Information technology has been an important part of higher education since the development of the lantern slide in the mid-1800s. However, occasions in which the academy has been transformed by technology are rare. Viewed in a historical perspective, these occasions can be considered as a series of three epochs: the online public-access catalog epoch; the personal computer, Internet, and web epoch; and the enterprise systems (ERP, CMS) epoch. Certainly, developments are continuing, but for most colleges and universities, these three epochs no longer represent technological frontiers. Looking forward, those of us in higher education are now focusing our attention on technology applications for teaching, learning, and research—or what can be viewed as the epochs of teaching and learning with technology, and cyberinfrastructure. In this commentary, I’ll be confining my comments to teaching and learning.

Given the centrality of teaching and learning to the mission of the academy, employing technology to improve teaching practice and student learning outcomes remains one of our most conspicuous goals—and one of our most conspicuous pieces of unfinished business. It’s not that we haven’t been trying. Over the past three decades, we have seen the emergence of new learning theories, such as social constructivism, and new, student-centered pedagogical practices. In addition, colleges and universities have made substantial investments in technological infrastructure such as course management systems, wireless networks, and multimedia classrooms. We have demonstrated that it is possible to implement a variety of educational technologies on our campuses and even to get a fair number of faculty members to use them. Yet the report card on our progress could be more promising, as evidenced by Robert Zemsky and William F. Massy’s Thwarted Innovation (2004), (1) Chronicle of Higher Education features with titles such as “Professors and Technology: Helpless or Hopeful?” and “When Good Technology Meets Bad Teaching,” a large body of “no significant difference” studies, and even occasional EDUCAUSE Review articles that confess to doubts about our progress. Although there have been some signature successes, overall higher education has not convincingly demonstrated that technology has had a systematic, widespread, or sustained impact on the process of teaching and learning outcomes.

Even so, our faith in the potential of technology as a tool to transform teaching and learning remains steadfast. Maybe we simply haven’t been going about it in the best way. A review of the literature on teaching and learning with technology reveals that to date, much of the emphasis has been on selecting the “right” technologies (or the “right” vendors of a particular technology) and assisting faculty members to adopt and use those technologies. In support of this approach, institutions have implemented roundtable discussions, instructional technology centers, workshops, training programs, and help desks. Indeed, some of these efforts have produced promising results. The problem with this approach, as Bill Graves has stated, is that all too often we “bolt on” technology rather than redesign the teaching and learning process. Graves notes that as exciting as these individual technological “random acts of generosity” may be, they tend to increase the cost of instruction, to be short-lived, and to seldom disseminate widely enough to encourage the institution-wide impact. (2) Tony Bates cites additional limitations of approaches centered on individual faculty adoption, including excessive time demands on faculty and support staff, failure to complete projects, inconsistent results, and lack of dissemination of best practices. Bates also notes that such initiatives typically do not scale well because they are so heavily dependent on the ideas and energy of one or a few individuals and because ramping up requires exponentially greater support resources. There are so many technologies to choose from, so many ways to use them, and so many faculty members that it is no wonder most institutions have pursued different strategies, with varying degrees of success. But the introduction of technologies is having a positive impact on student learning outcomes.

An institutional, or systemic, approach to teaching and learning with technology, on the other hand, can provide many elements essential for success, sustainability, and quality:

- Alignment with institutional mission and strategic goals
- Administrative awareness and commitment
- Infrastructure
- Faculty development
- Standards
- Policy formation
- Comprehensive assessment and data collection

In their simplest form, successful systemic approaches are characterized by institutional facilitation, administrative direction, and faculty interest. Institutional facilitation is perhaps the most critical of these because without it, administrative intent cannot be achieved and faculty engagement cannot be sustained. Effective systemic initiatives begin with the identification of small, proactive steps to eliminate points of “friction” for both faculty members and students.

One measure of an institution’s approach to teaching and learning with technology is the response to two questions: “How many faculty designers does the institution employ?” and “What do they do?” If the response to the first question is “none” or “a few,” and if the response to the second question is that the instructional designers are assigned to individual faculty projects, one picture emerges. On the other hand, if there are a number of instructional designers, if their work consists of developing and delivering enterprise-wide faculty development and is associated with institutional initiatives, and if they participate fully in project design, then a quite different picture emerges. Another measure of institutional capacity to facilitate is the relationship between information technology and instructional technology units. Institutions with very closely aligned information technology and instructional technology resources are better prepared to mount and sustain large-scale initiatives than are institutions in which the two functions do not communicate or collaborate well.

Transformation is change that is both broad and deep—in this case, change that is practiced by a large number of faculty members whose pedagogies and tools have undergone substantial modifications. Transformed, processes are redefined, and the change becomes permanent. Achieving meaningful transformation requires institutional-wide, systemic initiatives. Of course, a systemic approach is not appropriate for every technology, but such an approach is ideal for those technologies that have broad applicability across the institution, as well as those that have the potential to substantially change the teaching and learning process. Online learning, multimedia-equipped learning spaces, and e-portfolios are three examples. Once established, institutional initiatives such as these can serve as points of attachment for the use of other technologies, such as wikis, blogs, podcasting, personal response systems, and a host of other potentially useful tools. By integrating the use of these tools into one or more large-scale systemic initiatives, an institution can provide faculty development, technical support, assessment, and a host of other instructional services.

The path to improved teaching and learning with technology is an ongoing process. The institutional question we can pause and say, “Enough.” Systemic transformation is but the first step.

Notes
1. Robert Zemsky and William F. Massy, Thwarted Innovation: What Happened to e-Learning and Why, final report for the Weatherford Foundation Project of the Learning Alliance at the University of Pennsylvania in cooperation with the Thomson Corporation, May 3, 2004; see also, Dennis W.天天; "Notes"