innovation's leading edge, at least on the six campuses participating in the project.

Accordingly, if you want to know where e-learning is heading, watching the leading edge proves to be a useful strategy. From this perspective, what becomes most important is the direction or slope of change that occurs over time. Figures 4d through 4f report the degree of shift in respondents' reported usage of e-learning elements over the course of the project's 15 months of operation. Given the pace at which faculty ordinarily change their teaching patterns, it is not surprising that there was little change, although it is interesting to note the growth of e-discussions (Figure 4d).

More surprising was the reported growth of 8 percent in the use of course management systems and the even larger growth of 11 percent in the number of faculty who reported using computerized assessments (Figure 4e). Remember, we are charting the experiences of faculty who are at the leading edge of e-learning utilization. The fact that better than one in ten of these early adopters over the course of a single year began using computerized assessments becomes an important marker for charting an emerging market niche.

There was also a steady but slow increase in the rate at which these faculty invested their own time and effort in the development of

Figure 4d. e-learning Course Enhancements: Shifts in Faculty Respondents' Frequency of Use

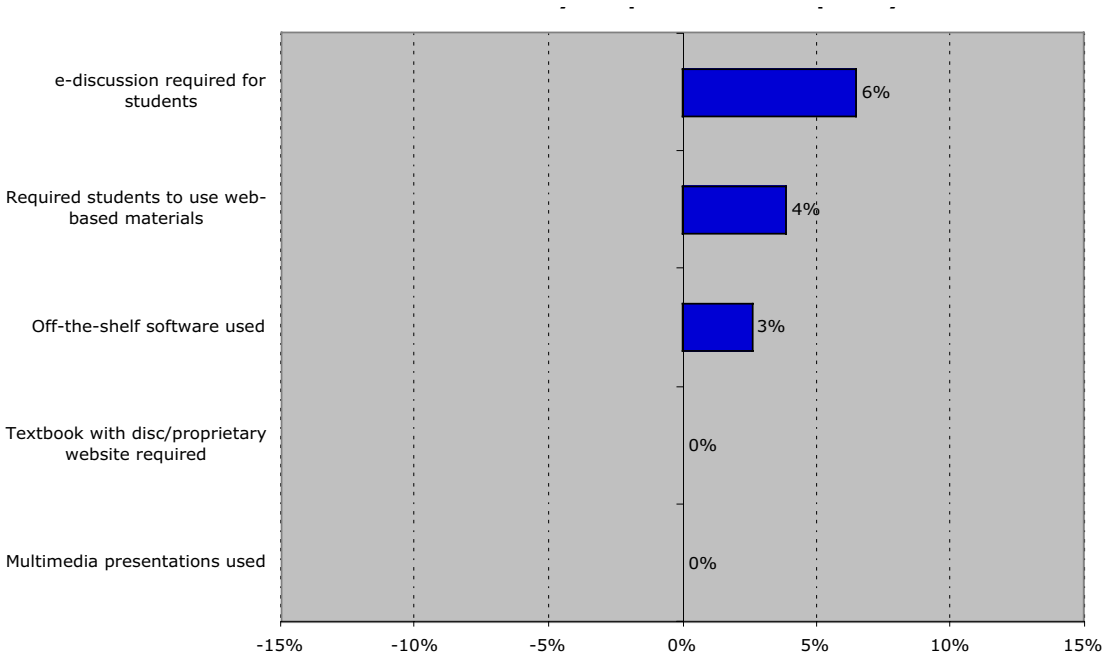
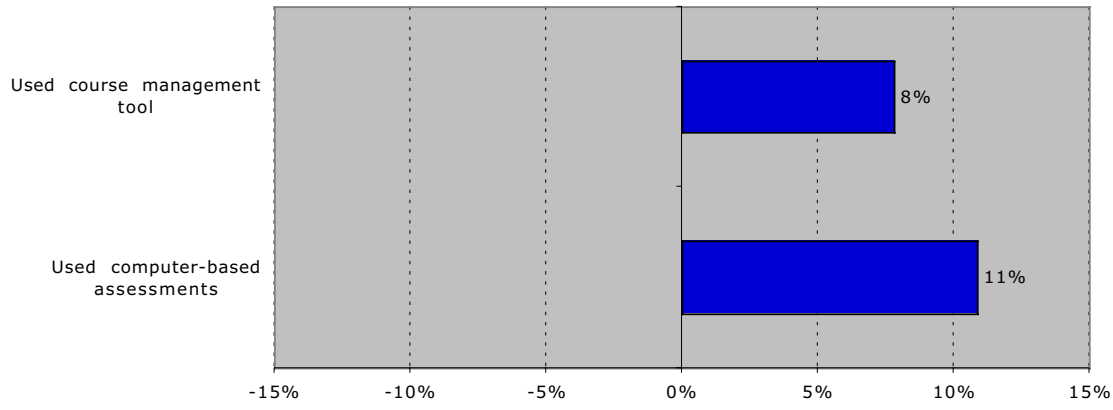
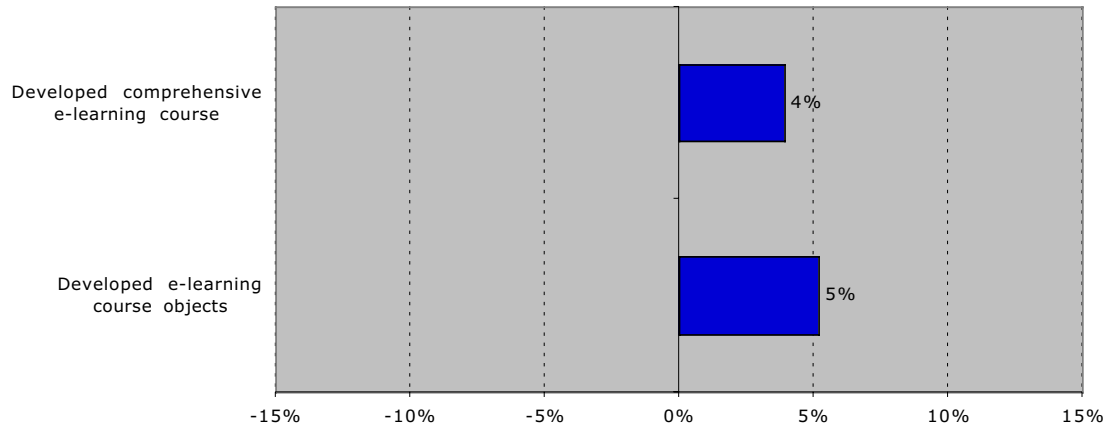


Figure 4e. e-learning Transaction Systems: Faculty Respondents' Shifts in Frequency of Use



learning objects (e-learning's basic building blocks) and the development of comprehensive e-learning courses (Figure 4f). From the more open-ended aspects of our initial interviews with faculty, we learned that a substantial number had received institutional support to develop these programs—in the form of technical staff, development funds, reduced teaching loads, and/or summer salaries. By the time the *Weatherstation* panels were in place, the

Figure 4f. Major Investments of Time: Shifts in Frequency of Faculty Responses



percentage of faculty reporting that they could expect a reduction in their standard workloads to support e-learning development had dropped to 13.2 percent. Over the course of the next 15 months, that share would be halved again to reach 6.6 percent. There was a similar decline in the reported level of department support for developing e-learning components.

Attitudes and Expectations

The campus *Weatherstations* made it equally possible to track the changing attitudes and expectations of respondents. We asked all respondents, administrative staff as well as faculty, to gauge the overall benefits associated with e-learning—high, medium/moderate, low—and then to estimate e-learning's potential for achieving economic efficiencies and opening up new student markets. Finally, we asked the respondents to estimate a future growth rate for e-learning, broadly defined.

Not surprisingly, this faculty group of early adopters thought e-learning offered substantial (moderate to high) benefits, although their estimates of its potential for realizing efficiencies and opening student markets was still in the medium/moderate range (Figure 4g).

It is, however, the shifts of opinion over 15 months that tell the more interesting tale. Overall, there was a slight erosion in the estimates of e-learning's growth; a modest increase in the respondents' estimates of e-learning's capacity to serve new markets; and a modest-to-substantial increase in their estimates of e-learning's potential for achieving efficiency gains (Figure 4h). There was almost no shift in the overall benefit associated with e-learning, suggesting that faculty respondents were primarily in the process of redefining the focus of those benefits.

Because the *Weatherstation* databases tracked how individual participants responded in each follow-up to all of the questions in the protocol, we could also track how often they changed their evaluation of e-learning. Figure 4i displays those changes for our four "benefit

questions." Note that, while only a slight negative shift in the respondents' collective estimate of e-learning's likely growth rate is apparent, in fact nearly one in four respondents had changed his or her mind. The overall measure shifted only slightly, because nearly as many respondents thought increased growth was likely as thought decline would occur. On that issue, then, there was substantial volatility.On the question of e-learning's potential to yield efficiency gains, there were also substantial changes—nearly one in four respondents changed their answers—but those changes were more clearly unidirectional. For every respondent who predicted that e-learning's potential for

Figure 4g. e-learning's Value Components: Faculty Respondents' Score

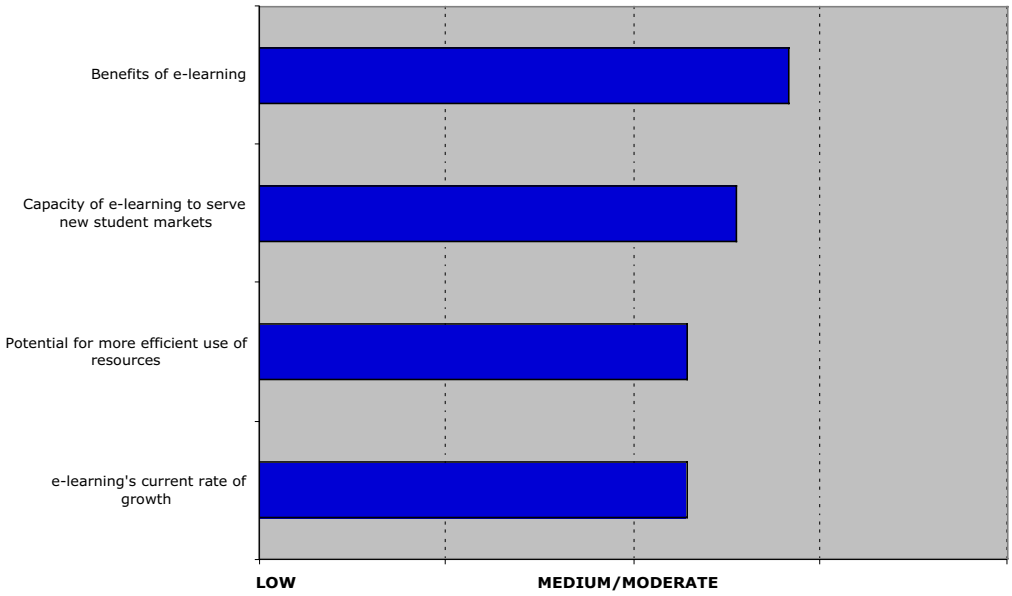


Figure 4h. e-learning's Value Components: Faculty Respondents' Shifts

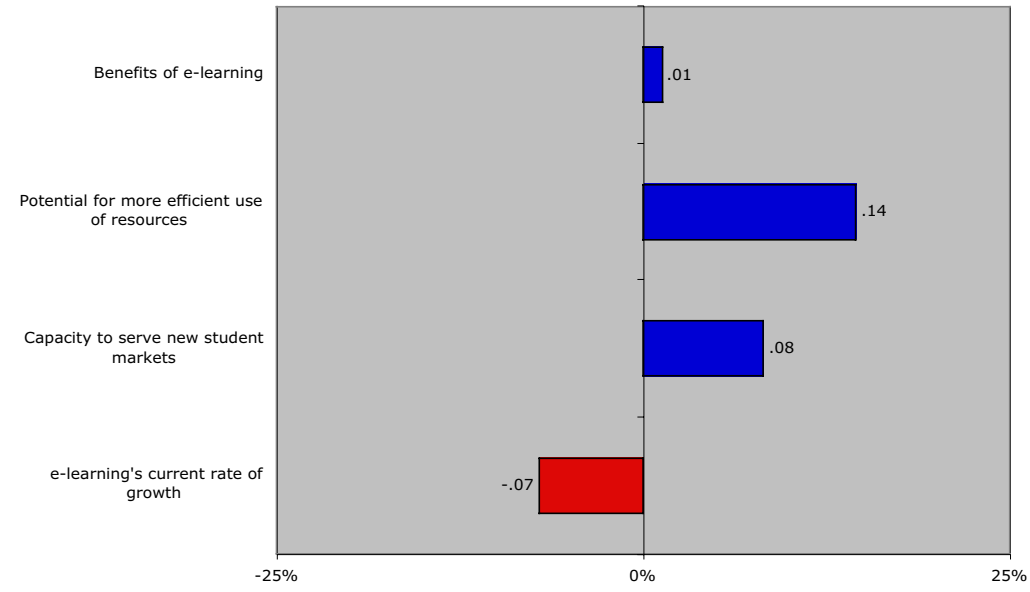
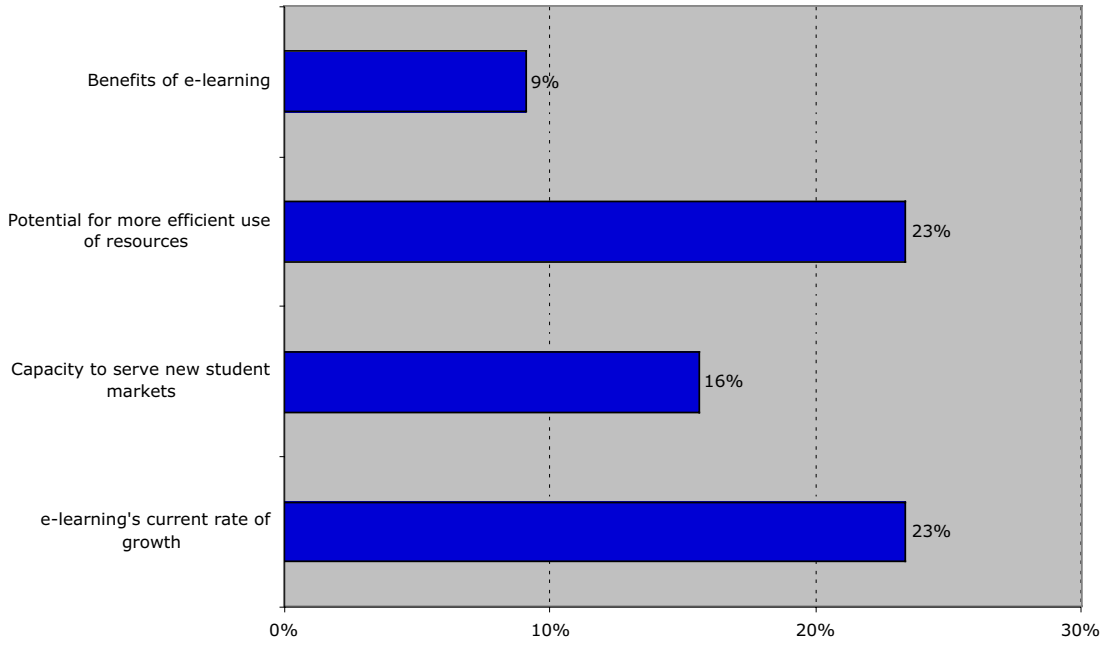


Figure 4i. The Volatility of e-learning's Value Components: Percentage of Faculty Respondents Changing Their Estimates



efficiency gains would decline, five thought the potential would increase. The *Weatherstations* seemed to report that, in the months ahead, those responsible for explaining and defending e-learning—the innovation's early adopters—would again be on the lookout for the economic efficiencies e-learning had, in the past, so often promised. The volatility surrounding the anticipated growth rate for e-learning can be interpreted in two ways: a major re-evaluation was underway which would lead either to more optimistic forecasts or, conversely, to a further diminishing of e-learning's prospects.

An Interpretative Frame

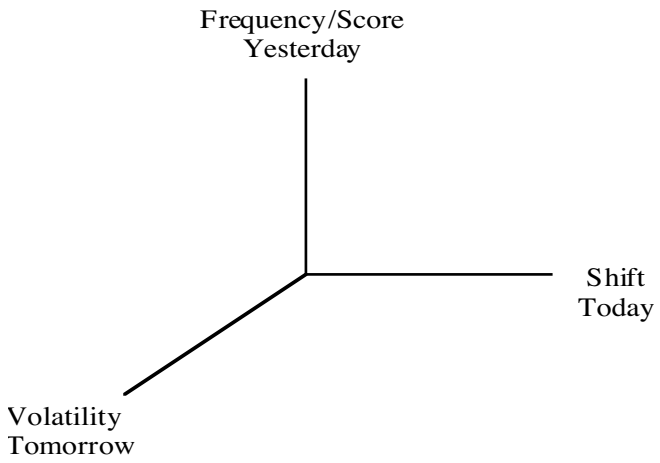
With this last example in place, we can now summarize the interpretative range of the project's measurement strategy. In the first instance, the panels provided a way to gauge a frequency of use (or, the overall interpretive score) for e-learning, reflecting the collective experience of the early adopters who made up the *Weatherstation* panels on each campus. These results are not substantially different from those reported by most surveys, including the one underlying *Sizing the Opportunity*. The principal difference in our study is that we know we are reporting the experiences and opinions of e-learning's early adopters—that is, the innovation's leading edge rather than its lagging center.

The response shift measures capture the direction and to some degree the momentum of change that is underway in the market. The volatility measures are an indication of likely changes to come—in some cases, allowing the interpreter to predict the direction of change (as in the case of the search for economic efficiencies) and in other cases, serving as an

alert that changes, probably unpredictable ones, are in process (as in the case of the changing estimates of e-learning's likely growth rate).

Yet another way to view this interpretative frame is to note that the frequency and score measures principally represent what happened yesterday; the shift measures call out what is happening now; and the volatility measures identify the areas and sometimes the direction of future change (Figure 4j).

Figure 4j. Interpretive Frame for Campus Weatherstation Data

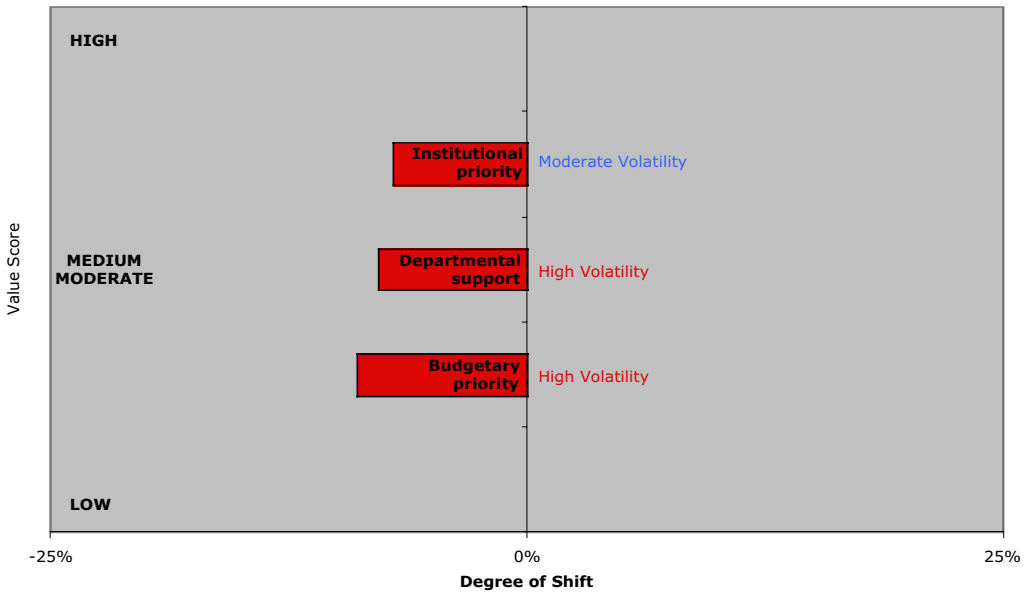


Shifting Institutional Priorities

We can now use this three-part framework to ask how institutional priorities were changing across 2002 and 2003 on the six campuses participating in *The Weatherstation Project*. Three questions focused on priorities. To what extent is e-learning an institutional priority? To what extent is it a budgetary priority? To what extent was departmental support (or school support, for the liberal arts college in the sample) available for faculty interested in developing e-learning for the classroom or the Web?

Figure 4k reports answers for these three questions. The vertical scale indicates the average score (high, medium/moderate, low) associated with each question, as answered in the spring of 2003. Interestingly, among early adopters there was a clear sense that e-learning's institutional priority was higher than

Figure 4k. e-learning as a Priority: Score, Shift, and Volatility in Faculty Responses



its budgetary priority. We believe that respondents felt institutional leaders would provide support by encouraging faculty to experiment more readily than they would commit the institution's discretionary funds to the cause. Respondents also reported that departments provided more support to e-learning than line items in their budgets, although they offered less verbal support than their institutional leaders. Here, we suspect, the departments found themselves caught in the middle—wanting to be helpful without having the necessary resources to follow through.

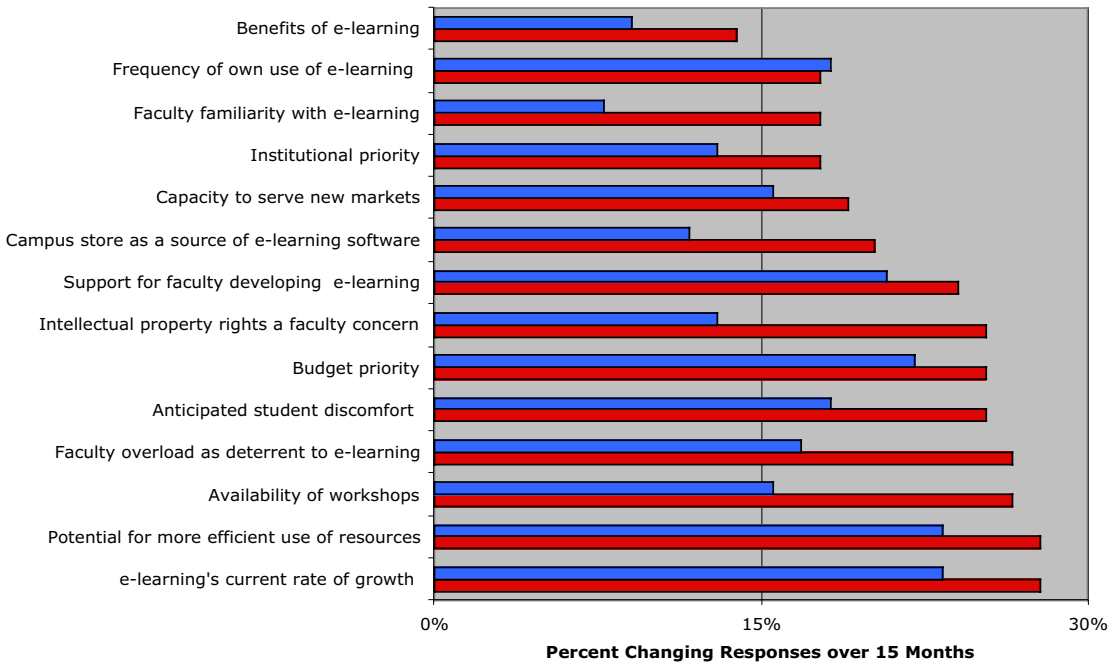
Figure 4k also suggests that, overall, e-learning's early adopters were becoming more pessimistic—for all three questions, respondents reported a shift toward a more negative stance. Again, it may be the volatility measures that provide the most meaningful indicators. The two questions that most directly affect faculty in the classroom—budget and departmental support—also occasioned substantial volatility. The designation of "high volatility" signals that more than 20 percent of faculty respondents had changed their mind over the course of the year. But the volatility involved switches in both directions. On the question of budget priority, almost as many faculty respondents reported an increase as reported a decrease. The responses to the institutional priority and departmental support questions were more unidirectional. In the case of the former, there were nearly three negative shifts to one positive shift; and on the departmental support question, the ratio was two-to-one in favor of a more negative estimate of e-learning's growth rate.

Faculty vs. Administrative Volatility

The administrative staff that comprised the other half of the campus *Weatherstation* panels were asked the same questions tracking attitudes, expectations, and judgments regarding e-learning's place within their institutions. For the most part, the responses of administrative staff, who are responsible for providing technical support to their institutions' e-learning initiatives, matched those of the faculty's early adopters. In one important aspect, however, the administrative responses were different. On all but one question, administrative volatility was substantially higher than faculty volatility.

Remember that volatility is different than opinion shift—in the case of the latter, there is a pronounced direction to the changes respondents made from their original responses. In the case of volatility, it is a matter of change without a specific direction—with some respondents becoming more negative and a nearly equal number becoming more positive. What Figure 4l indicates is an element of growing uncertainty on behalf of technical staff. They were less certain that they knew e-learning's future growth rate, less certain regarding whether or not e-learning could promote the more efficient use of resources, and even less certain about the availability of the workshops which, for the most part, they were responsible for offering. On 9 of the 15 questions, more than one out of five administrative staff

Figure 4l. Faculty vs. Administrator Response Volatility



changed their answers over the course of the 15 months tracked by the project. On four of the questions the degree of change exceeded 25 percent. By comparison, faculty responses seemed almost ploddingly stable.

Making Sense of a Mosaic

This increased sense of volatility among administrative staff offers a clue about the evolution of e-learning on these six campuses between 2002 and 2003. The tracking data suggest first and foremost that the chill of budget reductions was settling over e-learning. There was a growing perception that e-learning's priority within institutional budgets was declining. There was a noticeable increase in the economic benefits of e-learning that respondents hoped would come from achieving greater efficiencies and expanding the student market—principally, we gathered, by offering more online course to remote learners. What everybody sensed was that e-learning programs were increasingly going to have to pay for themselves.

The response of faculty early adopters to these changing circumstances was to pull back, noting in the process that e-learning was less an institutional as well as budgetary priority. It was less likely to receive direct support from their departments, and less likely to provide the extra incentives—release time, summer support, travel funds—that had been important in persuading them to invest their discretionary time developing e-learning courses and course objects 15 months prior.

The administrative staff simply vibrated—their jobs were on the line. When we talked to

the administrative staff about what was troubling them, we were met with two types of answers. The first was that looming budget cuts would undo all the good work they had been able to accomplish over the last five years. The second was that they were going to be left holding the bag—expected to continue to support faculty and student efforts at a time when resources were being withdrawn rather than being added to their programs.

Their questions were simple and to the point. Who was going to make Blackboard and WebCt work on their campuses now that the administration was touting how many courses had this online component? Who would train the faculty just beginning to experiment with tools beyond PowerPoint? And from where would the energy as well as resources come to introduce and then integrate the new products that inevitably would attract the attention and enthusiasm of faculty early adopters?

If administrative staff needed confirmation of just how much at risk they and their programs were, they needed only to consult the daily e-mail report published by *The Chronicle of Higher Education.* For as long as any of us could remember, those briefings had included a section on Information Technology, featuring a variety of items tracking the exigencies of technology issues—including e-learning—on the American college campus. The content was there on Friday, October 17, 2003—and was gone the following Monday. *The Chronicle* put a good face on it, suggesting that technology had become so ubiquitous that it no longer needed a separate section in the daily briefing. Ubiquitous or not, after October 17, *The Chronicle* became a much less interesting read if one's focus was information and educational technology. No doubt about it—the world of e-learning was changing and not necessarily for the better.

Chapter 5: The Corporate Market for e-learning

The reduction and then demise of our corporate *Weatherstations* forced us to adopt an alternate strategy for tracking the general market for e-learning. Unable to query the customers of e-learning, we instead shifted our attention to the providers—those who sold their wares to corporations, to organizations other than corporations, and to both entities.

Our methodology was remarkably simple and straightforward. The first step was to build a master list of providers—specifically, those providers with websites. The next step was to classify each provider in terms of a set of standard characteristics: market segment, business focus, specialization, and product range. The *Weatherstation* team completed the classifications, with two members visiting the websites of each candidate separately and independently. Results were then compared; where necessary, the websites were revisited, and a judgment about their classification ultimately rendered. The team also randomly revisited the websites, spending additional time with selected providers to ensure that the classification scheme was capturing the right information. In all, 262 providers of e-learning products and services were identified and classified. (The full classification scheme and results are presented in Appendices 4 through 7.)

The Shape of the Provider Market

The classification process began by determining to which market segment or segments the provider marketed its products and services: *corporate*, *academic*, *government*, and/or *direct to the consumer*, where the consumer is assumed to be an individual. Providers could offer products and services in more than one market segment—and, in fact, most do. Roughly one-third of providers market to a single segment, one-third to two segments, and one-third to three or more segments.

The segment in which most providers sell their products or services consists of businesses, both small and large. Only 1 of every 5 providers offers products and services that they believe will have minimum or no appeal to businesses. This corporate market for e-learning also contained the largest group of providers (20 percent) concentrating on a single market segment (Figure 5a).

Figure 5a. The Provider Market for e-Learning

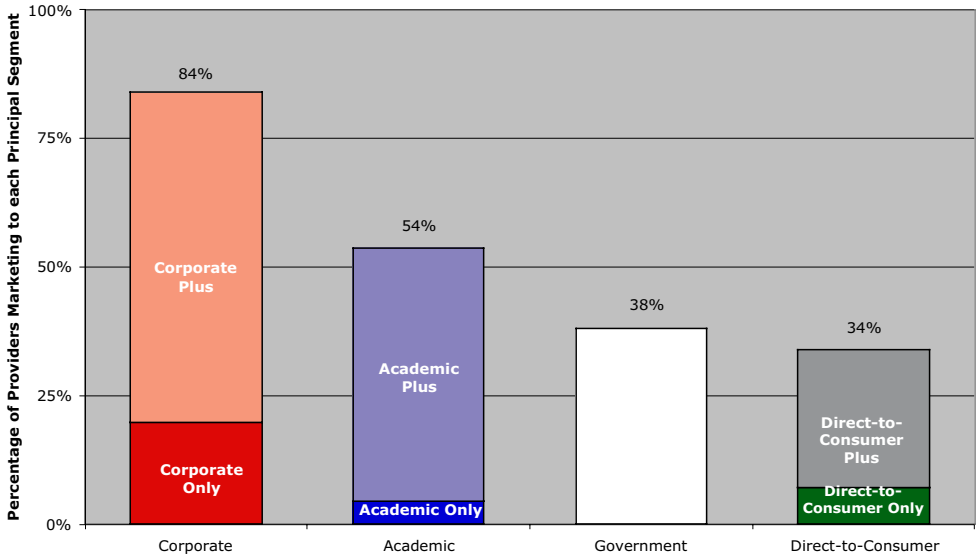
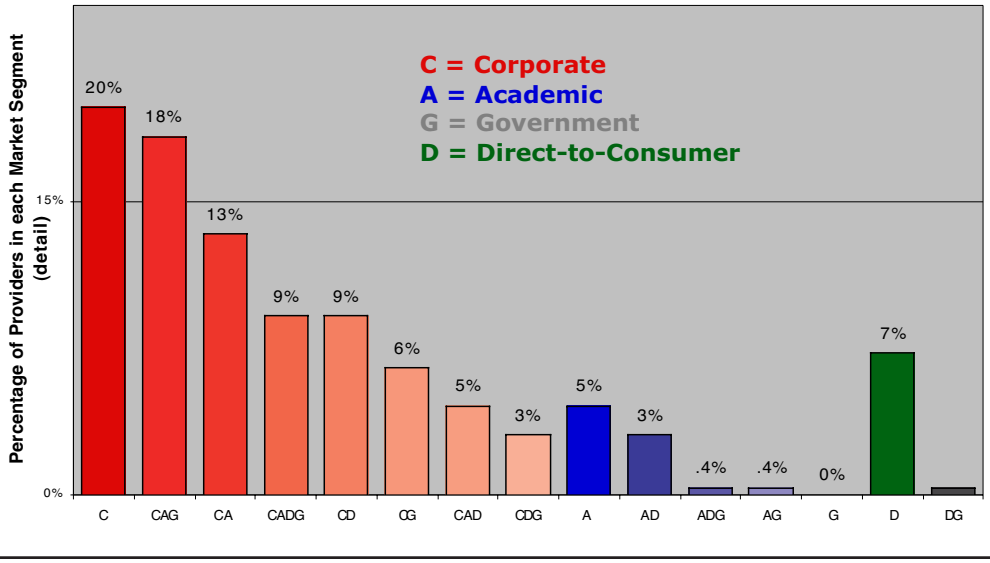


Figure 5b. Detail on Provider Market Segments



Half of the e-learning providers we tracked offered some products and services designed at least in part to appeal to educational and academic customers—principally schools, colleges, and universities. But just 10 percent of these providers specialized in the academic market segment. While a third of the market's e-learning providers sought to serve governmental agencies, none could afford to specialize in that domain. Finally a third of the market supplied products and services directly to individual consumers (Figure 5b).

The various combinations of market segments served by e-learning providers confirm how the market for business-related products and services dominates. It is, as one observer noted,

Figure 5c. Provider's Product Focus

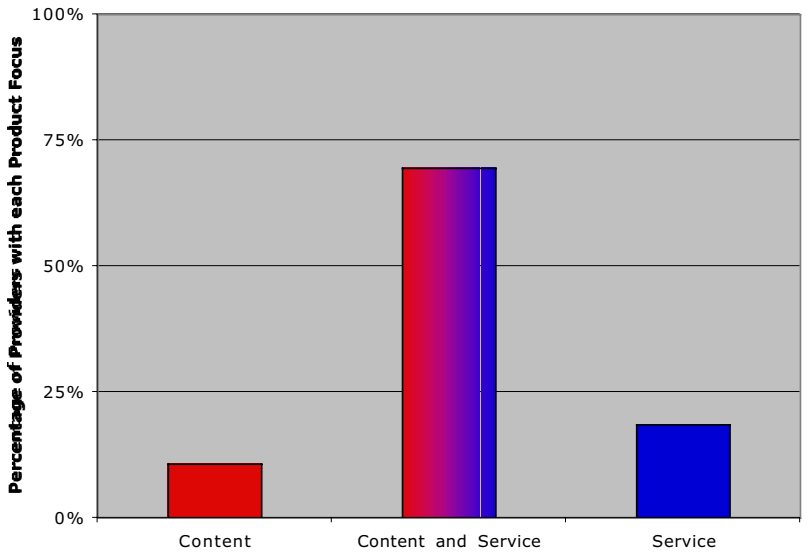
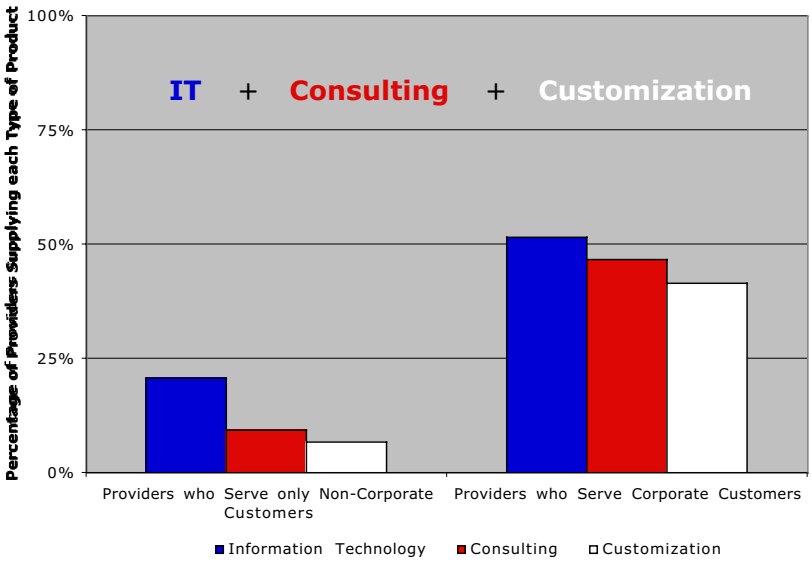


Figure 5d. Corporate e-learning's Principal Foci



consulting help, hosting, and the design and management expertise needed to produce customized e-learning programs. By February, the number of providers exclusively marketing services was almost twice the number of those exclusively providing content—and the number of providers who sought to do both accounted for 70 percent of the provider population (Figure 5c).

A second way to characterize e-learning products is to identify those that were primarily designed to appeal to corporate customers. Among providers selling to businesses, three specific product lines were dominant: information technology, customization, and consulting. More than half of the providers of e-learning to businesses offered products focusing on information technology; among providers whose principal appeal was to non-corporate customers, just 21 percent offered products and services focusing on information technology. There were similar tilts for customization—the promise of designing and/or delivering a program customized for an organization's need—and for consultation. In the case of customization, 47 percent of providers

the only place there is money—although, given the state of the economy, not very much is likely to be earmarked for e-learning!

By the winter of 2003, the market for e-learning had also transformed itself from one that initially focused on content into one increasingly dominated by providers with a greater or equal focus on services, including

Figure 5e. The Corporate e-Learning Signature: Combinations of IT, Consulting, and Customization

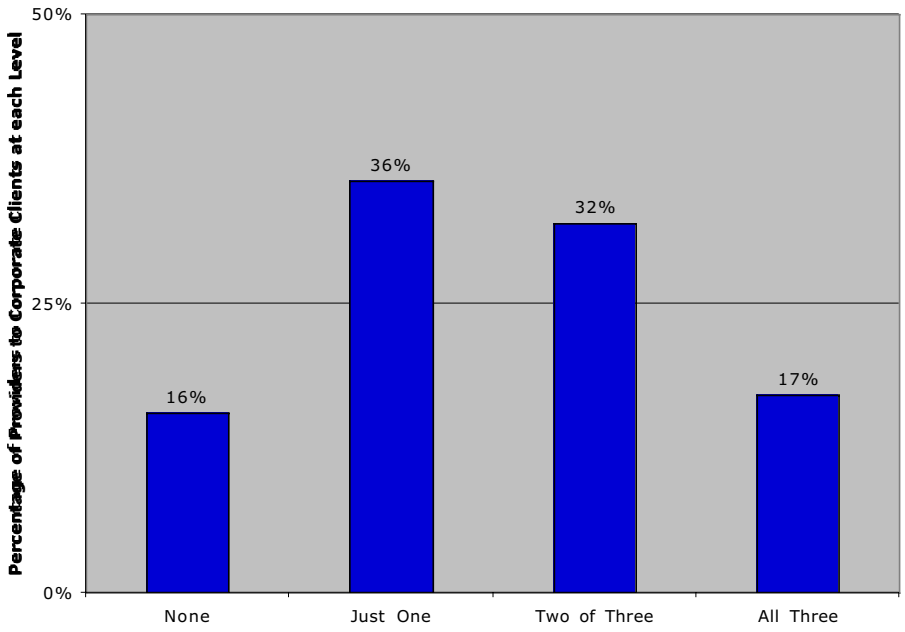
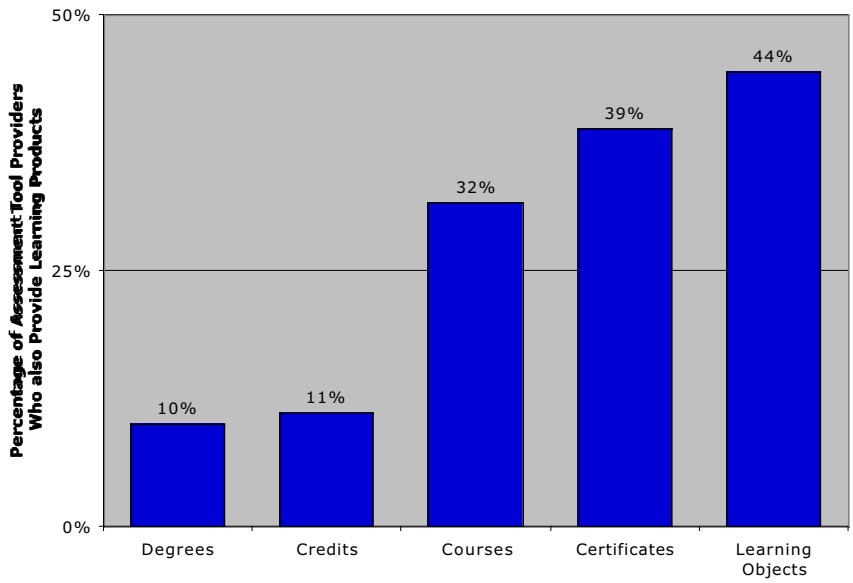


Figure 5f. Learning Products Sold by Providers of Assessment Tools



serving businesses offered to customize their offerings, versus just 9 percent for providers specializing in non-corporate products. In the case of consulting, the split is 41 percent versus 7 percent (Figure 5d).

So dominant were these patterns that we came to define the trilogy of information technology, consulting, and customization as *the* signature of the corporate e-learning market. All but 16 percent of providers serving businesses offered at least one of these specialties; a third offered two of the three, and 17 percent offered all three. All told, more than half of the providers serving the corporate market provided two or more of these specialties (Figure 5e).

The range of characteristics we used to describe and classify providers of e-learning make possible a rich variety of analyses detailing specific market niches. For example, Figures 5f through 5h focus on the 20 percent of providers offering assessment tools—exams, certifications, test writing, and test preparation. As shown in Figure 5f, most of these enterprises offered tools and products associated with learning objects and

certificates, while relatively few offered products associated with formal degree programs or college credits.

Many providers of assessment tools (31 percent) offered training to their clients; relatively few provided hosting services (Figure 5g).

Finally, providers of assessment tools were most likely to be found serving the health care industry. Somewhat surprisingly, just a third of assessment tool providers offered products related to the information technology industry (Figure 5h).

Figure 5g. Services Sold by Providers of Assessment Tools

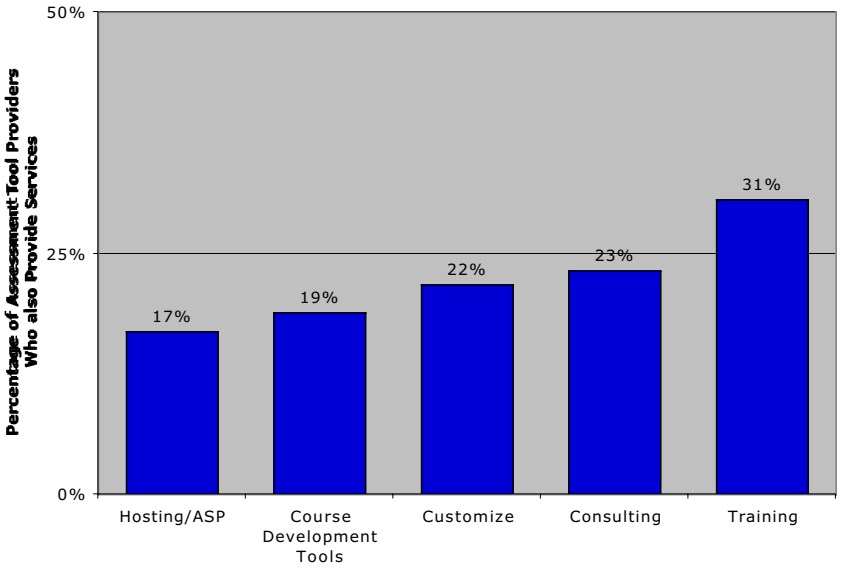
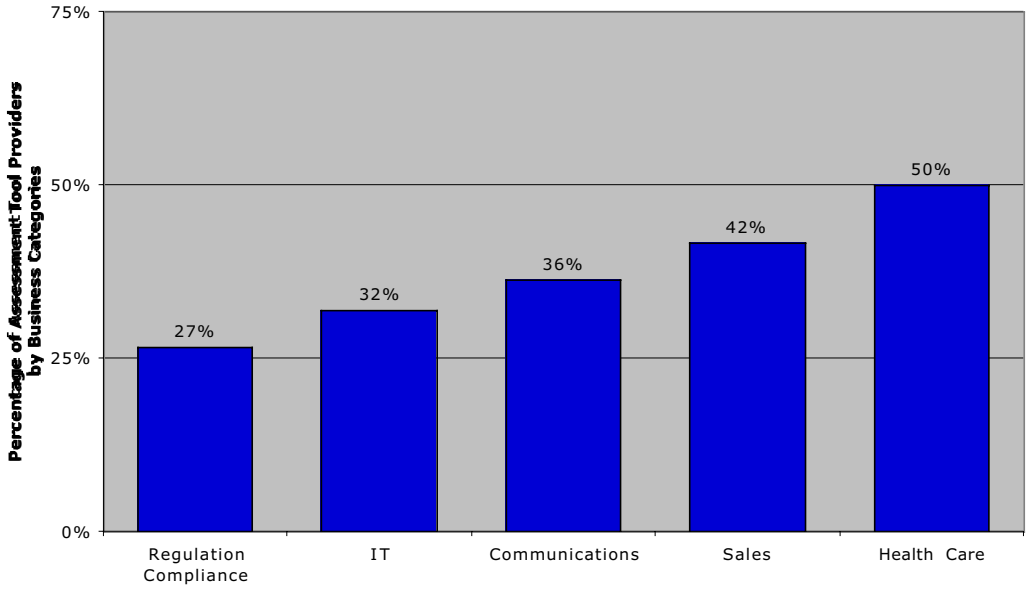


Figure 5h. Business Focus by Providers of Assessment Tools



Tracking the Corporate Market

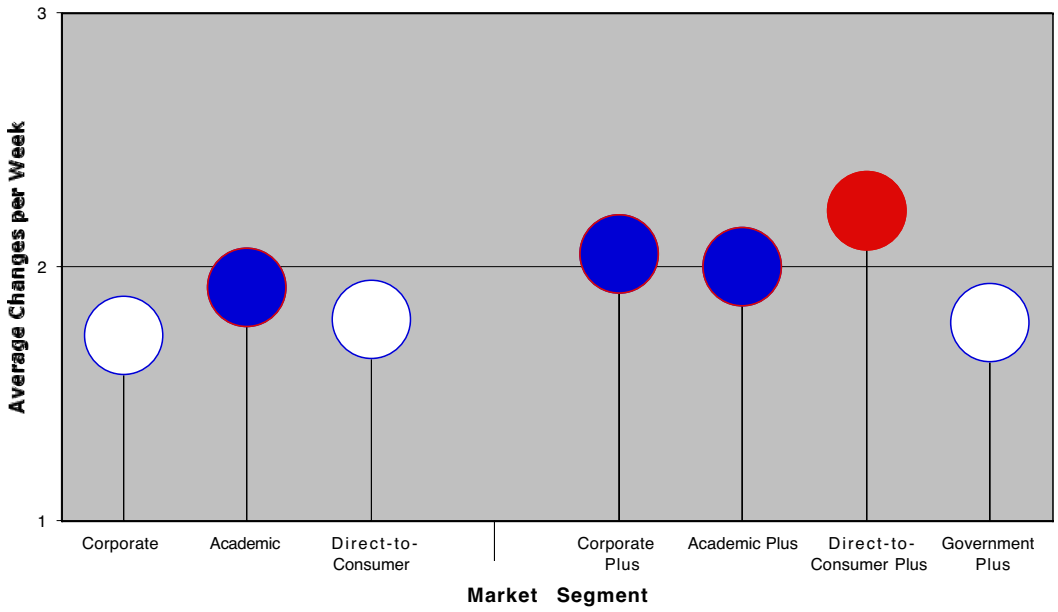
We developed market classifications for e-learning providers to help us track changes in the market itself. Our goal was a parallel measurement strategy—again using frequencies, shifts, and volatility to complement our *Weatherstation* strategy for tracking the collegiate e-learning market. What we needed was a set of variables or characteristics whose change over time would help us gauge the rhythms of the market.

We came to focus on the Web itself, asking how often and to what extent our selected providers were changing their websites. The assumption was that the majority of these changes would reflect decisions by the provider to offer new products and services or to revamp their current presentations to better appeal to the market. On a weekly basis, the *Weatherstation* team submitted the URLs from our master list of providers to a BullsEye search engine, which was configured to indicate which sites had changed in the last week. The BullsEye probes counted a variety of changes: new pages, new HMTL code, new graphics, even automated date changes. In the latter case we had to assume that such alterations were randomly distributed. Again, we were interested in the distribution of change rather than the absolute number of changes. Within this framework, we were able to count the changes for any category of providers, calculate an average, and then compare that average with the previous week's.

The results were interesting without being definitive. Given the novelty of the measure itself—average weekly website changes—we had to guess at what would count as a significant level of change. After some experimentation, we adopted the following rule of thumb. Where the average number of changes for a given week for all providers in that market segment was one or two per week, we said that market segment or niche was in the "white zone." Averages of more than two changes per week earned a market segment or niche the label "red zone." We also noted when a segment or niche seemed to be balanced between both zones.

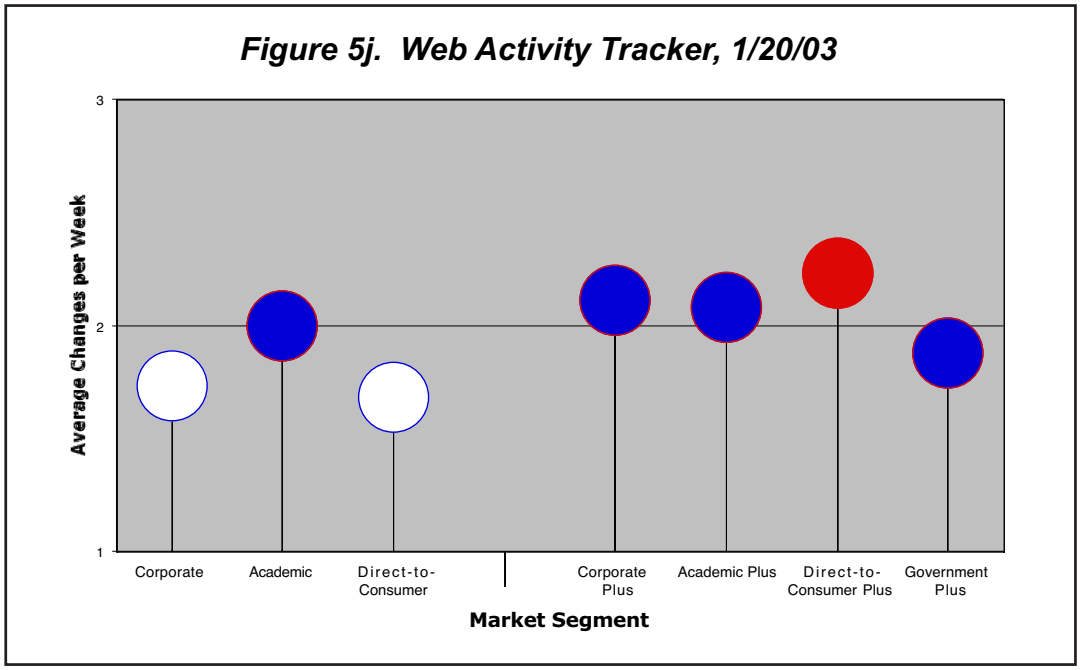
The measure worked, in the sense that it could identify market changes and rhythms. Figures 5i through 5k display this market tracker for January 2003. In Figure 5i, only the Direct-to-Consumer market segment is in the red zone, though the Academic, Corporate Plus, and Academic Plus segments are on the border.

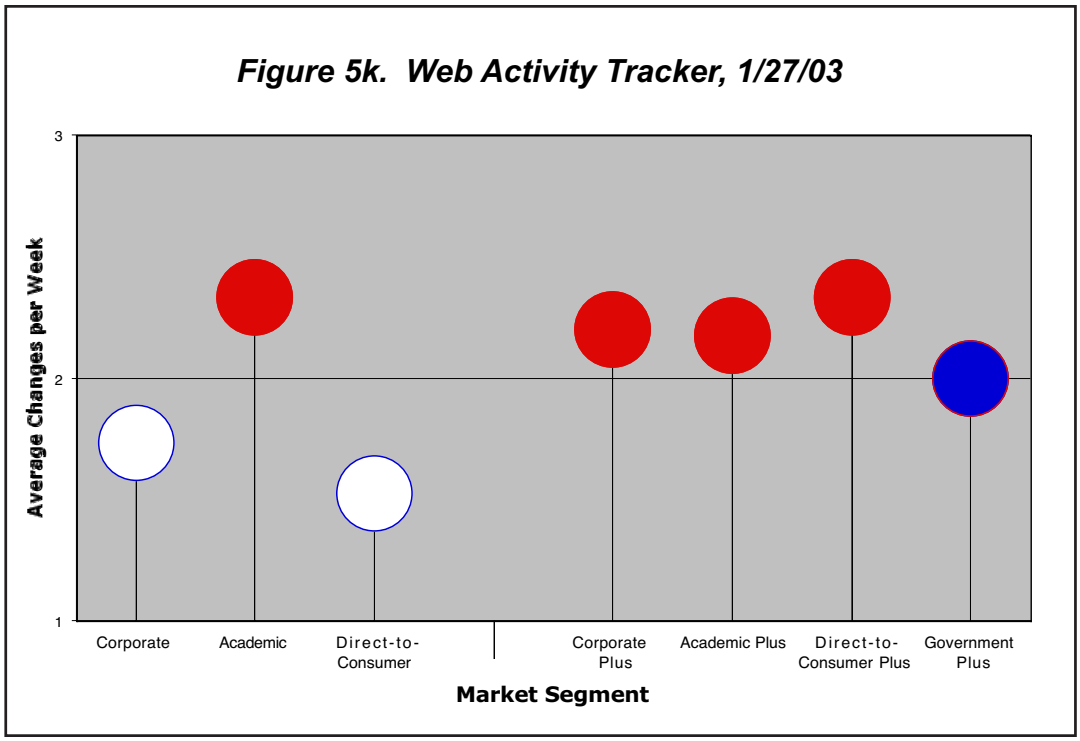
Figure 5i. Activity Tracker, 1/13/03



One week later, as captured in Figure 5j, most of the balloons had ascended; by the close of the month,

shown in Figure 5k, only the Corporate and Direct-to-Consumer segments had been left behind in the white zone. Flip quickly through the three figures, and the market's animation becomes clear—rising volatility in all but two segments.



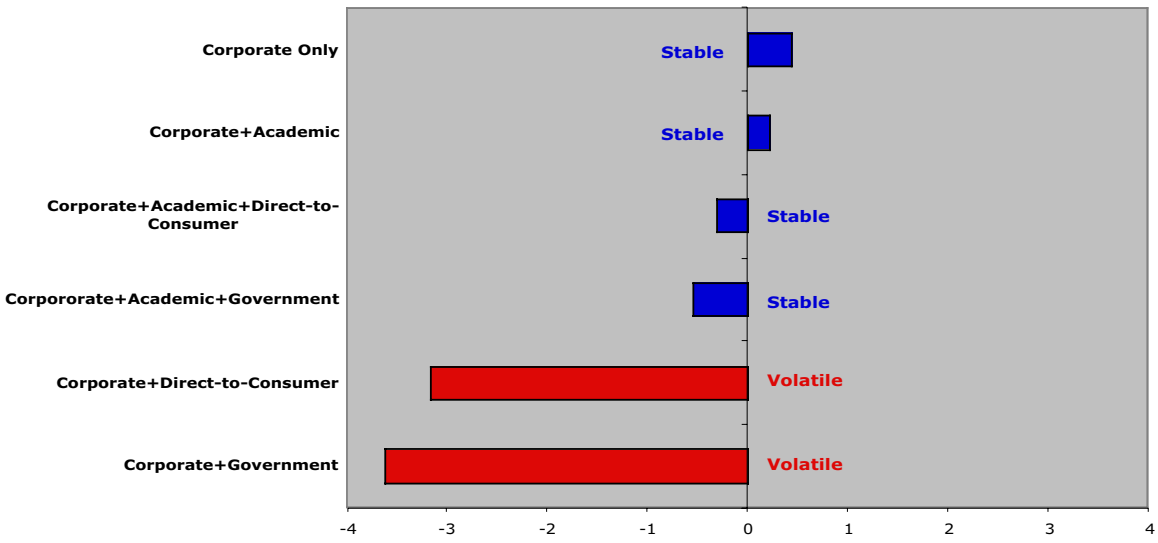


This market tracker can display data on any subset of the market—niche, product line, consulting versus service offerings, specialty, or business focus. It is also possible to expand the timeframe, comparing not weeks (as above) but rather months (as below, in Figure 5l). The measure is still "Average Weekly Web Changes," but the comparison is made across the last quarter of 2002. Two of the market segments—Corporate plus Government, and Corporate plus Direct-to-Consumer—have experienced dramatic swings, shifting downward from average changes per week in excess of 5.5 in October 2002 to less than 2.5 in January 2003. The remaining market segments displayed in Figure 5l were relatively stable.

In addition to tracking average weekly changes in each provider's website, we also calculated the proportion of any given set of providers who changed their websites in a particular week. Figure 5m provides a graphic

repre-sentation of the corporate market for e-learning, indicating the proportion of enterprises in each segment that changed their websites during the last week of September 2002. Much of the core of the corporate market remained stable, with just over one quarter of the providers changing their websites. Two sets of providers, however, showed signs of atrophy—the set of providers attempting to provide products to all four segments (Corporate, Academic, Government, and Direct-to-Consumer) and the set of providers seeking to bridge the difference between Corporate clients, Academic customers, and individuals marketed to Directly. Two other segments seemed in the throes of frenzied activity, the C plus D group and the C plus A plus G group. What isn't clear is whether such activity signals market growth or market churning.

Figure 5l. Shifts in Average Weekly Web Changes by Providers: October 2002 to January 2003

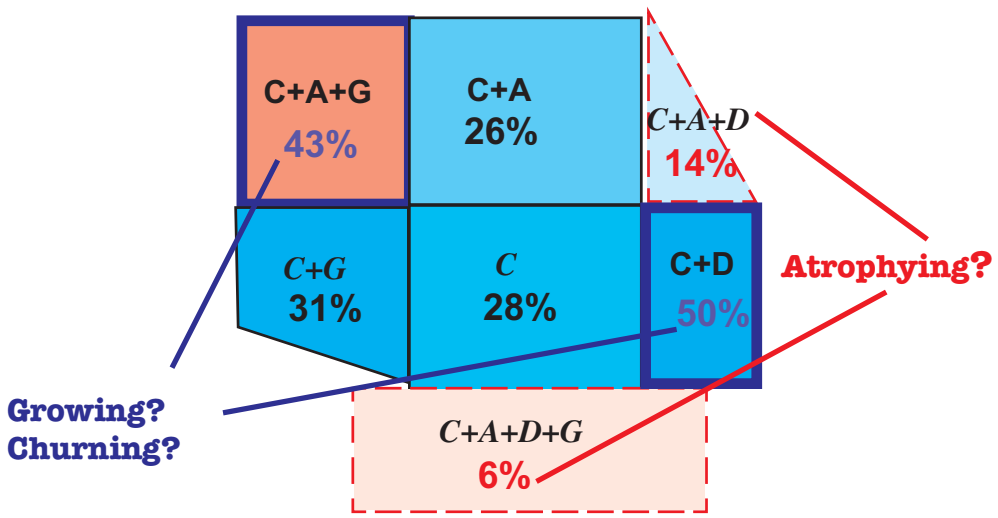


Googling the Market

To derive a second measure of market change, the *Weatherstation* team turned to Google, the predominant Internet search engine. Using Google's advanced search features, each week the team would input "e-learning" plus a specific product category—for example, "education" or "business and investing" or "humanities." For each category, for each week, the probe produced a total number of "pages" that then became the entry in the *Weatherstation* database. On a weekly basis, that database made two calculations for each entry—the category's share of the total number of "pages" for that week; and the week-to-week change in the category's number of pages.

The Google tracker operated from February 2002 through May 2003, similar to the operation of the campus *Weatherstations*, for a total of 15 months. From the data produced by the campus *Weatherstations*, we could deduce a strategic story of changing attitudes and expectations being shaped, on the one hand, by the budget chill creeping across higher education and, on the other, by e-learning's failure to

Figure 5m. Percentage of Providers in Each Segment Changing Their Websites



actually changed—most of the graphs balloons sit on top of one another for both points in time.

The big loser was the Education category. The winners were Technology and Government, Law, and Politics.

promote a fundamental pedagogical change in the classroom. The data from the Google tracker, as in the case of the data from the BullsEye probes, largely reflected more of the same for the corporate market—not currents or directions, but rather ripples in a pond that was being drained by an economic recession centered in manufacturing and technology.

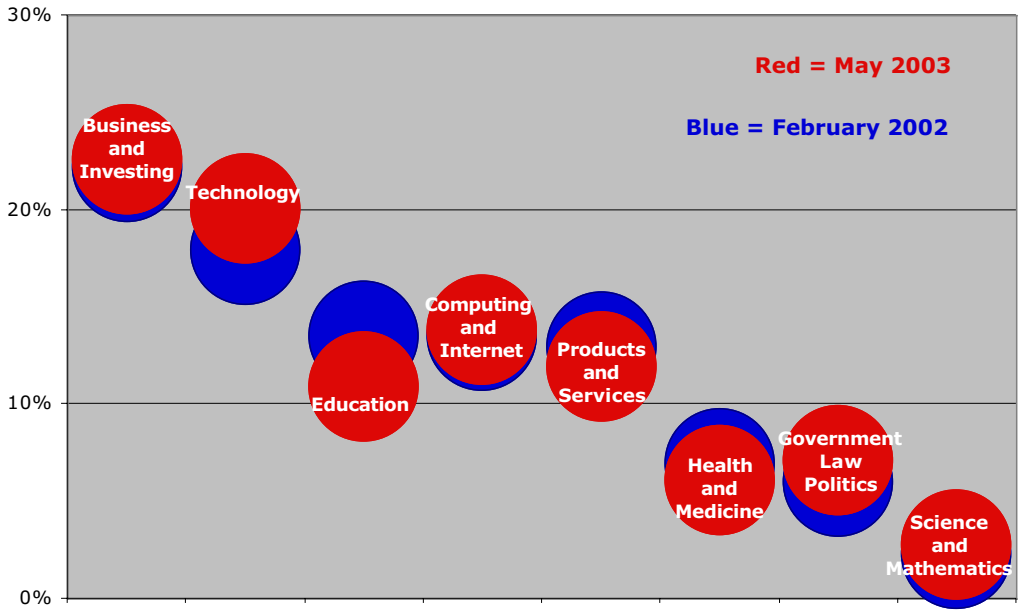
The overall shape of the e-learning market as reflected in the Google probe underscores just how much of that market is centered on corporate America. Business and Investing, Technology, and Computing and the Internet account for 55 percent of the activity. Education garnered 10 percent, Science and Mathematics just 2.7 percent, and the Humanities and Social Sciences just a trace (less than three-tenths of one percent each). Figure 5n displays those distributions for two points in time: February 2002 and May 2003. Perhaps the most important point is to note how little

Again, caution is needed in interpreting these results. The growth in Technology pages from providers offering e-learning products and services is not necessarily a sign of growth in the size of that market segment. The more likely interpretation is that, given the downturn in the fortunes of companies in the technology business, the e-learning providers of technology-related products and services were expanding their search for new customers—that is, the more likely explanation is market churning. One should use the same lens for interpreting the results displayed in Figure 5m.

The Google probe makes possible a display that can be best likened to the output of an EKG (Figure 5o). Again, the basic conclusion is one of relatively constancy. Just three major peaks and one trough appear over the course of 15 months—and, each time, there was a reversion to the mean. The first (A on Figure 5o) was a spike in the summer of 2002 in e-learning Web

activity connected to Technology and to Computing & Internet. However, this spike was followed immediately by a trough led by the same two categories (B). The second peak occurred late in the fall of 2002 (C) and involved the four categories of principal interest to colleges and universities: the Arts, Science and Mathematics, the Humanities, and the Social Sciences. That peak also subsided, leaving these four categories collectively at the same 5 percent level with which they began the tracking period. Finally, at the tail end of the tracking period, there was a third peak (D) led by Government, Law, and Politics, Computing & Internet, and Business & Investing.

Figure 5n. Percentage of Google Pages by Learning Subject: May 2002 vs. February 2003



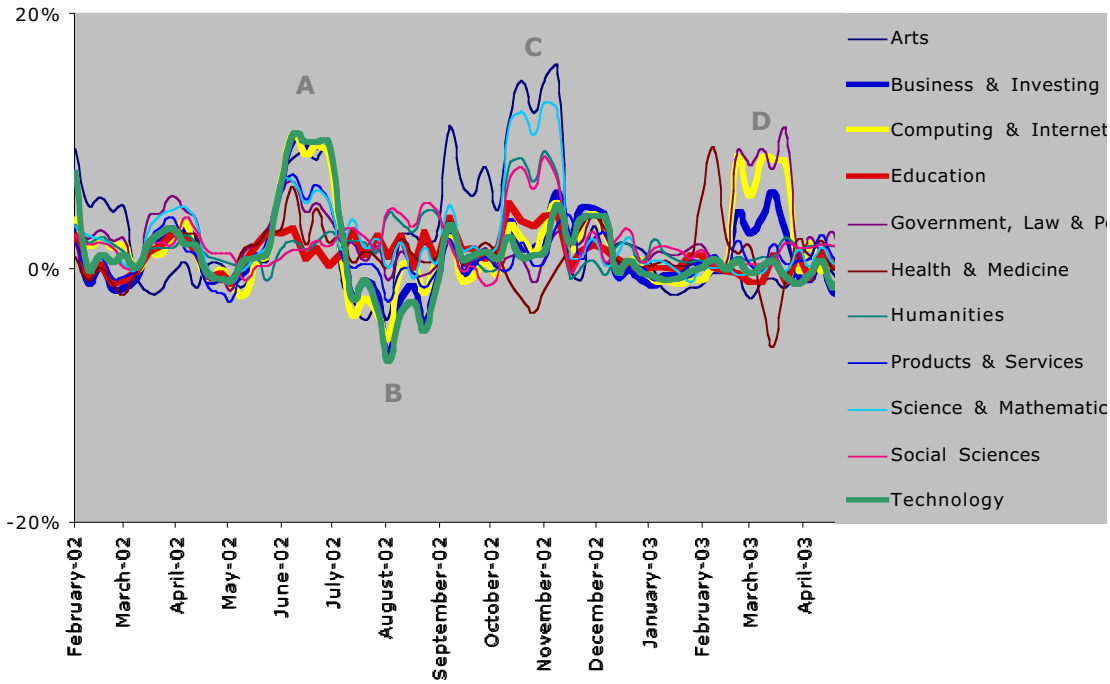
Do We Have a Market Tracker?

We cannot conclude, as we did in the case of the campus *Weatherstations*, that our market trackers worked, nor can we claim to know what was happening to corporate e-learning or its providers. It is possible that our market trackers simply missed substantial trends. It is also possible that the nature and severity of the recession produced a dramatically contracting market for e-learning—one that our trackers missed as well.

But is also just as plausible that the market trackers worked—and that what they have to tell both providers and consumers of e-learning represents an important insight into the future shape of the emerging market for e-learning: that is, this market is dominated now and will likely to continue to be dominated by providers who offer products to businesses, both large and small. Currently, to succeed in this market, providers must offer a host of services, including consulting and customizing learning products. Our reading of the data suggests that over the next several years providing services will prove to be more profitable than supplying content.

The other well-defined, seemingly successful, and ostensibly stable market niche is comprised of firms and educational enterprises that sell directly to individual customers—the distance education niche. Their products are not very soph-isticated, but their attention to detail and

Figure 5o. Weekly Changes in Number of Google Pages: February 2002-May 2003 (smoothed)



to customer interests is becoming a hallmark of their successes.

The other identifiable market niche with "legs" is comprised of firms offering computerized assessments—tests, exams for licensing agencies, test-prep, and remote access to standardized testing protocols like the SAT, GRE, GMAT, and TESOL. The evolving nature of this niche parallels the growing attractiveness of computerized assessments on college campuses—though it still is not clear just how often either faculty members or their institutions will have the financial wherewithal to purchase these products.

The educational segment—once thought to be among the market's leaders—is actually getting smaller. Though many providers advertise learning objects, there is little evidence that they are much in demand. Instead, the market remains focused on bread-and-butter applications—in Business and Investing, Technology, and Computing & Internet. One gets the sense when reviewing the products being offered that "innovation is out and survival is in."

From this perspective, then, the general market for e-learning looks very much like the market tracked by our campus *Weatherstations*: not very expansive; dominated by the suppliers of transaction systems and consulting; and still waiting for the innovation to take hold.

The obvious question, then, is why hasn't e-learning taken off? Why are there relatively few successful innovations? Why doesn't content matter more? Why should the market's educational segment be declining rather than growing? We set out in the next chapter to provide answers to these questions.

Chapter 6: e-learning's Troubling Assumptions

Perhaps the most productive way to decipher what happened to e-learning—and, in the process, to answer the questions we posed at the end of the last chapter—is to examine the three basic assumptions that defined its promise, as well as why those assumptions proved to be particularly troubling:

1. If we build it, they will come.
2. The kids will take to e-learning like ducks to water.
3. E-learning will force a change in how we teach.

A fourth assumption, related more to the potential for e-learning to build bridges across learning communities, could be added to this list: electronically mediated learning would lead rapidly to the development of international networks linking both scholars and learners.

Assumption 1: "If we build it, they will come."

As with most innovations, those responsible for the experimentation that yields an initial product simply assume that "If we build it, they will come"—that their customers will recognize the value of their product as soon as it emerges on the market. Almost all of e-learning's first applications began in precisely that way, as individual experiments whose interesting results led e-learning's first innovators to believe that they 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 from collections of successful applications.

The best catalog tracking the rise—and, on occasion, the fall—of e-learning experiments is Carol Twigg's *The Learning MarketSpace,* which she describes 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 available strategies and programs. Much of the content focuses on the development of course or learning objects—the principal building blocks of any program offering electronically mediated instruction, whether on the Internet or through some other form of electronic distribution.

The best collection of 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 learning objects and from which interested practitioners could download objects to use in their courses. A key component of the original design was to develop 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 elusive in practice, MERLOT nonetheless became a unique repository 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.

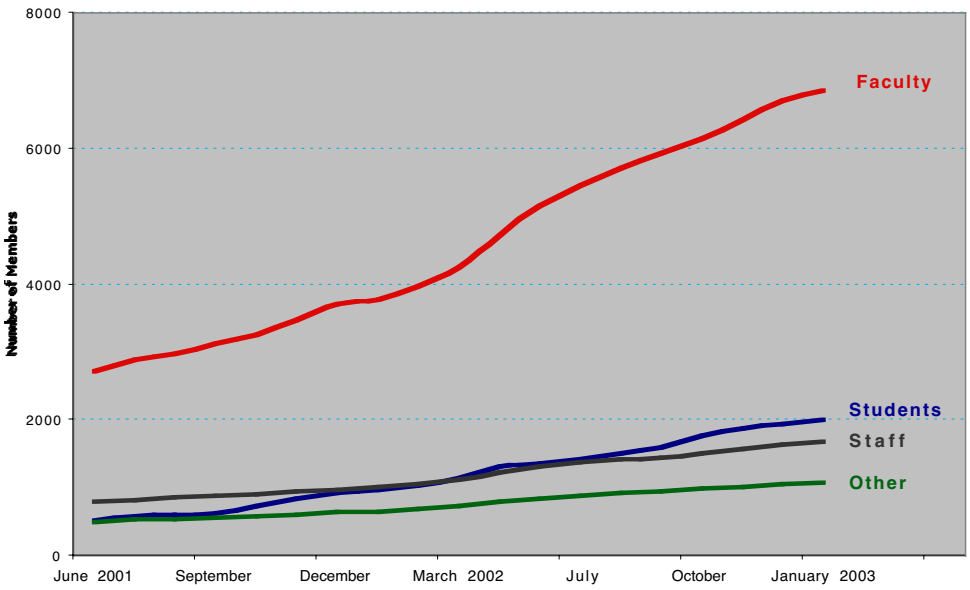
From June 2001 to January 2003, the *Weatherstation* team visited the MERLOT website on a bi-monthly basis. MERLOT itself is a marvel of careful documentation and reliable programming—features that allowed us to ask a series of critical questions: Who were MERLOT's members? Which fields of study were best represented? Which disciplinary communities? How fast was MERLOT both growing and changing?

The answers to these questions echoed those we had received from our *Weatherstation* panels. Over the course of 15 months of tracking, the number of MERLOT's registered members grew steadily at the rate of 2.5 percent per month. From June 2001 through January 2003, MERLOT's registered members nearly tripled, growing from just over 4,500 to just over 11,600. Faculty members were the largest group, growing from more than 2,700 to more than 8,000 (Figure 6a).

The growth was impressive; however, the fact that MERLOT's registered faculty numbered less than 10,000 out of more than 1,000,000 total teaching faculty in the U.S. (of whom roughly half were full-time faculty) meant that MERLOT's total market penetration amounted to less than one percent. Like the members of our own *Weatherstation* panels and respondents to the Sloan *Sizing the Opportunity* survey, MERLOT primarily tapped the opinions and interests of e-learning's innovators and early adopters.

Tracking MERLOT helps to document the degree to which the most complex of e-learning's adoption cycles—the one focusing on

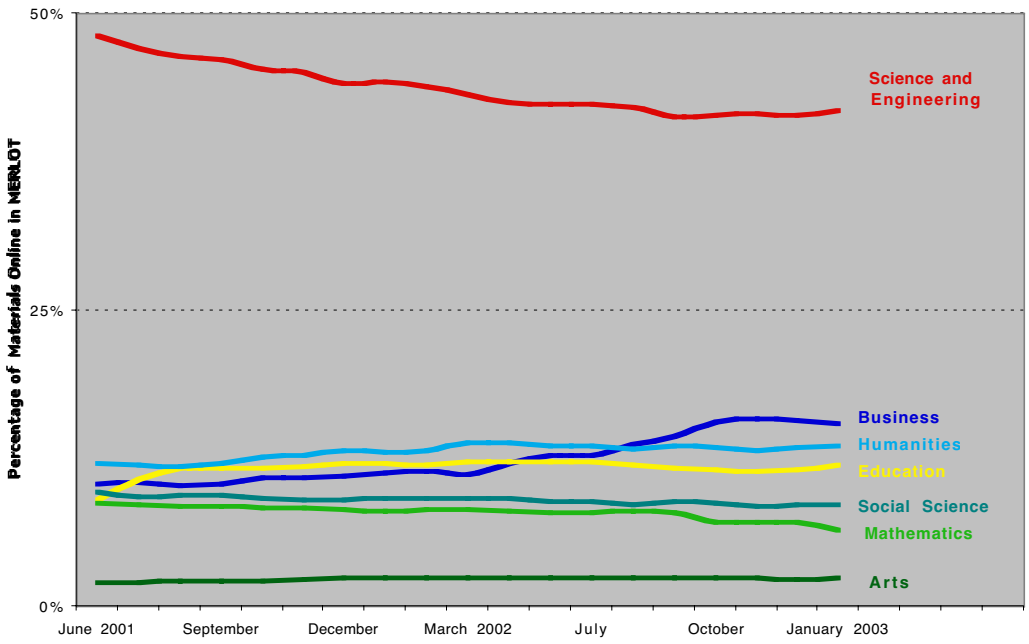
Figure 6a. MERLOT Members



learning objects—has yet to take off. In general, the learning objects posted to MERLOT are not becoming more sophisticated; and, while the number of MERLOT's visitors and members continues to grow, collectively they represent but a small portion of e-learning's potential adopters. Users continue to share what they have produced themselves without exhibiting much interest in rating or evaluating what others are offering. There is no feedback loop, no evident connection between the suppliers and consumers of learning objects. Indeed, if one follows MERLOT's postings as we did, one comes away with the feeling that there really are no e-learning consumers at all—only innovators and inventors eager to showcase what they have accomplished.

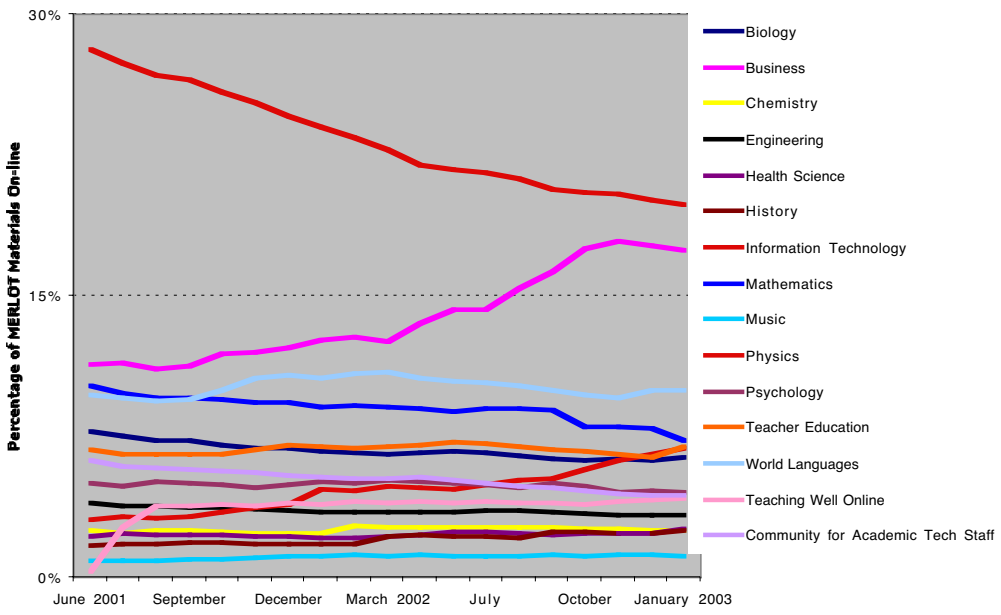
Just as important, tracking MERLOT suggests that the distribution of e-learning's early adopters has remained remarkably constant over the last two years. Course materials posted to the MERLOT site continue to be dominated by just two fields: Business, and

Figure 6b. MERLOT Course Materials by Field



Science and Engineering. Together, these fields account for nearly 60 percent of all the learning objects available through MERLOT. The principal shift in the number of learning objects posted over these 15 months was also largely between these two categories, with Business growing at the expense of Science and Engineering (Figure 6b).

Figure 6c. MERLOT Course Materials by Discipline Community



Tracking MERLOT's disciplinary trends suggests that this shift was largely occasioned by a decline in the physics' community domination of—and perhaps interest in—MERLOT in particular and course objects in general (Figure 6c).

Inspecting the actual learning objects posted to MERLOT reveals a second important aspect of e-learning's trajectory: there has yet to emerge any sense of a dominant design in course objects—the kind of dominant design that is almost universally characteristic of successful innovations. 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 concepts of a spreadsheet consisting of rows and columns. The second example of a dominant design is the emergence of the Apple-pioneered use of the graphical user interface—a dominant design that every developer of user-friendly systems now employs as a matter of course. The third is the kind of sophisticated web-crawler Google pioneered, which ultimately provided the service itself a dominant market position.

Within the realm of e-learning in general, two dominant designs have emerged. PowerPoint now supplies the dominant design for course enhancement materials—that is, for e-learning's first adoption cycle. For e-learning's second adoption cycle focusing on transactions, Blackboard and WebCT course management systems supply the dominant design. But 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 precisely what most e-learning users want, largely because they know that the 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).
>
> 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 of why this innovation's champions have built a field of dreams that, for the most part, has proven to be attractive only to themselves.

Assumption 2: "The kids will take to e-learning like ducks to water."

Two years ago, most faculty or staff members within a university community would have been nearly unanimous in their assessment of whether students would be able to utilize computer-based learning—as part of a course either on the Internet or in a classroom using an electronic course management system or learning objects. Indeed, they would be incredulous that you made such an inquiry. When *Weatherstation* interviewers posed this question in the fall of 2001, they were regularly told: "Not a problem—the kids take to e-learning like ducks take to water. After all, they love games and technology, 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* campus panels were less sure. Eighteen months ago, just over half of 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 great deal, of trouble; and just 15 percent said most students would likely have a lot of trouble. A year later the distribution of opinion among administrative staff in the *Weatherstation* panels was roughly the same: 46 percent said there would be no problem; 41 percent said most students would have some but not a lot of trouble substituting e-learning for in-class instruction; and 11 percent said most students would have difficulty.

The similarity of the two distributions, however, obscures the fact that one of every four administrators in the panels changed their opinion over the course of a single year—with 15 percent saying they now believed students would have more trouble, and another 10 percent 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 who were part of the campus *Weatherstation* panel broke nearly into thirds: 37 percent said students would have little or no trouble; 32 percent said most students would have some, but not a lot of trouble; and 31 percent said most students could have a lot of trouble with the substitution. As with their administrative colleagues, faculty opinion on this issue was noticeably volatile. How many faculty changed their mind over the course of the year? The answer is nearly one in five, although again the overall distribution of opinions remained roughly 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 such volatility in opinion was evident on the issue of whether students would have difficulty in 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 actual experience—along with a sense that no one had ever asked the students whether or not they actually *liked* e-learning.

Several weeks after the team's visit to Austin, there appeared in the *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 it proves in and of itself 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. . . .
>
> 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.
>
> 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. . . . 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.
>
> Isensee, L. (January 28, 2003) *The Daily Texan*, University of Texas-Austin

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 megabookstore, told the *Weatherstation* team to check out "the kind of software the kids were buying." The team did, conferring 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. In June 2003, 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, they are: Adobe Photoshop, Adobe Acrobat, Macromedia Studio MX, and Macromedia Dreamweaver MX. Photoshop is used for editing, enhancing, and optimizing photographs. Acrobat allows the reader to read and prepare PDF files. Dreamweaver allows the user to construct sophisticated websites. And Macromedia Studio MX, to quote the product's own website, "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 has most in common is the capacity to allow users 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 downloading 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."

Most promoters of e-learning simply missed all of this devotion on the part of students to complex presentations of self. 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 specially designed "studios" where students work in two-person teams on upwards of 25 computers. Faculty circulate throughout the studio, providing 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 at more than a dozen other institutions—because the curriculum itself was problem-based, because simple graphics could be used to simulate physical properties and rates of change, and because the students themselves saw Studio Physics as an example of the kind of system they had come to this engineering school to learn to develop. Yet, this set of characteristics 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, and they worked directly with their partners and 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 another 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 outreach programs capable of enrolling part-time adult learners who were distant from campus. What each of these universities discovered, however, was that better than 80 percent 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, however, enrolled in these e-learning courses because they were "convenient." Because they were on campus, the e-learning experience was neither remote nor detached, but simply there.

Assumption 3: "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 proven to be 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 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 when they have mastered the art of critical thinking and have acquired the discipline necessary to be self-paced learners. Constant assessment and feedback are critical, so that both student and instructor can determine, before it is too late, whether the student is mastering the necessary material.

E-learning seemed more than ready to satisfy each of these goals. As Studio Physics at RPI demonstrated, within fully integrated e-learning courses faculty are in fact guides—and designers and mentors and conveners. They are not presenters, unless they happen to have filmed themselves performing an experiment or conducting a simulation and then made those images available on their students' computers. The student pairs represented exactly the kind of interactive learning groups that educational reformers envisioned. The feedback was immediate and continuous. Students knew if they had the right answer or were at least proceeding in the right direction as soon as they submitted answers to the problem sets on which they were working. 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. Even when the text book comes with an interactive CD-ROM or when the publisher makes the same material available on a proprietary website, most faculty do not assign those materials. Only modest breakthroughs have occurred—in the use of e-mail 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 up-front is less dramatic: the ability for them "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 faculty really need are the rudimentary electronic library skills that most have already mastered. Blackboard and WebCT allow the faculty users to respond, when asked, "Are you involved in e-learning?" by saying, "Yes, my courses are already online!"

The rapid introduction of PowerPoint as e-learning's principal course enhancement tells much the same story. PowerPoint is essentially "clip art" e-learning—in the sense that it allows the instructor to import graphics and graphs from other mediums, including the instructor's old lecture notes. Illustrated lectures do not constitute electronically mediated learning any more than courses that use Blackboard or WebCT to distribute learning materials without introducing learning objects.

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, supported by 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 members' freedom to teach what they wanted, idiosyncratic. Once the course had been offered for two or three years, the faculty member often moved on to other topics and different experiments, having satisfied his or her own interests and curiosities. 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 faculty in order to involve them 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

More hope and anticipation than assumption, the belief that was held by many of e-learning's early proponents was that electronically mediated learning would lead rapidly to the development of international networks linking both scholars and learners. 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 better understood now 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 Motohisa Kaneko of Tokyo University and his colleagues, principally Naoki Ottawa of Todai and Fujie Yuan at the National Institute of Multimedia Education (NIME), have employed probes to analyze Japanese e-learning websites that are similar to those used by *The Weatherstation Project*. Two conclusions are evident. First, Japanese web-based e-learning is in its infancy, 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 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 websites is language instruction and acquisition—a subject that is simply not present on U.S. e-learning websites. 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-Prometric do have internationally configured networks spawned by the need to ensure 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 that 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 worldwide 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 percent of the price of the in-residence programs that 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. As *The Chronicle of Higher Education* 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."
> Olsen, F. (August 28, 2003), *The Chronicle of Higher Education*

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.

Conclusion: What's Next?

As part of our work for *The Weatherstation Project,* we have been examining the thwarted nature of the e-learning revolution, asking, "Why did the boom go bust?" The answer derives, first, from our development of a conceptual framework to answer the question (Chapters 2 and 3); then, from our analysis of the market, based on the campus *Weatherstations* and our tracking of e-learning across the Web (Chapters 4 and 5); and, finally, from our parsing of what we saw as e-learning's troubling assumptions (Chapter 6). The answer itself goes something like this.

E-learning, particularly in the United States, attracted a host of skilled entrepreneurs and innovators who sought, as their most immediate goal, to establish 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 particular 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 such as 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 only 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 postsecondary education rushed to market with e-learning ventures. A veritable feeding frenzy ensued, with large amounts of time, effort, and capital 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. In a fundamental way, the boom-bust cycle in e-learning stemmed from an attempt to compress the process of innovation itself. The entrepreneurial 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 remain robust and growing, particularly the transactional segment dominated by course management systems like Blackboard and WebCT and more recently receptive to computerized testing routines like those developed by Prometric. But overall the experience with e-learning has been disappointing.

There were many 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. 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—and not surprisingly, most ended up paying the price.

Contextual Changes

In many ways the underlying message of our report is that it is high time for "e-learning" to get real—in a dual sense. Those who promote, fund, and ultimately depend on e-learning need to talk less and succeed more. And those early adopters need to understand that their success depends as much as the context in which they operate as on the power of the technologies they employ.

- **Necessary Changes Within the Academy Itself.** The first set of necessary conditions involve changes within the academy itself. The future of e-learning—particularly for full-time, residential students—is linked to the pace of educational change and reform. The full potential of e-learning and electronically mediated instruction will not be realized unless there is an acknowledgment, on the part of a large number of faculty, that there is need to substantially improve educational quality, especially for undergraduates. 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.

- **A Methodology for Calculating Costs and Efficiencies.** Once a significant number of institutions, including a fair share of market leaders, have determined they need to improve the quality of their educational programs and that e-learning can serve as a means to that end, these institutions will find themselves addressing questions of costs and efficiencies. What adopting institutions will require is a methodology that allows 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.
- **Less Rigid Tradeoffs Between Costs and Quality.** 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 articulate 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. It requires a fundamental change in a mindset which heretofore assumed that education's production functions are largely fixed—that is, a change to one part requires corresponding changes to all other parts, because the relationship between inputs and outputs is fixed. In the final analysis, what the widespread adoption of e-learning requires is a broad willingness on the part of adopting institutions to search for more flexible combinations of inputs: people, facilities, and technology.
- **More Persistent Links Between Corporate and Collegiate Education.** Perhaps the largest unknown is what will happen to corporate training and education now that the economy is once again growing. If that growth results in substantial labor shortages, everyone will be looking for ways to speed up and make more efficient the ways in which the labor force acquires new skills. In the training depression that accompanied this recession, e-learning made some important inroads. Will they be preserved and expanded? Will for-profit collegiate education continue to expand and will entities like the University of Phoenix provide the bridge between corporate and collegiate education? Will there be a merging of efforts or the continued development of what amounts to almost two separate industries?

Technological Changes

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

- **A Dominant Design for Learning Objects.** 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—although that end is important—

but also more interchangeable and more easily linked with one another. In envisioning this context, it helps to think of a railroad marshalling yard in which the cars are the learning objects 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.

- **A Technological Focus on What Students Really Want.** At the same time, it is important for e-learning designers to resolve questions regarding what students expect from e-learning, as an extension of their interest in other technologies. Here, we require ways to motivate students to learn using the technologies and to bring human interaction into the equation in optimal ways.

Market Conditions

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 successes stories here as well.

- **More Market Successes.** More specifically, e-learning needs a substantial number of showcase ventures that generate revenue growth sufficient to sustain continuing innovation without continuous infusions of capital. In this arena, nothing will succeed like success.
- **A Real Market for Learning Objects.** At the same time, there needs to develop a robust and growing "market" 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. We count ourselves among the optimists who believe electronically mediated instruction will become a standard, perhaps even dominant, mode of instruction. But we 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-anytime learning will prove irresistible—educationally as well as financially. The next step will be to use the power of e-learning to establish the networks without borders that an increasingly fractured global community desperately needs.

Three Practical Steps to Start the Process

It could be said that the revolution—though slow in gaining momentum—has been launched. The challenge at hand involves the acceleration of e-learning's adoption. Three practical steps are required before e-learning and electronically mediated instruction can achieve its full potential.

- **Develop a Catalog of Lessons Learned.** First and foremost, the industry needs a catalog of lessons learned. Our hope is that this report represents a start in that direction.
- **Map the Obstacles still to be Overcome.** Second, we will need a more realistic mapping of the obstacles that must be overcome—in terms of the technology itself; in terms of assuring that universities in particular become platforms of adoption as well as sources of innovation and invention; and in terms of achieving the market conditions necessary for growth. In this report we have also tried to provide an initial enumeration of those conditions.
- **Move Ahead in Developing Dominant Designs and Global Networks.** Finally, e-learning in all four of its innovation cycles requires a set of realistic strategies for developing the dominant designs and the global networks that will make it possible for e-learning to come of age—and to signal its broad adoption.

Not the End of the Story

Despite the travails of the last several years, e-learning has retained a core of true believers who argue, still forcefully and occasionally persuasively, that a revolution is at hand—that the computer will do for learning today what printing did for scholarship in the fifteenth 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 who point out that e-learning is alive and has in fact spurred a host of important educational changes, probably best symbolized by the widespread adoption of course management tools such as BlackBoard and WebCT. Money is being spent. Smart classrooms are being built both on campuses and businesses. Collegiate faculty and corporate trainers are successfully integrating electronically delivered learning materials into literally thousands of courses focusing on both traditional and non-traditional subjects. What these pragmatists have come to understand is that e-learning is evolving in ways that few had predicted.

We count ourselves among the pragmatists. We believe the story of e-learning is still unfolding—no one really knows what tomorrow will bring, although we suspect that computer-based learning technologies will continue to serve as a major catalyst 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 too smart, for us not to take seriously the prospect that major changes will flow from their efforts.

Appendices

Appendix 1
Survey Responses of Faculty

	Round 1 Responses				Round 2 vs Round 1 Changes			Round 3 vs Round 2 Changes			Round 3 vs Round 1 Changes		
Item	Total Opinions	No	Yes	No Opinion	Any	Negative	Positive	Any	Negative	Positive	Any	Negative	Positive
Currently there is a reduction in the traditional workload for faculty in your department engaged in e-learning.	76	66	10	1	4%	1%	3%	5%	0%	5%	9%	1%	8%
Currently there is funding dedicated to support e-learning activities in your department/school.	74	24	50	3	7%	5%	1%	4%	0%	4%	9%	4%	5%
Currently there are technical staff in my department/school dedicated to support e-learning initiatives.	77	11	66	0	4%	3%	1%	5%	3%	3%	9%	5%	4%
In my department/school there are currently awards for pedagogical innovation using new technologies.	73	48	25	4	3%	3%	0%	1%	1%	0%	4%	4%	0%
I have used a course management tool like Blackboard, Prometheus, or WebCT.	77	22	55	0	3%	3%	0%	5%	5%	0%	8%	8%	0%
I have used off-the-shelf software packages such as Dreamweaver, Maple, JMP or another statistical package.	77	32	45	0	4%	3%	1%	1%	1%	0%	5%	4%	1%
I have customized, off-the-shelf software for use in teaching	77	45	32	0	5%	3%	3%	4%	4%	0%	6%	5%	1%
I have used multi-media presentations combining text, voice, and video/digital images.	77	21	56	0	3%	1%	1%	0%	0%	0%	3%	1%	1%
I have developed e-learning course objects.	77	26	51	0	4%	4%	0%	1%	1%	0%	5%	5%	0%
I have developed a comprehensive e-learning course.	77	46	31	0	3%	3%	0%	1%	1%	0%	4%	4%	0%
I have required students to purchase software tools such as Excel, SAS, SPSS, JMP, MAPLE, etc.	77	63	14	0	1%	1%	0%	1%	1%	0%	3%	3%	0%
I have required students to participate in electronic discussion groups.	77	38	39	0	5%	4%	1%	4%	4%	0%	6%	6%	0%
I have required students to use web-based materials.	77	10	67	0	0%	0%	0%	4%	4%	0%	4%	4%	0%
I have used computer based assessment instruments (tests or other forms of evaluation) in one or more courses.	73	43	30	4	7%	7%	0%	5%	4%	1%	12%	10%	1%
I have assigned text books that include interactive discs or access to a proprietary web site (password protected).	77	29	48	0	3%	0%	3%	5%	4%	1%	8%	4%	4%
I have made assignments requiring students to use the discs or proprietary web site that come with the text book.	77	52	25	0	5%	4%	1%	5%	4%	1%	10%	8%	3%
I have supplied students other interactive discs or programs.	77	44	33	0	5%	4%	1%	1%	1%	0%	4%	4%	0%

Appendix 1
Survey Responses of Faculty

	Round 1 Responses					Round 2 vs Round 1 Changes			Round 3 vs Round 2 Changes			Round 3 vs Round 1 Changes		
	Total Opinions	Low	Medium	High	No Opinion	Any	Negative	Positive	Any	Negative	Positive	Any	Negative	Positive
What is the frequency of my own use of e-learning products?	77	25	30	22	0	10%	8%	3%	8%	5%	3%	18%	13%	5%
What is the familiarity of faculty in my department with e-learning?	75	24	31	20	2	4%	1%	3%	3%	3%	0%	7%	4%	3%
What is the current rate of the growth in e-learning activity?	75	11	37	27	2	13%	7%	7%	10%	3%	8%	21%	8%	13%
How great is the value or benefit from e-learning?	77	4	38	35	0	6%	4%	3%	3%	1%	1%	9%	5%	4%
What is the capacity of e-learning to provide opportunities to use resources more efficiently?	75	21	33	21	2	11%	8%	3%	12%	11%	1%	22%	18%	4%
What is the capacity of e-learning to serve new student markets?	73	17	25	31	4	11%	8%	3%	5%	4%	1%	16%	12%	4%
To what extent is faculty overload responsible for the reluctance of some faculty to experiment with e-learning?	75	22	26	27	2	11%	11%	0%	5%	4%	1%	15%	13%	1%
How great is the concern among faculty about the intellectual property rights of teaching material?	74	37	27	10	3	5%	5%	0%	9%	9%	0%	14%	14%	0%
What degree of discomfort would your students have with the substitution of e-learning for face-to-face instruction?	75	28	24	23	2	11%	7%	4%	8%	4%	4%	19%	11%	8%
What is the degree of school/ department support for faculty developing e-learning courses or course objects?	77	16	32	29	0	10%	3%	8%	13%	5%	8%	21%	6%	14%
How much priority is given to e-learning initiatives relative to other budget priorities in the school/ department?	59	24	17	18	18	7%	3%	3%	17%	5%	13%	21%	6%	14%
To what extent are there workshops to introduce, teach, train faculty to use of e-learning?	76	15	21	40	1	7%	1%	5%	10%	6%	4%	14%	6%	8%
What is the priority my institution places on e-learning?	75	10	31	34	2	8%	1%	7%	4%	1%	3%	12%	3%	9%
To what extent are the campus book or computer stores a source of e-learning software?	60	29	24	7	17	3%	2%	2%	8%	8%	0%	8%	7%	2%

* Changes do not include those who had no opinion in one of the rounds in the computation.

continued

Appendix 2
Survey Responses of Administrators

	Round 1 Responses					Round 2 vs Round 1 Changes			Round 3 vs Round 2 Changes			Round 3 vs Round 1 Changes		
Item	**Total Opinions**	**No**	**Yes**		**No Opinion**	**Any**	**Negative**	**Positive**	**Any**	**Negative**	**Positive**	**Any**	**Negative**	**Positive**
Currently there are technical staff in my department/school dedicated to support e-learning initiatives.	78	5	73		1	0%	0%	0%	6%	1%	5%	6%	1%	5%
Currently there is funding dedicated to support e-learning activities in your department/school.	75	14	61		4	3%	3%	0%	4%	1%	3%	7%	4%	3%
Currently there is a reduction in the traditional workload for people engaged in e-learning development.	63	38	25		16	3%	2%	2%	7%	4%	3%	10%	6%	4%
In my school there are currently awards for pedagogical innovation using new technologies.	67	37	30		12	1%	1%	0%	3%	1%	1%	3%	3%	0%

Appendix 2
Survey Responses of Administrators

	Round 1 Responses					Round 2 vs Round 1 Changes			Round 3 vs Round 2 Changes			Round 3 vs Round 1 Changes		
Item	Total Opinions	Low	Medium	High	No Opinion	Any	Negative	Positive	Any	Negative	Positive	Any	Negative	Positive
What is the frequency of my own use of e-learning products?	78	22	28	28	1	14%	4%	10%	10%	5%	5%	16%	5%	11%
What is the familiarity of faculty in my department with e-learning?	74	19	35	20	5	7%	7%	0%	7%	5%	1%	14%	13%	1%
What is the current rate of the growth in e-learning activity?	76	15	24	37	3	12%	8%	4%	15%	5%	10%	26%	13%	13%
How great is the value or benefit from e-learning?	74	4	32	38	5	4%	1%	3%	5%	1%	4%	9%	3%	6%
What is the capacity of e-learning to provide opportunities to use resources more efficiently?	75	20	37	18	4	15%	12%	3%	13%	10%	3%	26%	21%	5%
What is the capacity of e-learning to serve new student markets?	75	14	31	30	4	17%	16%	1%	0%	0%	0%	17%	16%	1%
To what extent is faculty overload responsible for the reluctance of some faculty to experiment with e-learning?	72	29	27	16	7	13%	11%	1%	12%	9%	3%	22%	19%	3%
How great is the concern among faculty about the intellectual property rights of teaching material?	71	30	27	14	8	18%	15%	3%	8%	7%	1%	23%	20%	3%
What degree of discomfort would your students have with the substitution of e-learning for face-to-face instruction?	66	34	23	9	13	21%	11%	11%	4%	3%	1%	23%	11%	11%
What is the degree of school/ department support for faculty developing e-learning courses or course objects?	77	13	35	29	2	9%	5%	4%	12%	6%	5%	21%	12%	9%
What is the priority my institution places on e-learning?	78	16	24	38	1	13%	8%	5%	4%	3%	1%	16%	10%	6%
How much priority is given to e-learning initiatives relative to other budget priorities in the school/ department?	69	21	23	25	10	13%	7%	6%	13%	4%	9%	25%	10%	15%
To what extent are there workshops to introduce, teach, train faculty to use of e-learning?	77	18	21	38	2	12%	8%	4%	18%	13%	5%	25%	18%	6%
To what extent are the campus book or computer stores a source of e-learning software?	64	39	20	5	15	11%	5%	6%	8%	2%	6%	19%	6%	13%

* Changes do not include those who had no opinion in one of the rounds in the computation.

continued

Appendix 3
Clients Served by Providers Engaged in E-Learning

Number of Providers Serving the Combinations of Clients Marked	Corporate	Academic	Direct to Consumer	Government
52	X			
47	X	X		X
35	X	X		
25	X		X	
24	X	X	X	X
19			X	
17	X			X
12		X		
12	X	X	X	
8		X	X	
8	X		X	X
1		X		X
1			X	X
1		X	X	X
Total Providers Serving Client Type	220	140	98	99

Appendix 4
Content Offered by Providers Engaged in E-Learning

Number of Providers Offering the Combinations of Content Areas Marked	Information Technology	Business Practices	Education	Human Resources	Management (Non-HR)	Regualtion/Compliance	Sales	Health Care	Communications	Other	Engineering	Social Science
35			X									
30	X											
16	X	X										
10	X	X		X								
7										X		
6		X										
6		X		X								
5		X	X									
5		X		X	X							
4	X	X		X	X	X						
4						X						
3				X								
3									X			
3		X				X						
3	X	X			X							
3	X	X		X	X							
3	X	X	X	X	X		X					
2			X								X	
2			X		X							
2	X			X								
2			X					X				
2		X		X			X					
2				X	X	X						
2	X	X				X						
2	X		X		X							
2		X	X	X								
2	X	X		X		X						
2	X		X		X			X				
2		X		X	X			X				
2		X		X	X		X		X			
2	X	X	X	X				X				
2	X	X		X	X		X	X				
Total Providers Offering Content	126	122	89	82	68	41	38	35	33	24	21	8

* Only Combinations Found in Two or More Providers Shown

Appendix 5

Delivery System and Product Types By Providers Engaged in E-Learning

Number of Providers Using the Combinations of Delivery Methods and Offering Product Types as Marked	Asynchronous	Synchronous		Services	Content
145	X	X			
110	X				
4		X			
147				X	X
69				X	
45					X
Total Providers Using Delivery Method & Offering Product Type	255	149		216	192

Appendix 6

Items Offered by Providers Engaged in E-Learning

Number of Providers Offering the Combinations of Items Marked	Courses	Assessment	Certificates	Degrees	Credits
55	X				
40	X		X		
20	X	X	X		
13	X	X			
12		X			
8	X		X	X	X
7			X		
7	X				X
4		X	X		
4	X			X	X
1	X			X	
1	X		X		X
1	X	X	X	X	X
Total Providers Offering Product Type	150	50	81	14	21

Appendix 7
Services Offered by Providers Engaged in E-Learning

Number of Providers Offering the Combinations of Services Marked	Learning Management	Consulting	Training	ASP/Hosting	Customizable Content	Course Development Tools	Libraries/Reference Tools/ Databases	Real-time Conferencing	Learning Objects	Presentation Tools	Other
11			X								
10							X				
7	X	X		X		X					
6		X	X		X						
5									X		
5					X						
5							X		X		
5	X	X		X							
5	X			X		X		X			
4			X				X				
4	X			X							
4		X	X								
4	X	X	X		X						
4	X	X			X	X					
3	X										
3						X					
3								X			
3	X		X								
3	X			X		X					
3		X		X		X					
3	X			X	X						
3		X	X		X	X					
3	X	X	X	X		X					
3	X	X	X	X	X	X					
Total Providers Offering Services	113	106	100	94	94	89	47	38	29	16	6

* Only Combinations Found in Three or More Providers Shown