In higher education, the level of interest and enthusiasm for infusing information technology (IT) into the teaching and learning process is notable. For most institutions, however, new technologies represent a black hole of additional expense as students, parents, and faculty alike demand access to each new generation of equipment and software. Most campuses have bolted new technologies onto a fixed plant, a fixed faculty, and a fixed notion of classroom instruction. Under these circumstances, technology becomes part of the problem of cost containment rather than part of the solution. By and large, colleges and universities have not yet begun to realize technology’s promise to generate a return on IT investments by reducing the cost of instruction.

Making use of new technologies to reduce the cost of instruction requires a fundamental shift in thinking. It requires challenging the primary assumption of the current instructional model: that the only way to achieve effective student learning is for faculty members to meet with groups of students at regularly scheduled times and places. Rather than focus on how to provide more effective and efficient teaching, colleges and universities must focus on how to produce more effective and efficient student learning. Faculty are only one of many resources that are important to student learning. Once learning becomes the central focus, the important question is how best to use all available resources—including faculty time and
technology—to achieve certain learning objectives. Instead of asking faculty to work harder, they need to enable them to work smarter.

Responsible members of the higher education community have an interest in lowering the cost of instruction as long as such an effort does not result in a reduction of quality. All institutions hold different reasons for wanting to reduce costs. Some are concerned with reducing the cost to society—that is, the cost of tuition and fees. Both of these views tend to come from outside the institution. Stakeholders want to fund educational institutions to help the economy. Others want to reduce costs for their own families. While many are hard-pressed to find additional funds for such investments, finally, those in higher education most threatened by the growth of private-sector competition need to find more cost-effective ways to maintain their position in the new marketplace.

How can IT be used to reduce costs and increase academic productivity? Many experts have pointed out that moving away from our current model of educationthat is, from lecture to discussion—is fundamental. Some approaches employ a greater reliance on asynchronous, self-paced, or distance learning. Many institutions have already embarked on an initiative that characterizes most campuses today: the use of technology to “achieve academic goals” into the academic program but do not define what is “appropriate.” Others seek to use technology to “achieve academic goals” but do not specify those academic goals.

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computers, graphic design, music, animation, film and television, English composition and literature, and foreign languages. DeAnza estimates that 75 percent of its students have access to computers through their personal or means or through on-campus labs and networks. In addition, all faculty members have office computers connected to the ATM-backbone network.

Ubiquitous networking is a prerequisite to achieving a return on investment in the university's computer facilities. Until all members of the campus community have full access to IT resources, it is difficult to implement significant redesign projects.

An Institution Must Have a Mature IT Organization to Support Faculty Integration of Technology into Courses or Must Contract with External Providers to Supply Such Support

A "mature" IT organization is one that can provide more than technical support. It has an understanding of the goals and objectives of the institution's academic program—it can see the "big picture." More advanced IT organizations include instructional designers and developers, faculty members, and students with demonstrated experience and specific expertise with supporting course redesign.

Río Salado College, one of the ten Maricopa County Community Colleges, has been involved in online education for the last three years and distance education for the last twenty-five years. Currently, 80 percent of its general education courses are delivered via technology. Twenty-three full-time and ten part-time technicians and program managers provide all technical support in-house. In addition to the three full-time instructional units that support hardware and software (Information Services) and Help Desks for students and faculty, Río’s course Development unit is responsible for the development and maintenance of its Web-based courses.

UCF has a special unit, Course Development & Web Services (CDWS), with responsibility for faculty development and Web-based courses. The CDWS staff includes instructional designers, ten programmers (called "TechRangers"), six digital media specialists, four software engineers, and three administrative staff. The full-time staff, supported by part-time students, instructors, and consultants, is supported by five cross-disciplinary teams that work on multiple projects. The instructional design team creates and delivers professional development curriculum and supports with faculty to access management systems. It is necessary to have Web-based materials for courses and other strategic campus Web sites. The digital media team produces all graphics and photos on Web sites, print materials, CD-ROM, and video and audio production and editing. Software engineers create databases and systems to support large projects. The administration team provides planning, project management, and clerical support. This comprehensive support unit enabled UCF to enroll nearly 6,000 students in Web-based courses during the spring 1999 semester.

The University of Pittsburgh has a special unit, Course Development & Web Services, to "provide accessible, affordable, and high-quality education by keeping the traditional classroom the focal point of academic instruction-making process." The college recognizes that each student is different and, therefore, should have available a variety of modalities that support academic, personal, and career development.

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not have embraced a learner-centered view point, some institutions show movement in that direction. The University of Illinois at Urbana-Champaign annually runs an Active Learning Retreat, which has been well attended by the faculty and quite well received. Although it would be a mistake to believe that “the lecture is dead” at the university, active learning approaches have become much more widespread. A campus-level committee, the Teaching Advancement Board, has recently announced an internal funding program to involve dedicated and experienced instructors in the diffusion of learner-centered approaches.

Commitment to 24x7 education is another indicator of a learner-centered emphasis. For example, the IUPUI campus network provides students with access to a virtual learning environment—anytime and anywhere—by providing a technology infrastructure that enables both traditional and distant learners to access its offerings through various media and points of connectivity. This environment increasingly provides seamless access to distributed learning applications, library resources, and student information and tools.

An Institution Must Have Established Ways to Assess and Provide for Learner Readiness to Engage in IT-Based Courses

Learner readiness involves more than access to computers and to the network. It also involves access to technical support for such things as using navigation tools and course-management systems. How computer-literate and network-savvy are students? Are processes in place that enable students to gain these competencies if they are lacking? In addition to technical proficiency, students need to be aware of what is required to be successful in technology-intensive courses. Are processes in place that assist them in making wise choices and that prepare them for success?

For some institutions, like DeAnza College, computer literacy is not an issue. Located in the heart of Silicon Valley, DeAnza has a very high proportion of students who are quite computer and network-savvy. Yet DeAnza recognizes that awareness of what is required to be successful in technology-intensive courses is a critical prerequisite to success in such classes. To prepare its distance learning students for that experience, for example, DeAnza recently designed and installed an extensive Web-based orientation process. Rio Salado has also made a commitment to determine learner readiness to engage in IT-based courses. Efforts include clearly listing technology requirements for Web-based courses in schedules, creating Web-based tutorials for first-time Internet students, and instituting a calling program for first-time Internet students. Rather than waiting for problems to develop, Rio calls students during the first two weeks of class to determine if they are on track or have any questions. Several other initiatives are under investigation or development, including an in-person student technology orientation, a student learning styles assessment that will help students decide which delivery modality (print, mixed media, Internet, or in-person) to enroll in for a particular class, and student surveys to determine interventions that will help first-time Internet students.

UCF allows potential students in Web-based courses to assess both the technical and the skill requirements necessary for success. Technical requirements include access to the Internet, computer hardware, and computer software. Skill requirements include general computer skills, Internet skills, and study skills. Students can test their technical readiness for Web-based coursework by completing a Distributed Learning Orientation Course on the Web before registration. Before the beginning of each term, UCF holds on-campus orientations for students enrolled in fully Web-based courses. Students are exposed to the available library resources, campus services, and technical support, including the “Pegasus Connections” CD-ROM. “Pegasus Connections” assesses instructional readiness, supplies the software necessary to access Web-based materials, and provides all students and faculty with tutorials related to teaching and learning in technology. UCF plans to disseminate the “Pegasus Connections” CD-ROM to all students as they participate in the required university orientations.

Making the major change from face-to-face instruction to online learning involves far more than learning to use a computer. Many students are set in their ways after a lifetime (albeit brief) of passive instruction. They need preparation in making the transition to more active learning environments that are technology-based. Some students instinctively flourish in these new environments while others require direct intervention and assistance from faculty and staff.

An Institution Must Recognize That Large-Scale Course Redesign Using IT Involves a Partnership among Faculty, IT Staff, and Administrators in Both Planning and Execution

Substantive changes in the way courses are offered cannot rely on faculty initiative alone. They are systemic and involve changes in such institution-wide areas as policy, budgeting, administrative procedures, and infrastructure. Institutional policy regarding such things as class meeting times and contact-hour requirements will require revision. In some instances, obtaining the necessary governance approvals may be a prerequisite. In many cases, traditional budgeting processes do not welcome innovation and may need to be changed. Registral procedures such as the registration system or classroom assignments may need to be adjusted. Redesign may also require additional or unusual equipment purchases and deployment. The lesson of successful redesign is that many diverse members of the administration and faculty need to work together.

Virginia Tech’s administrative leadership has strongly promoted innovation in methods, content, and infrastructure. Although some faculty members have been developing new methods and materials for many years, it was administrative initiative that brought opportunities to the attention of the wider faculty and provided the infrastructure and support that enabled people to commit their time to course redesign. Meanwhile, curriculum oversight committees at Virginia Tech have learned to expect and encourage innovative course designs that break the traditional molds, providing the scheduling flexibility and
contact requirements needed by truly new approaches.

The University of Southern Maine has found that faculty and administrative collaboration is required even in the planning stages of large-scale course redesign. In addition to the time spent by faculty in redesigning one course, the registrar and the vice-president of enrollment management are considering the overall impact of asynchronous registration and course delivery and of reduced contact hours on the campus. They must also decide how to dedicate additional classroom space to computer laboratories. The provost is exploring, with the University of Maine System Office of Human Resources and the faculty union, how instructors of nontraditional courses will be compensated. In conjunction with the Center for Teaching, other academic administrators are investigating how one initial large-scale redesign might benefit other courses in the institution as well as exploring how this first course might be useful to other campuses in the state. In effect, even though Southern Maine’s initial effort has been focused on a particular course, everyone involved sees this as the first in a series of improvements designed to enable the campus to achieve its institutional goal of more effectively serving students in Southern Maine and also the rest of the state.

Many years ago, Rio Salado College recognized that distance learning and technology could not exist as depart- ments separate from the rest of the college. The processes that support distance learning and technology are integrated throughout the entire college, which has learned to make changes and adjustments from a systems perspective. One of the core process teams, called the Development Team, is a cross-functional group composed of faculty, IT staff, and administrators whose purpose is to provide input and direction to the design and implementation of distance learning courses and the technology that is used to support them. Meeting weekly, the team researches new developments in distance learning and technology, reads and discusses current publications and articles, and helps design long-range goals for distance learning and technology.

UCF is proud of its cohesive approach to addressing large-scale problems such as the shortage of on-campus classroom space. UCF recognizes that this endeavor requires collaboration and a partnership approach rather than independent action by individuals. The administrative leaders, including the president, the provost, and the deans of colleges, are committed to the use of technology as a solution to growth and space problems. This collaborative effort is evident in the institutionalization of distributed learning. Units are structured to develop the technical infrastructure, to provide administrative support and leadership, to implement systematic faculty development, to provide learner support, and to conduct ongoing assessment.

Institutions that have not recognized this interdependence view redesign as primarily a faculty matter, frequently as an individual faculty member’s task for his or her particular course, with some support from the IT organization. Such a view will inevitably resign institutional advancement to— in Eduprise.com founder Bill Graed’s apt phrasing—”random acts of progress” rather than substantive accomplishment. And inevitably these efforts will be unsupported and incapable of generating a return on institutional investment.

Conclusion

For those institutions that want to see a return on their IT investment but are uncertain as to the steps they should take, these institutional readiness criteria can provide a target as they develop the necessary capabilities. Taking stock of where an institution is in relation to these criteria can be an enlightening exercise, especially if all campus stakeholders are asked to assess institutional performance independently and then are brought together to compare notes and discuss their differing points of view. Institutions can also use these criteria to establish milestones between where a campus is today and where it wants to be and to set a timetable for achieving readiness in each category.

Arriving at a state of institutional readiness is no small task. It is the result of many years of effort and several millions of investment dollars. Even the most advanced colleges and universities demonstrate greater strength in some readiness areas than others; few can claim superiority in all eight.

Each of the criteria requires a somewhat different emphasis. Wanting to reduce costs and increase academic productivity, having a strategic approach, and recognizing the partnerships and institutional-wide interconnections needed for large-scale redesign are primarily attitudinal factors, requiring a significant shift in point of view from where most institutions are today. Creating a computing-intensive campus and developing mature IT support services necessitates substantial up-front investment, but such investment is essential before a return can be generated. Developing a critical mass of faculty with experience in integrating IT into their courses requires both a clear institutional strategy and a rather lengthy timetable; no one has accomplished this task overnight. Making a commitment to learner-centered practices, whether they involve IT or not, and establishing ways to assess and provide for learner readiness also begin with attitudinal change. Implementing new practices is, as always, the most difficult part of the equation, but it is the key to successful redesign.

In each case, less developed institutions do not have to reinvent the wheel but instead can learn from the institutions that have made substantial progress. The bad news is that this process takes both time and money. The good news is that the most important ingredients are free: the will to start on a path and the knowledge of which paths are most likely to lead to success.