

From Managing Expenditures to Managing Costs

Strategic Management for Information Technology

By George Kaludis and Glen Stine

INTRODUCTION It has been two decades since Howard Bowen¹ initially posited the first law of higher education financial management: “Raise all the money you can; and spend all the money that you raise.” In the intervening period, institutions of higher education have been generally loath to defy Bowen’s Law and have sought to develop better processes for controlling expenditures (often enabled by new technologies) rather than attempting to control *actual* costs. Perhaps nowhere has this approach been more perfectly operationalized than in campus budgeting for information technology (IT), whether for instruction or other purposes. . . .

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Yet institutions now face a world where policymakers, trustees, and students are applying increasing pressure to hold the line on costs.² More immediate for many institutions, new competitors for students, including for-profit providers, and other market forces may force reductions in price for certain programs or services, requiring institutions to change their cost structures to remain competitive.

In this context, it is critical to draw the distinction between the management of *expenditures* and the management of *costs*. For the most part, colleges and universities have managed expenditures through budgeting and other fiscal controls like procurement procedures within the institution. Managing costs, however, encompasses broader issues like depreciation, assets and liabilities, and activity measurements and opportunity costs. Strategic management of costs may require analysis of economies of scale, return on investment measurement, and scalability of the technology being implemented.

If one assumes that personal computers and the Internet are transformational, even “disruptive” technologies, then, for many institutions, a substantial part of the technology infrastructure has become a “utility” much like electricity and the heating plant, some portion of which can be capitalized while others are an ongoing operating expense. These infrastructure costs include the development of campus networks and the provision of minimally configured personal computers, network connections, and e-mail technology with appropriate network servers. For some institutions, the utility infrastructure will include the provision of a purchased or licensed platform through which to offer Web-based courseware. These utilities are generally “managed” through direct subsidy of the departmental budget or through

some charge-back/cost recovery mechanism. As a utility type of expense, management of the costs will depend heavily on institutional policy and plans for provision and expansion of the utility, and will be partly driven by other issues like the needs of administration and institutional economic factors like indirect cost recovery and research funding. That is, does the method of charging for the infrastructure allow for the recovery of the expenditure through either direct charges to grants and contracts or by applying those expenditures to the institution’s indirect cost rate?

The basic approach to controlling costs is to *limit* access to *the utility*; and when access control is not feasible or functional, institutions must find ways to absorb the expansion costs. The relatively unplanned and non-integrated set of decisions to develop the infrastructure means it occurs without substitution for other areas of expense. Over time, the use of PCs has changed the way most faculty and other staff conduct their business and may have led to cost substitution, but few institutions were either able to recapture the savings or to plan systematic reinvestment. An example of the change in the way work is conducted can be seen in the fact that faculty and staff now produce finished papers rather than using secretaries to meet these needs. In the main, this change in work has not been recaptured by a systematic budgetary approach.

The following three basic and unavoidable principles apply when managing the cost of information technology:

1. The uses of instructional technologies will only increase costs of instruction when that technology is used to supplement existing activities or be an add-on to current courses.
2. The cost of instructional technol-

ogy must be measured as part of a whole process or activity, not as a stand-alone cost. That is, the development and use of instructional technologies will inevitably require new expenditures to acquire those technologies; cost savings, if any, must come in the application of the technology to other activities associated with the use of IT, e.g., course delivery costs.

3. Instructional technology works well for certain activities, but cannot readily be used for other activities, no matter what costs are incurred. For example, instructional technology generally works well for large courses with multiple sections. It works less well where interaction in class is essential to achieve the course purposes.

Each of these principles challenges current management thinking and the state of current management practice at most colleges and universities. We treat each of the principles and the management challenges it poses below.

THE CHALLENGES TO MANAGEMENT

Data from the Campus Computing Survey . . . show that most campuses are employing information technology in the instructional program to supplement and enhance traditional course offerings. This strategy allows institutions to use traditional faculty and department structures as the primary mode of operations. Costs are not likely to be the primary consideration and rates of expenditures will be based on the availability of the support infrastructure and marginal allocations of funding through regular budget processes. More faculty are interested in learning to develop information technology applications for part or all of their courses, and institutions are likely to be limited by the availability

of technical talent to support both the needed technology infrastructure and the faculty support functions. This situation will limit institutional expenditures, but may not actually manage costs. The approach, however, will limit institutional goals to what Dr. William H. Graves, the president of Eduprise.com, calls “random acts of progress” which he distinguishes from “global progress.”³

Under this strategy or scenario, the task of management is essentially to manage the expenditures of the utility, which now includes course development support and new instructional support functions. Costs are high because expenditure management is the resource allocation tool. Many new kinds of proactive management decisions may more effectively manage costs. What and how many courseware systems will be licensed? Will the institution do its own Web hosting or purchase the service? How will student enrollment transactions be handled within the technology-enhanced courses? How will faculty support functions be developed and managed? Issues may arise concerning faculty seeking significant support or even supplemental salary for course development, intellectual property ownership and royalties owed, and responses to individual faculty initiatives to develop distance course offerings. Typically, these questions will be handled within the traditional decision and resource allocation process of the institution. The overall result is likely to be high cost and low impact, with incremental expenditures and incremental unplanned progress. Lots of different “experiments” will occur, driven by individual faculty interest but with little thought to issues of replication and scalability of the experiment. Institutions are attempting to build in technology fees to pay for the infrastructure and technology course

fees to pay for the added expenditures of delivery.

Institutions have faced similar situations in the implementation of Enterprise Resource Planning (ERP) client-server software systems for administration.⁴ The expenditure for the systems and their implementation usually is in the millions of dollars and the level of technology support to maintain them and install frequent upgrades essential for the long-term maintenance of the systems is usually significantly higher than for existing fully depreciated legacy systems.⁵ (The Y2K problem highlighted some of the hidden costs of legacy systems that are not accounted for by traditional expenditure control processes.)

Institutions choosing to implement new ERP systems *with the same administrative and management procedures* were then faced with extraordinary expenditures for changing the systems and their implementation to handle the old processes and higher costs for maintenance and renewal. Institutions willing to dramatically redesign their administrative transaction processes and activities to take advantage of the ERP systems’ power often lowered their overall cost of a transaction. They also created significant new management opportunities to take advantage of, for example, e-commerce, such as the availability of Web-based procurement systems linking the institutional customer directly to a vendor of a needed product or service. The costs were lowered by reducing redundant control steps, multiple points of data entry and by using technology to handle the repetitive transactions and reducing the needed “shadow systems” to capture data.⁶ Impact on both the new process and the administrative culture of the institution was high and the initial expenditures for implementing the process changes were high. Costs had to be considered across the whole process and, to be worthwhile, the process change

had to yield substantial cost and time savings. The basic question became, how does the institution produce the maximum rate of return on its investment in the new ERP system, given that the investment is essential?

There are a number of clear parallels to the case of managing the costs of instructional applications of information technology. Institutions tied to traditional time issues (e.g., semesters), customized course and program offerings, a “not made here” approach and traditional cost measures (expenditures per student) will neither manage costs nor take advantage of high return on investment opportunities. Institutions allowing “producers” rather than “customers” to determine programming, particularly within the distance and off-campus learning program, will not be able to manage costs. Institutions that do not seek to deal with economies-of-scale issues and build scaleable, replicable technology uses will find escalating costs. Institutions that are not able to deal with issues like the continuing debate over the ownership of intellectual property for courses and courseware will be left with high costs and low returns on investment.

Particularly when dealing with Internet delivery issues, institutions must understand that the new customers for purchasing products and services using the Web are looking for “deep markdowns, razor thin margins and the commoditization of goods and services.”⁷ By being customer and market focused, institutions can avoid courses or curricula that have high costs that too few customers are willing to purchase. For example, a course that costs \$100,000 to develop and can only be delivered to an average of 20 students once a year has a much higher cost than the same expenditure of \$100,000 for a course delivered five times a year to an average group of 200 students.

Information technology can effectively handle certain approaches to courses, classes, and course delivery and potentially reduce, and certainly allow for, the management of costs. While potential savings can be realized from reductions in the need for new class space by allowing a portion of a course to be taught asynchronously and in virtual form, the more important management of costs will be done understanding the issues of scalability and replication. In one way or another, about 25 courses constitute over one-third of all course credits delivered to undergraduates at colleges and universities in the U.S. The sheer volume of these courses, and, perhaps, of the next 25 largest courses, makes them suitable subjects for managing IT costs with high educational impact. Distance and off-campus learning opportunities are clear candidates to produce courses and, potentially, curricula where costs are managed. Courses and programs offered on-campus to few students are unlikely to be attractive to off-campus students either and will not meet acceptable management criteria for scalability and replication. Off-campus courses offered or facilitated by information technology with standard time and instructional practices are unlikely to achieve the essential economies of scale and to meet scalability standards to “manage costs.”

For a few wealthy institutions that desire to be on the “bleeding edge” in information technologies, these issues and principles will not matter because maximum return is achieved by being out ahead of others and defining a new institutional competitive niche. Most other institutions need management strategies to deal with these cost issues or should attempt to at least control the resources allocated to information technology, so that small decisions do not inadvertently and dramatically increase long-term costs.

COMPREHENSIVE ENTERPRISE PLANNING (CEP): A STRATEGY FOR MANAGING ENTERPRISE, INVESTMENTS, AND MISSIONS

The costs of information technology can only be *managed* to the extent that an institution understands its technology-enabled educational objectives and places them in the context of overall institutional mission. Information technology-enabled improvements are potentially available at many levels and parts of the institution. Some colleges and universities, however, will be neither willing nor able to achieve the fundamental shifts in thinking necessary to manage the cost of information technology. Many do not have an integrated, purposeful plan for applying information technology to new delivery systems and new customer markets. They will treat such efforts through separate organization, using separate faculty policies and approaches and generating separate revenue streams and investment decisions. Traditional students may or may not be included in any redesign of the learning delivery process. Some institutions have made and must continue to make their reputation on course delivery mechanisms that do not allow economies of scale essential to manage technology costs. Further, the introduction of certain technologies creates significant links and ramifications to and with other administrative systems, resource planning and allocation policy, libraries, student services activities, alumni management, and degree and course certification. Without critical enterprisewide thinking and strategic agenda setting, the costs of instructional technology are essentially an unmanageable process. We have labeled the process *Comprehensive Enterprise Planning (CEP)*.

The CEP planning model identifies the following five critical areas of concern for every institution:

1. What are the key characteristics of the institutions as they relate to the use of instructional and other technologies?
2. What is the institution’s current and desired future market position in terms of instructional applications of information technology? Going into distance learning, for example, on a small scale will be extremely costly because shared technologies and overhead costs cannot be leveraged.
3. How ready is the campus in terms of the physical, policy, and management infrastructure to apply information technology to the instructional program? Campus attitudes are also part of this question.
4. Is the institution ready to deal with management issues like activity-based costing, multi-year capitalization of losses, and a broader view of strategic asset management?
5. What are the critical determinants for the institution’s reputation and current market position?

A critical mission element to consider is what portion of an institution’s mission includes services to non-traditional students. For the most part, this means working students, older students, and students for whom convenience and price are primary considerations. The higher the mission importance of these students, the less likely traditional delivery systems are going to work in the future and the greater potential for instructional applications of information technology. A second mission element to consider might be the role research, particularly research in the use of information technology, plays at the institution. A few institutions will play leading roles in the development and implementation of instructional applications of IT as a spin-off of their research roles. Current institutional

economics should also contribute to the analysis. Small institutions may have to join together or make greater use of outsourcing services than institutions that can absorb short-term investment costs within their existing revenue streams. Institutions with large numbers of high enrollment introductory classes and sections have significantly greater use of technology opportunities than institutions that limit class size.

Institution-wide goals for the instructional use of information technologies need to serve as a benchmark against which to test plans and activities. For example, an institution that seeks to develop new and expanded markets using technology needs to act considerably different from an institution that plans to develop, protect, and perhaps expand on-campus or existing continuing education markets. Even within on-campus markets, institutions having enrollments of traditional undergraduate students are likely to need to invest differently from institutions with large non-traditional or graduate enrollments. Finally, technologies can be fully developed by the focal institution or can be used only after a fully tested purchasable product is available. Institutions will face different "management of cost" issues by deciding where they want to fit on a continuum from "bleeding edge" to "total non-participant" in the instructional applications of information technologies. Even within the distance learning arena, institutions can be content producers, course distributors, learning support centers, or course and degree providers, depending on their enterprise strategy.

The desire, even with much of the technology infrastructure in place, may not be enough to allow an institution to become a major competitive force in distance learning. In a long prospectus touting e-knowledge businesses using the Internet to deliver services as a fun-

damental and major opportunity for investors, Wit Capital Corporation provides the following admonitions about what *value* will require in the market:

1. The focus on "Value Added" content, delivery, or services to sustain a competitive advantage.
2. The use of brand and reputation not just for narrow audiences, but for all that must evaluate the service (including students, employers, parents and businesses who might want to purchase services). Since location will be less important, establishing reputation will depend on type, level, quality, and price of services, not faculty reputation.
3. The development and maintenance of a strong management team, management processes, and management action that can move quickly and decisively to have a winning approach.
4. First movers have advantages, but these advantages are based on quality relationships, particularly corporate and strategic alliance relationships. Few companies (or institutions) will be able to provide a comprehensive set of services.

Wit Capital indicates that traditional higher education currently offers weak competition to emerging for-profit providers in the major growth of e-knowledge commerce because of higher education's inability to leverage capital and confront these issues.⁸

Alternatively, focusing on on-campus uses of IT, Carol A. Twigg identifies the following eight criteria against which an institution can assess its own readiness to reduce costs and enrich learning through information technology:


1. The institution must want to reduce costs and increase academic productivity.

2. The institution must view technology as a way to achieve strategic academic goals rather than as a general resource for all faculty and for all courses.
3. The institution's goal must be to integrate computing into the campus culture.
4. The institution must have a mature information technology organization(s) to support faculty integration of technology into courses or it must contract with external providers to offer such support.
5. A substantial number of the institution's faculty members must have an understanding of and some experience with integrating elements of computer-based instruction into existing courses.
6. The institution must have a demonstrated commitment to learner-centered education.
7. The institution must have established ways to assess and provide learner readiness to engage in IT-based courses.
8. The institution must recognize that large-scale course redesign using information technology involves a partnership among faculty, IT staff, and administrators in both planning and execution.⁹

Conditions and issues such as the ownership of course materials, the role of non-faculty in course delivery, and faculty compensation management must be addressed by most institutions to successfully manage the enterprise and associated costs.

ANALYZING RETURN ON INVESTMENT AND STRATEGIC ASSET MANAGEMENT

Because the instructional applications of IT will inevitably require the expenditure of funds, analysis of the return on the investment (ROI) and the use of strategic asset management provide strategies for cost management. ROI, while usually seen in strictly quantitative or

The background of the page is a collage. On the left side, there are several close-up photographs of people's faces, including a young man looking forward and a woman looking down. On the right side, there are several US dollar bills, including a \$100 bill and a \$20 bill, with the serial number K28265176E visible on several of them. The text is overlaid on a white rectangular area in the center.

financial terms, can use qualitative criteria as well. That is, by measuring the progress an investment returns against a set of stated goals, the ROI can be compared against other investments that the institution might make. This process assumes that an institution can identify and measure the goals or strategic agenda that it seeks to accomplish and is willing to explore a series of investment opportunities for capital or other funds to which it might have access. Investment funds can be generated from many sources, including fund raising, capital funding, debt, or operating funds after fixed costs have been met. The largest allocable resource at most institutions is the time and effort of faculty and staff. Increasingly, institutions are using for-profit corporations as a means of generating equity and potential venture capital for the development of new markets and delivery systems.

Strategic asset management takes a broader view of the assets of the institution than that found in financial statements. For example, intellectual property generated and owned or licensed by an institution has substantial potential value. Many institutions have developed technology transfer operations to deal with the potential value of inventions, patents, and licenses in the institution. By more systematically applying underutilized assets, particularly those with high development and depreciation costs, institutions can better manage the cost of information technology. Different institutions with different cultures are using a number of models for this management strategy. Many outside vendors are also willing to support strategic assets management depending on the model an institution chooses. The point is that institutions need to make overt and significant decisions about deploying their strategic assets as part of a cost management approach.

Truly managing the cost of information technology will also require cost measurement processes and understandings rarely evidenced in higher education. Twigg points out the value of activity-based costing, but only after assignment of certain expenditures to fixed institutional costs.¹⁰ Thus, both measurement methodologies need to be employed. Understanding the half-life of certain technology, certain content and knowledge, and similar issues are essential for building cost strategies based on depreciation. Predicting markets and market responses may also be a significant issue for determining ROI and thus management of costs. Because a large portion of the potential cost reduction from the use of IT will come in the form of time and effort savings of current personnel, institutions will need to understand how to recapture and put to productive use that time and effort.

Beyond the expense in dollars and cents of information technology applications, certain non-tangible costs in terms of an institution's reputation and current market position may be equally significant and will require searching analysis. Large enrollment courses, particularly those with either many sections or several types of delivery activities like labs or discussion sections, present substantial opportunities for reducing instructional cost and improving learning. Institutions whose reputation is built around small sections and high direct faculty involvement will need a high ROI to begin to substitute technology for the small enrollment reputation. Similarly, increasing opportunities will appear for institutions to purchase course content and even outside delivery with potentially significant savings and learning improvements, but institutional reputation must be a significant consideration. Institutions renowned for providing leading self-service technology

solutions cannot forego continuing investment in these technologies to support instructional applications of IT.¹¹ Strategic assets may be sold or licensed to outside businesses, but a cost consideration must include reputation management and current market position management. There may be opportunities to develop economies of scale through institutional consortia or partnership arrangements, but there are likely to be reputation considerations, which can add to or reduce costs.

All these considerations suggest that an institutional investment strategy must also include a corresponding exit strategy, i.e., management processes to avoid costly expenditures. Because institutions are not generally good at eliminating programs and many institutions have current investments in antiquated technologies for instructional delivery, the rate of technology and content depreciation costs are going to increase and this will further outdate existing infrastructure investments. Cost management, thus, requires planned exit and risk mitigation strategies rarely found in the academic management of colleges and universities.

IN CONCLUSION: COST MANAGEMENT REQUIRES A PARADIGM SHIFT

Information technology will strain not only the instructional budgets and current policies of many institutions, but will also strain the management skills and experience of their leaders. As we have suggested, IT costs can go unmanaged, but the costs will be high and are unlikely to meet significant institutional goals. On the other hand, IT presents significant opportunities. Those opportunities will not be realized without management skill in the assessment of technology investments, both from the point of ROI and at levels like buy (and potential

outsource) versus build decisions. Partnerships, alliances, and consortia represent potential opportunities to increase ROI, reducing costs of required technologies or achieving economies of scale, but require significant management skill in negotiation and relationship management. The potential for significantly different organizational forms within or around the institution will be critical to most institutions considering new markets or technology-based learning markets.

Cost issues and assessment of outcomes will challenge academic management structures because assessment of programs will need to move from deliverer assessment to learning outcome assessment. Cost issues will also require decisions to be made on what technology standardization is essential for the entire institution to use. Most institutions will not be able to afford IT without having significant standardization of technology to limit various costs, including maintenance and training in the chosen technologies. Exit strategies for programmatic decisions must be developed and used.

Thus, the use of information technology presents institutions with paradigm shifts not only in course and program delivery, but also in the management of costs and in broad management processes. A key is to manage costs, not expenditures. Costs must be managed at the following four levels:

- At the *infrastructure or utility level*, the management of costs is not only to determine whether the expenditures will be made, but also how fast and which technologies provide the greatest functionality at the lowest price to meet institutional needs.
- At the *Comprehensive Enterprise Model planning and strategy level*, institutional positioning, strategy, and technology are brought to-

gether in an integrated package. Using technology for experiments and “random acts of progress” can be an expenditure-controlled process, but not a cost management approach. Without a realistic approach to developing the institutional strategy, costs cannot be managed and priorities for enterprise progress established. Because the strategy mix is different for every campus, no singular approach is available to manage the cost of IT, even within institutions that appear fairly comparable. Indigenous enterprise planning must be a key element.

- At the level of *institutional management*, practices and policies will need to be transformed to accomplish the set of desired global or enterprise-wide progress outcomes. Institutions unwilling to transform current practices and approaches to instruction and service delivery will not find ways to manage costs for new types of IT.
- Finally, at the level of *strategic investment*, appropriate assets deployment and measured return on investments and new management processes skills and experiences will be essential. The technologies have great potential for transforming instruction, cost structures of institutions, and institutional opportunities to manage overall costs.

The deployment of information technologies will have a high impact on the institution. Lowering costs (or insuring net returns) will require that other activities and management practices within an institution be transformed as well. Thus, for many institutions, a conservative approach to investment makes the most sense. For a few on the “bleeding edge,” costs will not be a primary consideration. For all others, man-

agement of costs, investments, assets, and relationships presents tremendous challenge and opportunities, the level of which depends on institutional goals, competition, and strategic agendas. Cost management is an active process, certainly not integrated into the current practices of many institutions, and best not left to chance. **e**

Endnotes

1. Howard R. Bowen, *The Cost of Higher Education*. San Francisco: Jossey-Bass Inc., 1980.
2. National Commission on the Cost of Higher Education, *Straight Talk about College Costs and Prices*. Washington, DC: U.S. Department of Education, January 21, 1998.
3. William Graves, “The Instructional Management Systems Cooperative: Converting Random Acts of Progress into Global Progress.” *Educom Review* (November-December, 1998): 33–36, 60–62.
4. ERP systems are used by colleges and universities as well as other for-profit and not-for-profit enterprises to manage transactions and store data and information related to those transactions. Institutions usually have ERP system applications in the financial, human resource, and student management areas. These applications are licensed for institutional use from large software application providers, but the applications are fit to the institutions.
5. Legacy systems are also transaction management systems for payroll, accounting, registration, and other similar functions. The software architecture and technology for these systems is out-of-date and, in many cases, no longer supported by the original software vendor.
6. Shadow systems are record systems that organizational subunits create to track their business that operate in parallel to formal organization-wide systems. For example, if accounting statements are routinely late, inaccurate, or do not include up-to-date financial commitments, institutional units will “keep their own books.”
7. Jeremy Seigel, “Are Internet Stocks Overvalued? Are They Ever.” *The Wall Street Journal* (April 19, 1999): A-22.
8. Wit Capital Corporation, *The E-Knowledge Industry*. August 11, 1999.
9. Carol Twigg, *Improving Learning and Reducing Costs: Redesigning Large-Enrollment Courses*. Philadelphia: The Pew Learning and Technology Program, 1999, pp. 5–7.
10. Twigg, *Improving Learning and Reducing Costs*, pp. 18–22.
11. Self-service technology solutions allow, for example, students to be admitted, plan their major, audit their progress, register for courses, apply and receive financial aid, and pay bills through technology rather than standing in lines or having to obtain unnecessary signatures.