

Change Dynamics and Leadership in Technology Implementation

The pressures for incorporating technology in higher education are both internal and external, and the consequences substantial. Students need to be empowered to succeed as lifelong learners in an information-rich environment (Barr & Tagg, 1995; Chapman, 1996; Holmes, 1999). Using technology to engage students in the integration and synthesis of information changes the fundamental teaching paradigm from teacher-centered to learner-centered instruction (Van Dusen, 1997). Younger students arrive at campuses with the expectation that technology will play a major role in their education, and as consumers they demand the same service quality that they demand elsewhere: lower costs, better service, higher quality, and a mix of products that satisfies their definition of a good education (Mooney & Bergheim, 2002; Zemsky, Massey, & Odel, 1998).

Technology expands opportunities to market educational programs for older or working adults, and also opens the higher education market to new providers: corporate universities, for-profit institutions, and technology-based distance providers. Employers seek graduates who demonstrate both mastery of the current knowledge base and mastery of the technology that will enable them to stay current (Duderstadt, 1999/2000; Klor De Alva, 1999/2000; Zuboff, 1988). External financial pressures on colleges and universities send a mixed message. On the one

Polly S. Owen is Chair of the Department of Nursing and Related Services at Columbus State Community College.

Ada Demb is Associate Professor of Educational Policy & Leadership at The Ohio State University.

hand, the growing public dismay about escalating educational costs results in efforts to control expenditures and budgets (Burd, 1998; O'Banion, 1997). On the other hand, despite shrinking financial resources at the state level, the federal government offers grant opportunities to institutions for technology initiatives (Carnevale, 2000; Ohio Board of Regents, 1992).

Institutions have recognized that incremental responses—such as adding a few courses here and there or enriching existing course offerings (Demb, 2002; Von Hippel, 1988)—are insufficient to fully exploit the opportunities or manage the challenges represented by technology. Those institutions are thus adjusting to a new reality whose response requires transformational change (Backoff & Nutt, 1997b; Connor, 1998; Hammer & Champy, 1993; Young, 1997; Wheatley, 1992). Some institutions respond more quickly than others. With missions closely tied to the needs of workforce development and businesses, community colleges have already exhibited an innovative level of responsiveness and leadership with technology-based programming (Baker, 1998; Ehrmann, 1998; Oblinger, 1996). Other types of institutions are also responding to these pressures. Market forces are pushing private liberal arts institutions to incorporate technology to keep and attract students. Bentley College, Wake Forest, Seton Hall, Franklin University, and others are reconstructing their educational offerings. Eventually every institution will be transformed to some degree because information technology fundamentally affects not only how the colleges function and who is served, but the very core of teaching and learning pedagogy (Van Dusen, 1997). The special challenge faced by these institutions is to preserve vital *core values* as they stretch toward frame-breaking new realities (Backoff & Nutt, 1997a; Carter & Alfred, 1997; Collins & Porras, 1997).

Community Colleges, Change, and Leadership

Successful community colleges respond to the educational needs of their communities by broadening their portfolios to include a major focus on perpetual learning for adults, workplace learning, and occupational preparation (Holmes, 1999). Enrolling an estimated 5.5 million students by 2000 and capturing 40% of the higher education market, community colleges are expected to be major players in employing new technologies to “harness the winds of change” (Bleed 1993; *Chronicle*, 2002). In recent years, almost all community colleges have implemented programs to improve service and quality. Whether they label these programs marketing, strategic planning, or continuous quality improvement,

community colleges have invested significant resources in trying to make change happen (Carter and Alfred, 1998/1999), departing from traditional ways of operating by moving from partnerships to networks, from synchronous to asynchronous learning, and from teaching to learning (Myran, Zeiss, & Howdysshell, 1995).

Because it is their mission to respond to the educational needs of their communities, community colleges must adjust quickly to the way society embraces an expanding use of technology (O'Banion, 2000; Roueche & Roueche, 1998). The pressure to respond drives them to experiment with programs often without the benefit of long-term studies. The risks associated with being among the "lead" innovators mean that community colleges may serve as a higher education version of the miner's canary. Their experimental programs utilize technology in a variety of modes with differential success. Thus, their experience is instructive for other types of institutions.

To support change of this magnitude, the leadership literature advocates sharing leadership (Curry, 1992) and building relationships, defining institutional vision (Bates, 2000; Wallin & Ryan, 1994), working through concepts rather than structures (Wheatley, 1992), and empowering stakeholders and constituents to achieve the vision, to create "a larger sense of the future" (Covey, 2001, p. 56). Higher education leaders are faced with difficult decisions about the proportion of already-shrinking budgets that will be allocated to technology. Linking technology closely to institutional mission and goals and working with a broad range of stakeholders prior to the financial decisions increases the likelihood of "buy-in" and may help smooth a rough decision process. In addition to engaging trustees and faculty in financial decisions, strong leadership and explicit implementation plans are needed to guide a process that may substantially alter the structure, culture, and functions of the college (Curry, 1992; Twigg, 2000). A broad-based team approach is most likely to capture the best thinking for strategy development (Bates, 2000).

Basic to the management of major organizational change are the conduct of in-depth assessments of the current situation using such frameworks as SWOT, which evaluates organizational strengths and weaknesses and environmental opportunities and threats (Backoff & Nutt, 1993; Hammer & Champy, 1993; Rowley, Lujan & Dolence, 1998), and the development of common goals and strategies. The change literature highlights the stage-wise nature of change (Carter & Alfred, 1998; Heifetz, 1993); the need to identify barriers; the importance of champions (Burgelman & Sayles, 1986); support from institutional leaders and communication (Bates, 2000; Freed & Klugman, 1997); continuous

assessment and realignment of the change process; and celebration of successes. Effective change processes lead to the development of learning organizations that seek and utilize feedback relative to goal achievement (Senge, 1990). Change can be instigated by new leadership with new visions or environmental pressure. Often the provocation is an unanticipated, sometimes unpleasant, event that challenges and unfreezes existing assumptions stimulating the formation of new perspectives (Backoff & Nutt, 1992; Schein, 1961).

Three questions arise from a review of this literature, and are the focus of this research:

1. What elements of current leadership models appear most salient in guiding large-scale technology implementation efforts?
2. Which factors affecting the change process seem most important to participants in the context of technology change, and how do they describe them?
3. What are the distinctive dynamics of change involving technology implementation?

Methodology

This study used an instrumental case study that examined the experience of a community college known nationally as an exemplar for its learner-centered approach to education and integration of technology into pedagogy. The dynamic interaction between technology and higher education, leadership, organization change, and community college environments was investigated by listening to individual perceptions and stories. A qualitative approach was used because this methodology is best suited for analyzing detailed case data in order to frame issues and formulate emerging themes.

Leadership issues and aspects of the change process were surfaced by interviewing people experiencing the change, observing related events, and analyzing institutional documents for evolving rationale, value statements, and indications of institutional direction. Mid-Western Community College¹ is a public, urban institution with 23,000 students in a medium-sized city and is supported through state funding and a local tax levy. The demographic profile of the student population is divided approximately into thirds by these age groups: 18–24 years of age, 25–39 years of age, and 40 or more years of age. In addition, there are several hundred high school students under the age of 17 taking advantage of a partnership program. Through conversations and documentation obtained during the six months of data collection in winter and spring of

2000, it was possible to loosely reconstruct a process of technology change beginning in 1985, spanning approximately 15 years, with substantial investments beginning in 1991. General observation that spring was conducted in the technology center and computer commons area, in addition to observation of three different student classes with substantial technology enhancement.

Because a good study participant is one who has the knowledge and experience that the researcher requires (Morse, 1994; Patton, 1990), the sampling procedure for this case study was purposeful. A research strategy based on individual interviews and focus group discussions allowed for the inclusion of a broad range of perspectives from a variety of individuals who were intimately immersed in the innovative changes on campus as developers, implementers, and/or end users. Three groups of individuals were interviewed: students, faculty, and administrators.

The nine college administrators interviewed individually were in position to have key information about technology use on campus as well as about the planning and strategies to promote change toward the use of technology: the provost, the vice president of business operations, the vice president of administration, the vice president of student services, the vice president of information and technology, the vice president of instruction, the director of information technology services, the dean of distance learning, and the director of student counseling services. Thirty-six individuals who participated in focus groups were drawn from several different faculty groups teaching with technology and/or distance learning, chairpersons of departments where multiple faculty are using these pedagogical approaches in their classes, an interdisciplinary leadership group that reviews innovative teaching proposals from faculty and awards yearly seed grants for these projects, and students who have engaged in one or more courses where technology is a major component. All interviews were conducted using open-ended questions adjusted in three separate guides (one each for students, faculty, and administrators) to accommodate the different roles of the interviewees.

To analyze the data we chose two distinct approaches, one focused on leadership issues and the other on the change process. There are well-documented leadership models, so it made sense to choose a model developed from the community college experience. By contrast, while there are many organizational change models, whose common elements were noted earlier, there is little documentation about the critical aspects of change related to technology implementation in higher education, much less in community colleges. Therefore, as described below, we felt it most appropriate to use an analysis rooted in participant perception that allowed themes to emerge from the data.

The community college change model developed by Carter and Alfred (1998) was adapted and used as a framework for organizing and analyzing data related to leadership strategies. Their model proposes five key dimensions for managing change that are consistent with an amalgam of other commonly used models: understanding fundamentals, forging strategy, identifying champions, supporting innovation, and communicating and celebrating success. This model allows for the integration of leadership strategies, participatory involvement, environmental scanning, and communication. Perhaps its one weakness is the lack of an explicit feedback loop that connects outcomes to revisions of strategy and plans, as found in other models of organizational change and learning (Freed & Klugman, 1997; Senge, 1990). Once the interview, observation, and document data were coded, the data specific to leadership strategies and technology use in teaching and learning were clustered for analysis according to the dimensions of the Carter and Alfred model, incorporating the need for feedback.

By contrast with the question about leadership and technology that used the model as organizing framework, data analysis for the question about change dynamics rested entirely on the themes that emerged through coding. Themes that became evident during the process of data collection were verified and expanded after the data were transcribed and coded. Two broad theme categories were recognized: change themes and institutional themes. A two-dimensional change dynamics grid was created using change themes as rows and institutional themes as columns. Each cell was filled with the raw data and further analysis revealed common themes in each cell.

Trustworthiness and credibility were achieved by triangulation of data collection methods, interview, observation and document review, and analysis (Patton, 1990). Although the results of a case study cannot be broadly generalized, the case method provides an in-depth analysis of experience. The insights gained by studying this college should be of interest to leaders on college campuses engaged in similar technology journeys.

Findings: Leadership

Emerging from the data was a broad array of leadership strategies that was consistent with and broadened the scope of the key dimensions of the Carter and Alfred model. Table 1 illustrates the range of leadership activities that guided and supported innovation with technology for teaching and learning at Mid-Western. The orderliness of the table is both helpful and potentially deceptive. Displaying the data using the dimensions of the model shows the comprehensive and far-reaching nature of activities that

were energetically pursued after great forethought. The model draws attention to the centrality of forging specific strategies, distributing leadership through the role of champions, supporting innovation by allocating substantial financial resources, and communicating achievements to celebrate success. However, using the model to organize the themes could yield an incomplete picture because the dimensions do not specifically direct attention to the power and importance of the leader's commitment, the importance of developing ways to cope with the risks of error inherent in true innovation, or the role of serendipitous events.

TABLE 1
Leadership Strategies in Support of Technology Implementation

	<i>Making Technology a Visible Priority</i>	<i>Increasing Technology Use for Teaching/Learning</i>
Understanding Fundamentals	<ul style="list-style-type: none"> • Power and importance of CEO commitment & management style • Responding to expectations 	<ul style="list-style-type: none"> • Encouraging innovation • Student evaluation/feedback*
Forging Strategies	<ul style="list-style-type: none"> • Incorporating technology in College vision and mission • Core effectiveness indicators incorporate technology* • Financial support 	<ul style="list-style-type: none"> • Providing technology • System changes • Faculty development and incentives • Recognition of projects • Special technology projects initiated
Identifying Champions	<ul style="list-style-type: none"> • Encouraging and supporting faculty R&D with technology for teaching/learning 	<ul style="list-style-type: none"> • Support early adopters • Assess innovations* • Identify mentoring options
Supporting Innovation	<ul style="list-style-type: none"> • Financial support • Increase technical support personnel • Continuously evaluate corollary infrastructure* 	<ul style="list-style-type: none"> • Rebuild infrastructure* • Reward Trailblazers • Create peer pressure through budget allocation • Bring pilot projects into mainstream teaching/learning
Communicating Vision & Goals	<ul style="list-style-type: none"> • Incorporate technology into College strategic plan 	<ul style="list-style-type: none"> • Campus publications • Spring and Summer Institutes • National publications • Use technology to increase communication
Celebrating Success	<ul style="list-style-type: none"> • Report achievements to internal and external audiences* • Conference presentation • Faculty and administrators join national innovation team 	<ul style="list-style-type: none"> • Offer opportunities to use the Incubator • Successful implementation of technology-enhanced and online courses

*Examples of feedback processes

Understanding the Fundamentals

The critical role of top leadership in this institution cannot be overstated. The expectations of external constituents and students created strong pressures on Mid-Western. It was the president who initiated a response by articulating a vision directly addressing technology at an in-service faculty meeting in 1985 and by giving away 10 computers. His leadership style focused on the fundamentals of the change process. Participative decision-making characterized the strategy from the beginning. His behavior empowered the faculty and administration and unleashed their creative energies (McGregor, 1960). The importance of the president's vision about technology and about the design of the change process warrant special mention and highlight the power and importance of commitment and management style. The continuity of the president's commitment to technology over a period of almost 10 years communicated the importance of this undertaking to the entire community (Freed & Klugman, 1997). In addition, whether or not he was comfortable with delegating substantial responsibility for the technology effort at a personal level, the president consistently behaved in ways that supported broad-based participation in leading the change. There were no mixed messages here.

Forging Specific Strategies

From the outset, technology was explicitly highlighted in formal and informal statements of the College Vision and Mission. An Academic Technology Team was formed with responsibility for creating annual plans for activities and budgets. Plans were made to install a campus-wide communication network, to establish and staff student computer labs and a building, an "incubator," where faculty could experiment with technology and pedagogy. The Incubator housed interactive classrooms for distance learning and teleconferencing, computer-networked break-out rooms for student and faculty teams, a state-of-the-art simulation lab, another lab dedicated to the professional development of faculty, semiprivate workspaces for the use of community partners, and a multimedia theater. Incentives for faculty were created, in the form of release time or pay for overload, to encourage experimentation with technology. Performance measures, "Core Indicators," were designed to evaluate progress and represent the institutionalization of the feedback loop that allowed the college to learn from its experiences. One administrator explains: "We built a state-of-the-art technology center with the goal that we would try out new things there and then try to scale them up and implement them across campus."

Distributing Leadership through Champions

Beginning in 1985, approximately a dozen individual faculty, “early adopters” and “lone rangers,” began exploring technology options on their own, using seed money and equipment provided by the administration (Moore, 1991). Several years later, Mid-Western formalized a broader base of involvement by putting together teams of faculty, staff, and administrators to begin planning technology initiatives. These included the Academic Technology Committee and its five associated task forces, the Distance Learning Team, the Incubator Team, the Student Lab Team, and the Telecommunication Infrastructure Team. Altogether, more than 60 faculty, staff, and administrators participated in the planning that guided the ensuing activity. Concurrently, another group of faculty and middle managers started a group called the Trailblazers.² One of the group members describes the charge of the team: “The original inception of the team was that we were going to be sort of a catalyzing agent to integrate the change drivers of the institution as we worked to move innovation in a more strategic direction.” Supported initially by a \$200,000 grant from National Science Foundation, they created an innovation-focused grant program for faculty, offering awards ranging from fairly small sums to \$20,000.

Many leaders emerged over the decade of the 1990s as the college community sought to integrate technology into the environment and especially into student learning. The largest cohort of champions has come from the faculty, representing quite diverse disciplines. One of the earliest and continuing champions is a member of the developmental education group. The quandary of how to work with students at different stages of development, all of whom scored below the academic norms for the campus in reading, English, and math, captured the interest of a reading expert. This faculty member’s exploration during a sabbatical year of how technology might support this type of teaching led to the adoption of a new teaching philosophy in the department, supported by the computer-based modules she created.

Another faculty member was prompted to embrace an online strategy when a student had to leave the health information management program just prior to finishing because her Air Force husband was transferred to England. A clinical rotation was set up in England and the faculty member communicated with the student and preceptor by e-mail. Success with this student stimulated the professor to begin the development of an online version of several of that department’s courses. A faculty member adds:

I think from a faculty standpoint there are faculty like EK and myself that have had an interest in technology already, and maybe we were early adopters in it. We sort of saw intrinsically that we could use technology in

certain ways to improve, or at least experiment to improve student learning. So, I think there is sort of a level of faculty that have taken that approach and have moved ahead relatively rapidly.

These individuals served as examples by developing programs, classroom enhancements, and distance initiatives, and shared what they learned through presentations at spring and summer institutes (described below). They were resources for their faculty colleagues, and a grass roots impetus for change. College administration showed support for them by supplying equipment, software, and the freedom to experiment, i.e., the leadership “behind the leadership.”

Allocating Substantial Resources in Support of Innovation

Money enables strategies. Mid-Western focused substantial financial resources on technology innovation. In addition to the National Science Foundation grant, early on all faculty were provided with desktop computers for both campus communication and data, and for exploring new teaching strategies. Over a seven-year period \$27 million were allocated to build the Incubator and hire technical support staff to assist faculty and students, \$11 million to install a campus network and renovate 50 classrooms as multimedia facilities, and several million dollars to renovate space for two large student “computer commons.”

The budget process also made it apparent to faculty that technology-related projects were more likely to attract funding. Development and training opportunities were provided for faculty and staff through spring and summer “training institutes,” where any employee could attend workshops on specific software or technology tools. Because the academic calendar left summers open as personal time for faculty, those participating were paid \$100 per day to attend. The workshops became a showcase and forum for peer mentoring. The time commitment of faculty and administrative personnel beyond the workshops also represented a substantial financial input.

Money does not generate progress toward an objective without a plan, however. Mid-Western was able to commit these resources because of the work done by the planning teams, and because of the high degree of “buy-in” achieved through the distributed leadership and systemic changes in reward structures and evaluation. The words of one administrator illustrate both the organization’s financial commitment and frustration:

Now there is a tremendous need for strategic and coordinated thinking and planning of technology. The darn stuff is changing so often it’s like trying to

catch the proverbial greased pig at the county fair; you can never seem to get your hands around it, hold it, and figure it out. The cost, even with standardization of most of the systems, is never ending.

Communicate Priorities, Offer Examples, Celebrate Success

Reporting and celebrating achievements to both internal and external audiences serves a number of purposes. The recognition is one incentive for innovators, and their work offers concrete examples for faculty whose “technology imagination” is not yet so well developed. In addition to information about Incubator activities, listings were provided so that faculty knew which colleagues were familiar with software packages and were available to assist them. Inserting language into the college’s formal strategic plan, along with critical performance indicators, delineated the college’s development direction:

Information technology will be a transforming agent that will affect everything. Distance learning will serve as a catalyst for the adoption of learner-centered approaches to instruction. Faculty and counselors working as facilitators and often as part of a team will empower students to manage their own learning through a wide variety of alternatives to traditional teaching. . . . [I]nstruction will focus less on content and more on process—the process of acquiring and managing knowledge.

Technology became a high-priority item on the public agenda, having been reclassified from the experimental stage to a recognized learning methodology.

Serendipitous Events

People and institutions are remarkably resistant to change. Often help for leaders attempting to guide major change comes in the form of a crisis, a painful event that “unfreezes” attitudes and creates a “readiness” to consider new proposals (Argyris, 1970; Schein, 1961). At Mid-Western, the crisis came in the form of an electrical explosion that wrecked the administrative computer system on the day 15,000 students were on hand to register for classes in the field house. An administrator describes what happened:

The institution had made an attempt to grow our own information system and it crashed, badly. There was no stability in the system and this was back in the day of the field house circus registration, where you move 20 terminals to the field house for mass registration for classes. But the system crashed and it was absolute chaos. There was actually an electrical explosion, an electrical vault blew up on campus down on one of the lower levels and we had a meltdown of all of our computer wiring across the campus.

With the crash, the whole community began to realize the significant role computers played in their academic lives. While this event might have exacerbated skepticism of technology or heightened fears of dependency, none of the interview comments reflected such negative responses. Rather, the crash was described as a catalytic event, unfreezing attitudes toward change. As the campus evaluated, purchased, and customized a replacement system, an education process began that changed perceptions about the role of technology even further and raised awareness of the kind of investment that would be needed to create a stable platform for the campus.

Findings: Change Dynamics

Analysis of the data about change revealed an institution that traveled considerable distance toward its goal of integrating technology into teaching and learning. Six themes related to change dynamics emerged as the data were coded and analyzed: turbulence, tension, planning, implementation, barriers, and cultural change. *Turbulence* characterizes an environment where change is rapid and outcomes are unpredictable (Emery & Trist, 1965). As a minimum, turbulence is unsettling; more often it causes confusion that can undermine sincere attempts to make progress. *Tension* grows from simultaneous, opposing forces related to specific issues. There are many issues related to technology that cause tension and the controversies elicit strong emotions. The result is a great potential for volatile reactions. *Planning* has been a valued process at Mid-Western. It is fairly easy to follow the Strategic Planning process and see how Core Indicators guide institutional planning and then translate to departmental planning. Unfortunately, for an “early adopter institution” there was no way to predict all of the nuances and the complexities associated with bringing this level of technology on campus. *Implementation* of technology in teaching and learning is at many different phases across campus. Implementation efforts sometimes exposed unanticipated issues which exacerbated tensions related to funding and support, and revealed the inherent inability of “planners” to anticipate the consequences of innovation. *Barriers* to change come in many forms. Two of the most difficult to overcome are the unwillingness of those affected to participate in the change and the high cost of technology. *Cultural change* represents the guided or provoked emergence of new norms, practices, and ways of thinking. At Mid-Western, as with other colleges in the midst of similar transitions, the mid-stream culture is a mixed bag of old, new, and in between.

These themes described the impact of technology-related change associated with four institutional elements: faculty, students, funding, and support. Table 2 presents a summary of themes and issues organized by

institutional element. The following discussion is selective, focusing on issues which exemplify unusual or cumulative effects or those which were experienced by study participants as most intractable (the gray-shaded cells). By far the greatest number of intractable issues appeared in the column dealing with faculty and in the row which enumerates the tensions. The discussion outlines the issues in the gray cells, sequentially by institutional element.

TABLE 2
Change Dynamics Related to Use of Technology

<i>Institution Elements</i>	<i>Faculty</i>	<i>Funding</i>	<i>Students</i>	<i>Support</i>
Themes				
Turbulence	Rapidity of Change Amount of Change Continual Change Lack of Time	Expectations and external Pressure Expense of Technology	Skill Diversity Expectations	Responsibility Confusion Loss of Personnel
Tension	For the Good of the Whole Intellectual Property Funds for Technology vs. Traditional Teaching	Cost versus Benefit Where to Set the Limits Old budget structure vs. new structure	Trust	Need for Increased Technical Support for Faculty
Planning	Infrastructure Support —new Classrooms Class Size Limits/ Impact on Cost	Unpredictability of Technology Cost Restructure, Centralized Budget Forecasting and Allocation	Access Systems Capability	Restructure of Personnel and Support Allocation Centralized Leadership
Implement	Faculty Workload and Compensation	Whose Cost Old Budget Structure Academic Freedom	Student Assessment Student Learning Student Success	Faculty Driven
Barriers	Role of Faculty Pedagogical Controversy Intellectual Property	Cost Percentage of Budget Allocation	Technical Support Personal Responsibilities and Commitments	Budget Limitations Academic Technical Support Reaction to Change Process
Culture	Disrupted by change	Have and Have Nots	Importance of Face to Face Contact	

Faculty

In any institution of higher education the faculty are central players. In the context of institutional change involving teaching and learning, every theme was expressed with heightened clarity in the faculty context.

Keeping up with everything that is going on was a frustration expressed by most faculty interviewed in the focus groups. They described the turbulence as the feeling that nothing gets settled before something else gets started and that they were always working on or planning something. They said there used to be more time for everything and now that does not seem to be the case, as described by one faculty member:

Technology was supposed to make things easier, less labor intensive and it's just not true. Technology has significantly increased the workload; we are significantly busier than ever before. First thing in the morning, even before I my coat off, I have the computer on scanning e-mail. Some days it takes significant time just to get those messages and voice-mail returned. I also type a lot of my own stuff now that I would previously have a secretary do, but it is as easy to do it on the computer as to hand write it and have her type it. I think that because we have the technology that the expectation is that we do more and more with it.

Teaching online courses is more time consuming than originally anticipated, as noted by another faculty member: "When I signed on to work with and teach a distance course, I didn't realize that the college distance learning slogan of anywhere, anyplace, anytime, meant me."

A tension related to both faculty and funding grew out of a college decision, consistent with the strategic plan, to spend an extreme amount of money on technology for teaching and learning and very little on traditional teaching needs, and weighting the personnel budget toward technology support rather than faculty positions. There was campus consensus about the substantial need for these individuals. However, a strong argument about the need for more full-time faculty positions came from the same focus group that cited the need for technology support personnel. One department chairperson sums up the dilemma, speaking of a faculty member:

The faculty member was so frustrated after learning several software packages to create this project. He said that if I have a wonderful idea I either have to do it myself all on my own, which means my classes may suffer because I'm spending a lot of extra time trying to create, or the frustration level is so high that I will just never do it again. On the other hand [the chairperson continues] we have such a desperate need for faculty that when we see support people being hired, then it's like well, come on. We need people to do the teaching as well as do the support.

A key administrator also questions the wisdom of spending so heavily in the direction of technology:

However when you ask the question, for example, is it truly better installing and supporting a multi-million dollar developmental education computer-mediated instruction math system or writing system? Or, would we be better off spending a couple million dollars on extra tutors, teachers, and smaller classes? The answer is often of course, we are better off with technology, that's the way things are going, how could you even ask those questions? But really, this is the responsible thing to ask.

The question of intellectual property is another tension-filled topic for faculty and administration. Faculty put countless hours into the development of online courses and programs for technology-enhanced classes, and the idea of just giving away these products is distressing. Certainly other institutions face similar questions; the issue at Mid-Western has not been resolved. This uncertainty creates reluctance among faculty to continue developing online courses without rules that govern intellectual property.

The new vice president of information technologies is overseeing planning processes involving faculty and support personnel. However, for the faculty, technology innovation generates as many unanticipated consequences, often related to infrastructure, as desirable outcomes. One department chairperson shares her perspective:

We've put the cart before the horse with respect to technology and everyone knows it. The original plan for the [Incubator] was that it would be the starting point. . . . then if the project was successful, it was to be brought "over the wall" to the main campus. Well, they can't move my project to main campus because there is no place on the "other side of the wall" that can support it.

The planning process is being revamped to address the infrastructure problem as part of the ripple effect and the learning curve generated by a project the size of the Incubator.

A budget surprise also developed as technology-enhanced classes were implemented across the campus. The Incubator classrooms were designed so that each student sat at a computer work-station. This same model was followed for the 50 new multimedia classrooms across campus, and as computer stations were added to the multimedia rooms seating capacity was limited to 20 students. Courses larger than 20 students now require multiple sections, which increases faculty costs, as either more faculty must be hired or the same instructor must be paid for teaching more sections. The rooms will incur higher maintenance costs for equipment and replacement costs for computers and software. Overall, per student costs have increased rather than decreased as a result of these design decisions.

Some of the major development and implementation issues for faculty relate most often to technical support, and are discussed below. Compensation is another central issue for faculty and relates to the amount of faculty time associated with learning technology, developing courses, working with the students, and updating programs. While compensation is adjusted for technology and online course development, none of the faculty time required to maintain and update programs is compensated or offset by release time from other academic activities. Nor is there a standard method of calculating compensation for teaching an online course.

The goal for Mid-Western, becoming a learning-centered institution by integrating technology into teaching/learning activities, requires changing the “traditional” role of faculty. The challenge, and a major barrier, is the attitudes of faculty who will not alter their methodologies. One chairperson reported that “several of my faculty are really opposed to having any computer equipment in the classroom. They find it to be a distraction as the students should be paying attention to the instructor.”

As more and more initiatives come “over the wall” from the Incubator into the campus mainstream, there is less physical distance between technology-enhanced classes and traditional classes. Proximity to colleagues engaged with technology may stimulate the conversations to entice a few of the traditionalists to rethink their attitudes. Not everyone needs to adopt technology enhancements to the same degree. Active learning can take place in a variety of ways along a continuum beginning with low or no technology activities all of the way to high-end computer and simulation use.

Many of the issues discussed in the faculty section relate to the culture of the college and most specifically the culture of the faculty itself. Substantial cultural change in an institution occurs at a glacial pace, even when the institution is pursuing transformational change of the magnitude sought by Mid-Western College. Here is one administrator’s perspective on institutional culture:

One of the ways I think we are round-abouting some of the scale-up issues is we are just getting smarter about our culture, and we know you don’t mandate but you sort of connect and hold hands, you know, you make a big enough net.

He and other college leaders focused attention on analyzing and understanding the institutional culture. Another thoughtful remark about the cultural effect of this change, specifically about the teaching and learning mission, came from a faculty member who positioned herself in the “middle of the road group.” This group represents individuals who are not the early adopters out there in front yelling “me first,” but who are in

that large middle group that is just watching to see what happens before jumping in. This faculty member had obviously spent some time thinking about what had been going on over the last several years, commenting:

Another change for me is probably just a general change in philosophy to some degree about how we deliver education. We want to make it accessible to as many people in as many places as we can, but I still have a lot of concerns about the lack of face-to-face contact and the presence in the classroom with the distance learning. My heart is in the classroom so this is a difficult concept for me to get a hold of and be all right with.

Probably half the battle in the move to technology enhancement of education is helping people to understand their own values and assisting them to build on their strengths. This individual, for example, may never become an online faculty member, but with some encouragement and resources may enhance her classroom and course assignments with creative uses of technology.

Findings: Tension

Tension and change appear inseparable. Some faculty-related tensions have been outlined above, and it is apparent that each theme examined in the faculty context ultimately increased the general level of tension. Turbulence created confusion. The inability of planners to completely anticipate the impacts of technology innovations meant that implementation brought surprises. And the pressure for faculty to adopt unfamiliar teaching strategies and new roles created resistance in a culture whose norms remained more consistent with previous patterns of behavior. The following highlights tensions related to funding, students, and technology support.

Funding

Tensions surrounding funding at Mid-Western reflect both external and internal pressures. An administrative officer describes the external pressure stemming from the combination of expectations and lack of funding support:

I went to the Board of Regents annual conference yesterday. The Governor spoke as did the former Science Advisor to the President of the United States. They were talking about not being far away from the point where one in every six jobs in the state will be an information technology job. These types of changes are really picking up. However when it comes to financial support, they don't have much to give us. They say that they absolutely love us and want us to continue to increase the use of technology in teaching and

learning at the college. The Governor had encouraged us to put forth an aggressive budget proposal for technology and then the state economy fell apart in relation to financial support for higher education, so it looks like this funding cycle is going to be real tough.

Responding to a 1994 survey, the local community indicated that tax dollars should be spent simultaneously to: keep tuition low for students (89%), offer courses to prepare for new high tech jobs (88%), and develop technology for taking courses at home or work (72%). Expectations are high that institutions of higher education should be integrating technology, but the funding is not forthcoming.

In order to update college systems, student services, and instructional technology, over the last five years Mid-Western has allocated millions of dollars for software, facilities, and equipment. Essential technology is enormously expensive, and yet there appear to be few economies of scale in higher education. An administrator compares higher education to industry on this point:

The problem that higher education has with technology overall, is the fact that practically every other industry out there takes technology and uses it productively. Through that productivity, they are able to get technology to pay for itself. So, society in general has been used to technology investments that pay for themselves. However, there is really no price effect to doing that in higher education.

Technology has not decreased faculty cost, nor are teaching and learning less costly. On the contrary, the rapid need to purchase computer systems, replace infrastructure, and pay a new and emerging workforce, coupled with decreasing assistance from the state and the increased demand of consumers, generates tension and turbulence in the financial planning and funding allocations of the college. The inability to project future costs associated with technology exacerbates the situation.

Within the college there are other tensions. Mid-Western has clear technology indicators in its strategic plan that should allow faculty and administrators to “measure” progress toward their objectives. However, the allocation of resources central to progress raises troublesome and tense issues such as defining the criteria that will be used to establish the limits to the funding of technology. Another tense issue, related to student outcomes (discussed below), is how to determine whether the benefit gained by technology justifies the cost. A third issue calls into question the adequacy of the budget structure.

The critical funding issue revealed by the data is the question “whose budget does the implementation come out of now?” Long-standing departmental, line-item budgets remain in place. The academic departments

have budgets; IT has a budget; and different Incubator programs have their budgets. In a zero-sum budget environment, new teaching and learning projects are not welcome additions to departmental budgets when they “come over the wall” unless they are cost neutral. Even more complex are the teaching and learning projects that cut across departments and/or divisions. A member of the Trailblazers group explains:

Let’s say a project proved to be something that should be scaled up, and it cuts across divisions. We ask the Dean to put it in the budget, but what Dean would want to put it in the budget when it has return not just for his division or her division, but across divisions. What if there are impacts for academic policy?

Faculty course assignments are another aspect of budget structures that were discussed in the chairpersons’ focus group. Consider a scenario involving a professor who developed a new online course for a department. The course is an elective with new and creative dimensions thought to be attractive to students both in and outside that department. This new offering enrolls 15 students and the faculty member receives full contact hour load for the course. However, this person typically teaches two sections of a required basic course and two sections of a required advanced course, already a full workload plus several overload hours. Central to degree requirements, the courses must be offered. This individual would like to avoid additional overload, and would prefer to teach the new online elective in place of one of the existing sections. Now it will cost extra department budget money either to hire an adjunct instructor to take one of the regular sections or perhaps to pay another full-time faculty member to do an overload.

Balancing encouragement for innovation with the need to deliver basic courses is a constant tension in higher education, exacerbated by pressures to integrate technology. In the context of institutionally-mandated technology innovation, there is the potential to create costs that double, triple, or quadruple as different faculty in a department go through the same process. Imagine that this class were an on-campus technology-enhanced course that could enroll 35 students but now has to be taught in two sections because 20 is the seating limit for the multimedia-enhanced rooms. One astute faculty member summed up the discussions, stating “We’ve created a monster. I know technology is here to stay, but we’ve created a monster.”

In an era of scarcity, when no greater percentage of the budget can be allocated to technology without a reduction in other areas, responsibility for deciding which budgets are cut to support technology becomes critical. An administrator describes the frustration of trying to get a handle on some of these issues with national benchmarking:

We were trying to take a look at how much is one institution versus another spending on this or that. Information technology is one that is so elusive because everyone organizes it differently and there are so many different types of resource commitments. . . . Questions like what does it cost and what outcomes are we looking for are largely unanswered.

Students

Student-related tensions can involve both students and/or faculty. Tensions experienced by students often stem from the wide range of skills students bring to the classroom—e.g., from writing HTML, disassembling computers, and participating in e-commerce to never having turned on a computer. For example, from student focus groups we learned about two men taking the developmental reading course together. Jim was 20 years old and not long out of high school; Joe was in his mid-50s and attending college for the very first time at the urging of a friend. The developmental reading course is an in-class computer-based course. After placement exams, Joe enrolled agreeably in developmental reading and math. However, he did not expect to walk into class and find a computer at his desk. His reaction was dramatic:

I almost turned and walked away. I never touched a computer before and I didn't know how and I didn't want to look stupid. But for some reason I stayed and I met Jim. Jim helps me with the computer. I don't know what I would have done without my little buddy.

Jim, the younger man, said:

I don't mind helping at all. I'm on the computer all of the time. I'm pretty good at math and working with computers; I guess I don't read all that well because almost everything I read is just short things on the computer. But I showed him some basic things and he is getting along real well now. I knew I would use computers at college, but I guess that Joe didn't know to expect it and hadn't used one before.

A faculty-student tension associated with distance courses is the issue of trusting the student when it comes to testing and assignments. From a faculty perspective, the question is “how do you know whether students are doing their own work?” Many of the faculty get around the testing dilemma by having the students take their exams in the student-testing center on campus. However, the homework assignments and written papers can be turned in online, and there is no more guarantee that these were completed by the student than there is with assignments associated with traditional classes.

Of similar concern are the high attrition rates in the online courses. Faculty believe that some students are just not ready or self-motivated

enough for distance learning, and they are aware of published research which confirms their assumptions. There was consensus that interventions are needed to improve retention rates in the distance, specifically online, courses.

Assessing differences in student outcomes is one of the most significant issues related to both online and technology-enhanced courses. One administrator reports that an ongoing dialogue between faculty and administrators suggests that all are struggling with these questions:

Are the students learning the content better and is there a difference between the outcomes of the students in the technology courses versus the traditional courses? Also, and most importantly, is all of this time and effort and financial expenditure worth the result?

The indications are that the assessment of technology as an enabler of learning and an adjunct tool is just beginning.

Support

Tension was a palpable consequence of the turbulence surrounding the support unit. Within the support unit, while it appeared that the staff were trying to do their best job, there was no strong focal point defining the purpose and interrelation of different technology initiatives or the organization of the infrastructure to support them. Early on, much of the development and maintenance of classroom technology and online courses was orchestrated by faculty. When the Incubator programs began operating, two distinct groups evolved, one geared to support off-campus learning modalities and the other to support on-campus instructional technology initiatives. After personnel departed from both groups, support was outsourced while a consultant was hired to assess the structure of technology support in the college. Instability in institutional structure led to uneven support.

The inadequacy of support for faculty attempting to innovate with technology grew apparent and potentially damaging. One administrator notes, "The College was in danger of losing the faith and commitment not only of faculty considering adopting instructional technology, but also that of the faculty that had already been successful." A faculty member comments:

When working to bring up a technology project, what you need is somebody as sort of a consultant on a regular basis to work with, maybe assigned to you. For me to get interested, I need somebody I can go to two or three times a week and say, okay, this is not working, this has happened, help me enhance this, or just what do I do next.

Many of the early technology projects were championed by individual faculty who were able to obtain the immediate financial and equipment support that they needed. As more individuals became interested in technology projects, they needed a more accessible and stable support framework than could be achieved through an entrepreneurial environment. The coordination that is occurring now through the new office of the vice president for information technology is geared to overcome these barriers and support issues.

Discussion

As we review the findings from leadership and change, a number of issues come to light which lead to a richer understanding of the dynamics associated with an institution-wide effort to integrate technology into teaching and learning. Our findings support Moore's early predictions about the stages of technology adoption (Moore, 1991). See Figure 1. His lone rangers and early adopters are clearly identifiable on the Mid-Western campus as the first set of faculty involved with the Incubator and later the Trailblazer group. A department chair used the term "middle-of-the-roaders" to describe the equivalent of Moore's early majority, those faculty taking a wait-and-see attitude because they need evidence of the value of the outcomes relative to their efforts.

The key role of leadership during this period was to establish incentives to help faculty overcome their anxiety and skepticism and cross

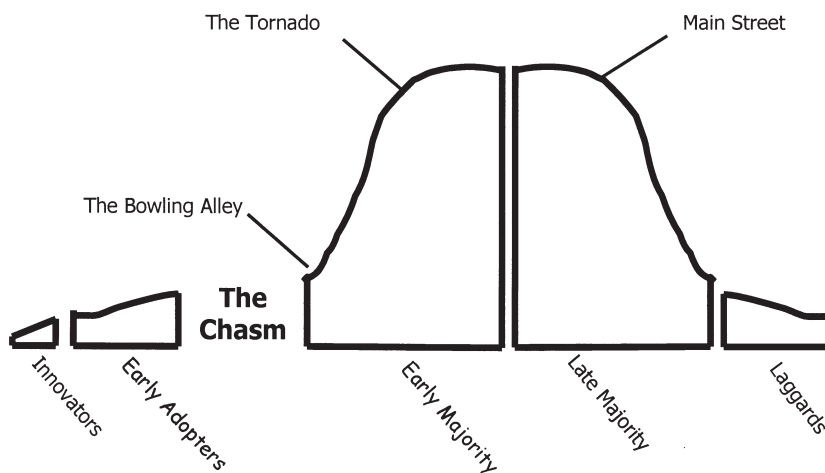


FIG. 1 The Adoption Cycle. (Adapted from Moore 1991, quoted in Daniel, 1996, p. 87)

“the chasm.” The reward and recognition offered to faculty by supporting travel to conferences to present papers about their projects, the changes in budgeting and resource allocation to favor technology projects, compensation for overload, and support of the summer staff and faculty institutes which utilized peer mentoring are examples of support systems initiated by campus leadership to steady faculty preparing to cross the still-wobbly bridge over the chasm.

The findings also strongly suggest that transformational change associated with technology is even more disruptive for faculty than change without technology. Organizational change stemming from changes in core technologies impacts people in both personal and professional spheres. At the personal level, people differ dramatically in their degrees of comfort in dealing with technology. At one extreme, we all know friends or associates who still refuse to leave messages on answering machines. As a minimum, technology is foreign to many who must move far beyond their comfort zones even to begin experimenting. For more than half the currently employed faculty, the movie *2001*, released in their youth during the 1960s, represented the science-fiction version of the frontier of technology. For the youth of the 2000s, the equivalent technology frontier is portrayed in *Terminator 3* or *The Matrix Reloaded*. Coupled with the unsettling nature of transformational change, which challenges assumptions, roles, values, and norms, participants experience a disturbing lack of control and the result is a situation full of both personal and institutional tensions.

These dynamics increase the importance of broad participation in guiding the change process. Previous research about change speaks to the need for participation to engage as much talent and expertise as possible, and to increase the level of buy-in so important at implementation. In fact, participation may give faculty and staff an important degree of control that can help them deal with the tension and disruption and that may be the difference in whether they engage with the new directions or resist.

The extraordinary institutional and professional tensions stem from a complex of dynamics associated with technology use for teaching and learning. Changing from well-established ways of teaching, learning, and developing course material creates a basic level of tension. Institutional cultures are not easily changed; they shift at a glacial pace inconsistent with the new modes of interaction. Unpredictable changes in the availability and capability of new technology generate anxiety for decision-makers who are trying to select effective technology options, and frustrate users trying to stay current with software and hardware. Planners are unable to anticipate the implementation process accurately

because the institution is engaged in true innovation, thereby increasing the likelihood of problems. With few role models to consult among institutional peers, planners, leaders, faculty, and students must simply move forward and deal with unexpected situations as they arise. Institutional obstacles and individual efforts to undermine or resist change create barriers that exacerbate the underlying unease. The pace of change can vary dramatically. For example, if it becomes necessary to adjust to major oversights, such as the need for campus-wide classroom renovation to respond to an unexpectedly high level of demand for media-rich classrooms, it may appear to halt.

Underneath these specific tensions is an underlying unease stemming from uncertainty about whether efforts to integrate technology and change to a learner-centered environment will achieve these ambitious institutional goals and actually improve student learning outcomes. For institutions at the leading edge of innovating with technology, the outcomes of the new educational programs are unpredictable. Ironically, without substantial investment there will not be enough data to evaluate the worth of the experiment. In order to be able to determine whether the outcomes are worth the investment, Mid-Western and its peer institutions need a critical mass of faculty and students engaged in the experiment. Yet the sparse and ambiguous evidence about student outcomes is unsettling for those who are committing so much personal and institutional energy and resources. Intuitively, the new initiatives appear consistent with evidence such as research about factors that enhance student retention and learning, but the data remains incomplete and inconclusive (Chickering & Gamson, 1987).

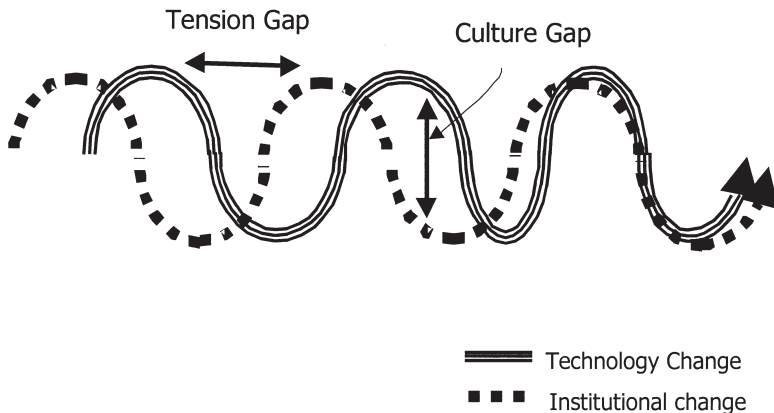


FIG 2. Technology and Institutional Change

Figure 2 illustrates the nature of transformational change associated with technology integration. The findings suggest that an institution embarking on this path must accept the level of constant dislocation suggested by the two separate curves. Engaging with technology means adjusting to the rapid and unpredictable changes associated with technological development. Integrating technology in pursuit of new institutional goals requires organizational changes represented by the second curve. The two are always out of phase, with technological change always outpacing the institutional adjustments. The gap is permanent but the size of the gap may vary. The gap creates a constant state of disruption, tension, and stimulation for further organizational change. Organizational culture may evolve to cope with technology and appear to close the gap. However, the rapid nature of technology development will soon create yet another gap. Larger gaps describe inconsistencies between institutional structures and technology that are generating a level of tension that is dysfunctional and requires intervention.

We can see Mid-Western managing this “phasing” by first addressing the oscillation of its technology curve. As computer use became more widespread on campus, leadership *slowed* the “tech curve” and narrowed the gap by standardizing the specifications for computer and software purchases. When it became clear that computer support was proliferating in a fragmented and uncoordinated fashion, dissipating the organizational focus in the change, the position of vice president for information technology was created to bring coherence to institutional efforts and to enable more rapid response. These adjustments were possible because of a robust set of feedback loops that channeled the results of experimentation back into a continuous planning process. The establishment of the Incubator as a first strategic step is the clearest evidence that leadership grasped the power of learning from action. Representing this type of change as two slightly out-of-phase curves draws attention also to the importance of assigning responsibility for monitoring the distance between the curves. Someone within the institution must have responsibility for recognizing when the gap is large enough to become dysfunctional and have the authority of a leadership role to prompt an intervention.

If we extend this metaphor more broadly to the academic industry as a whole, we might suggest that community colleges are de facto playing this role for academe. Community college leadership has recognized that the market is demanding learner-centered, technology-enabled strategies (O’Banion, 1997). Their experience suggests strongly that all of higher education needs to attend to managing the gaps between their technology strategies and institutional cultures.

The findings highlight the nature of the difficult challenges faced by faculty, and suggest that institutional efforts to assist them to deal with a constant level of disruption need to be comprehensive and robust. Faculty and their institutions are in the midst of reframing their roles both with respect to the learner-centered environment and with respect to technology. Both roles reposition faculty from hierarchical relationships to lateral interactions which are somewhat inconsistent with professional socialization and, certainly, with reward structures. In the classroom, faculty are learning to be guides rather than “sages,” and in preparing for class they must learn to work alongside technology experts as co-members of a team. At the same time, institutional support that buffers faculty from some of the technology change will be vital so that faculty can continue to pursue the creative work that requires quiet and often lengthy reflection. Institutional appreciation that there is a spectrum of effective classroom integration of technology, and that each faculty member will participate somewhat differently along that spectrum, is key to providing faculty with appropriate support. Robust support means valuing and facilitating a variety of teaching methodologies that embrace a learner-centered focus.

Finally, the findings illustrate an institution that continued to pursue its goals despite unease, unpredictable outcomes, and side-steps to adjust corollary systems. This steady progress was enabled largely by the leadership at Mid-Western. Administration has been, and remains, committed and unwavering in its support for initiatives that are consistent with the new goals for more than a decade. This single element of stability has permitted a critical mass of faculty (over time) to get involved and change the way they work with their students. Sustained commitment of leaders and substantial resources has been the enabling factors in an uncertain environment.

Conclusions

Mid-Western Community College is transforming itself as an institution, and it is experiencing the dislocations, tension, and surprises that accompany change that is “revolutionary, a new paradigm that alters the rules of the game and changes core processes, cultural commitments, products/services, markets and strategic alliances” (Backoff & Nutt, 1997b, p. 241). The way members of the college interact with each other, their students, and their community has changed drastically, enabled by a shift in technology utilization from a few personal computers to technology research and development facilities, multimedia classrooms, and Web-based courses. Millions of dollars of infrastructure

changes have taken place in the last nine years and innovation in teaching and learning are highly recognized within the college culture.

How do you get a whole college campus, faculty, administrators, support staff, and students engaged in new ways to think about and implement teaching and learning? Students adjust most easily. The younger students have grown up using and learning technology through the Internet. Older students have been slowly immersed in technology in their work environments. However, for faculty who were not the champions of change or members of the planning teams, changing pedagogy that has been successful for years represents a major disruption. The change to a learner-centered environment required more than creating an administrative paper trail to show how department goals linked to a strategic plan, with few practical impacts in the classroom. This time there was day-to-day in-your-face evidence that the world at the college was going to be different. The construction of the Incubator, teams doing beta testing with their efforts highlighted at college in-service days, the campus-wide addition of technology equipment in classrooms, the addition of computer-filled student learning centers, and the allocation of funding based on those initiatives that supported these changes all represent change in a very visual and constant way. It is like placing the proverbial elephant in the middle of the room—not only can't he be ignored, but you quickly learn he is getting all of the peanuts. Access to resources is a definitive catalyst for change.

The changes have brought many continuing challenges and questions; three are highlighted here. Up front is the issue of faculty development. The president acknowledges that a substantial commitment to the professional development of the faculty is imperative, and he underscores the importance of faculty assuming leadership roles to guide the college toward a learner-centered environment using technology as a major learning methodology. Central to the design of effective programs to help faculty work with technology is an appreciation that these institutional "requests" intrude into intensely private relationships between human beings and their technology. The importance of the availability of individualized, one-to-one "training" sessions that can be tailored to personal learning styles becomes apparent in this context.

A second and related issue that bears continued study is the redefinition of faculty roles. As more faculty teach technology-enhanced, mixed-methodology, and online courses, new dimensions are being added to the faculty role (Baldwin, 1998). Faculty are becoming frustrated with the amount of time needed to appropriately develop and maintain technology-enhanced or online courses as well as with the time invested in meeting the students' learning needs. The frustration stems

not only from the number of new activities, but also from the fact that their efforts are not captured in old workload models whose structure does not accommodate this new work, thus failing to provide the base for appropriate recognition and reward. Participants in this study felt strongly that the faculty work process is significantly different and should be recognized explicitly in workload calculation, faculty role identification, and pay structure. The faculty experience at Mid-Western offers a microcosm of faculty experience across the nation, as both committed and reluctant faculty begin working with technology and confront challenges and inconsistencies that test their best creative efforts.

The third challenge is to be able to attribute student success to different technology enhancement options. Cost versus benefit is not an easy phenomenon to evaluate at this juncture because many of the technology initiatives at colleges across the country are just getting to the point where data can be collected (Bates, 2001). However, because technology is expensive and state support dollars are dwindling for higher education, data to support fiscal decisions regarding technology and learning modalities is imperative. Cost versus benefit is such a tense issue for faculty that the administration at Mid-Western has paused to search for evidence that the huge expenditure is warranted by benefits to their students.

True innovation means embarking on a direction without a road map, where “you don’t know what you don’t know.” Despite good planning, there is a steep “learning curve” and a high risk of error inherent in true innovation. Institutions can pursue transformational change by following in the footsteps of other institutions, or they can pursue transformational change in the process of breaking trail themselves. Mid-Western Community College has chosen the leadership route with respect to a comprehensive, campus-wide integration of technology into teaching and learning. For individuals and institutions taking the path-breaking route, when it is difficult to anticipate the full ramifications of an experiment, there is a critical need to continuously evaluate the corollary impacts of innovations. Long-term success depends upon building a culture that supports a learning organization, where review and evaluation of activity is standard operating procedure and where findings are incorporated into subsequent planning and decision making.

The disruptive characteristics of technology challenge leadership to address the management of change with greater degrees of commitment, participation, planning, support, and real-time response than is addressed by previous research or institutional leaders. The disruptive aspects derive from the rapid and often discontinuous changes in technology; the rapid and unpredictable increases in the cost of a comprehensive technology program with its associated support functions;

and the immediate leap into transformational or second-order change that requires reframing institutional assumptions about budget and reward systems, and the fundamentals of the teaching-learning process and the student-faculty relationship.

Notes

¹The name has been changed to preserve the confidentiality of the institution.

²Names of these teams have been changed to protect the identity of the institution.

References

- Argyris, C. (1970). *Intervention theory and method*. Reading, MA: Addison-Wesley.
- Backoff, R. W., & Nutt, P. (1992). *Strategic management of public and third sector organizations: A handbook for leaders*. San Francisco: Jossey-Bass Publishers.
- Backoff, R. W., & Nutt, P. (1993). Strategic issues as tensions. *Journal of management inquiry*, 2(1), 28–42.
- Backoff, R. W., & Nutt, P. C. (1997a). Crafting vision. *Journal of Management Inquiry*, 6(4), 308–328.
- Backoff, R. W., & Nutt, P. C. (1997b). Organizational transformation. *Journal of Management Inquiry*, 6(3), 235–254.
- Baker, G. A. (1998). *Managing change: A model for community college leaders*. Washington, DC: Community College Press.
- Baldwin, R. G. (1998). Technology's impact on faculty life and work. In K. H. Gillespie (Ed.), *The impact of technology on faculty development, life and work* (Vol. 76, pp. 7–21).
- Barr, R., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. *Change*, 27(6), 13–25.
- Bates, A. W. (2000). *Managing technology change: Strategies for college and university leaders*. San Francisco: Jossey-Bass Publishers.
- Bates, A. W. (2001). Beyond button pushing. In R. M. Epper & A.W. Bates (Eds.), *Teaching faculty how to use technology: Best practices from leading institutions* (pp. 141–152). Westport, CT: ACE/Oryx Press.
- Bleed, R. (1993). Community colleges: Using information technologies to harness the winds of change. In R. C. Heterick Jr. (Ed.), *Reengineering teaching and learning in higher education: Sheltered groves, camelot, windmills and malls*. Professional Paper Series, #10 (pp. MF–01; PC–03). Boulder, CO: CAUSE. (ERIC Document Reproduction Service No. ED 359 921.57.)
- Burd, S. (1998, January 30). U.S. panel warns colleges to cut costs or risk an “erosion of public trust.” *The Chronicle of Higher Education*, pp. A26–A27.
- Burgelman, R. A., & Sayles, L. R. (1986). *Inside corporate innovation*. New York: The Free Press.
- Carnevale, D. (2000, January 28). U.S. backs the development of internet-based courses. *The Chronicle of Higher Education*, p. A46.
- Carter, P., & Alfred, R. (1998/1999). *Making change happen*. Critical Issues Paper. Ann Arbor, MI: University of Michigan, Consortium for Community College Development.

- Carter, P. , & Alfred, R. (1997). *Reaching for the future*. Ann Arbor, MI: University of Michigan, Consortium for Community College Development.
- Chapman, D. (1996). Strategic planning for information technology. In *The 21st century community college: Technology and the new learning paradigm* (pp. 65–70). White Plains, NY: International Business Machines Corporation.
- Chickering, A. & Gamson, F. (1987). *Seven practices for good practice in undergraduate education*. Washington, DC: American Association for Higher Education. (ERIC Document Reproduction Service No. ED 282–491).
- The Chronicle of Higher Education* (2001, August 31). *Almanac Issue, XLVIII(1)*, p. 7.
- Collins, J. C. (1997). *Built to last: Successful habits of visionary companies*. New York: Harper-Collins Publisher.
- Conner, D. R. (1998). *Leading at the edge of chaos: How to create the nimble organization*. New York: John Wiley & Sons.
- Covey, S. (2001). *Four Roles of Leadership, Leadership is a Choice Not a Position*. Lexington, KY: Franklin Covey Co.
- Covey, S. (1991). *Principle-Centered Leadership*. New York: Fireside.
- Curry, B. (1992). *Instituting enduring innovations: Achieving continuity of change in higher education*. ASHE-ERIC Higher Education Report No. 9. Washington, DC: The George Washington University, School of Education and Human Development. (ERIC Document Reproduction Service No. Ed 358–809).
- Daniel, J. (1999). *Mega-Universities and Knowledge Media: Technology Strategies for Higher Education*. London: Kogan Page Ltd.
- Demb, A. (2002). The intellectual supermarket. *EDUCAUSE review*, 37(4), 12–23.
- Duderstadt, J. J. (1999/2000). New roles for the 21st century university. *Issues in Science and Technology*, 16(2), 37–44.
- Ehrmann, S. (1998). Using technology to transform the college. *New Directions for Community Colleges*, 26(1), 27–33.
- Emery, R. L., & Trist, E. L. (1965). The causal texture of organizational environments. *Human Relations*, 18(1), 21–32.
- Freed, J. E., & Klugman, M. R. (1997). *Quality principles and practices in higher education*. Phoenix: Ace/Oryx.
- Hammer, M. & Champy, J. (1993). *A manifesto for business revolution*. New York: Harper & Collins Publishing.
- Heifetz, M. (1993). *Leading change, overcoming chaos: A seven stage process for making change succeed in your organization*. Berkley: Ten Speed Press.
- Holmes, W. (1999). The transforming power of information technology. *Community College Journal*, 70(2), 10–15.
- Klor De Alva, J. (1999/2000). Remaking the academy in the age of information. *Issues in Science and Technology*, 16(2), 52–58.
- McGregor, D., (1960/1985). *The human side of enterprise*. New York: McGraw-Hill.
- Mooney, K., & Bergheim, L. (2002). *The ten demandments*. New York: McGraw-Hill.
- Moore, G. A. (1991). *Crossing the chasm*. New York: Harper Business.
- Morse, J. (1994). Designing funded qualitative research. In N. Denzin & Y. Lincoln (Eds.) *Handbook of qualitative research* (pp. 220–235). Thousand Oaks, CA.: Sage Publications.

- Myran, G., Zeiss, T., & Howdysshell, L. (1995). *Community college leadership in the new century: Learning how to improve learning*. Washington, DC: American Association of Community Colleges.
- O'Banion, T. (1997). *A learning college for the 21st century*. Phoenix: Oryx Press.
- O'Banion, T. (2000). An inventory for learning-centered colleges. *Community College Journal*, 71(1), 14–23
- Oblinger, D. (1996). Creating a learning culture. In *The 21st century community college: technology and the new learning paradigm* (pp. 27–38). White Plains, NY: International Business Machines Corporation.
- Ohio Board of Regents (1992). *Managing for the future: Challenges and opportunities for higher education in Ohio*. Columbus, OH: Ohio Board of Regents.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbery Park, CA: Sage Publications.
- Rouche, J. E., & Rouche, S. D. (1998). Dancing as fast as they can: Community colleges facing tomorrow's challenges today. *Community College Journal*, 68(5): 31–35.
- Rowley, D. J., Lujan, H. D., & Dolence, M. G. (1997). *Strategic change in colleges & universities*. San Francisco: Jossey-Bass.
- Schein, E. (1961). *Coercive persuasion*. New York: W. W. Norton & Company, Inc.
- Senge, P. (1990). *The fifth discipline*. New York: Doubleday.
- Twigg, C. A., (2000). Institutional readiness criteria. *EDUCAUSE Review*, 35(2), 42–48, 50–51.
- Van Dusen, G. (1997). *The virtual campus: Technology and reform in higher education*. (ASHE-ERIC Higher Education Report Vol. 25, No 5.) Washington, D.C.: The George Washington University, Graduate School of Education and Human Development.
- Von Hippel, E. (1988). *The source of innovation*. New York: Oxford University Press.
- Wallin, D., & Ryan, J. (1994). Order out of chaos: Leadership for the 21st century. *Community College Journal of Research and Practice*, 18, 527–538.
- Wheatley, M. J. (1992). *Leadership and the new science: Learning about organizations from an orderly universe*. San Francisco: Berrett-Koehler Publisher.
- Young, J. R. (1997, October 3). Re-thinking the role of the professor in an age of high-tech tools. *The Chronicle of Higher Education*, p. A26.
- Zemsky, R., Massey, W., & Odel, P. (1993). On reversing the ratchet. *Change*, 25(3), 56–62.
- Zuboff, S. (1988). *In the age of the smart machine*. New York: Basic Books, Inc.

Copyright of Journal of Higher Education is the property of Ohio State University Press and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.