Library and cross-disciplinary literature all stress the increasing importance of instructional technology in higher education. However, there is a dearth of articles detailing funding for library instructional technology. The bulk of library literature on funding for these projects focuses on one-time grant opportunities and on the architecture and design of spaces for public computers. This article seeks to examine the financial implications of educational technology funding for libraries and how ultimately libraries can be absorbed into a strategic, campus-wide technology funding cycle. Theoretical models of cyclical funding were analyzed, primarily through EduCause articles, resulting in five key elements of fiscally responsible funding practice: (a) leadership, (b) strategic planning, (c) collaboration, (d) changing organizational structures, and (e) flexibility. Findings generated were used to examine the financial implications of maintenance, rates of return of Instructional Technology, capital and operating budgets, and short- and long-term funding plans on funding models.
The research procedure for this article was a review of library and computing publications followed by an evaluation of qualitative and quantitative literature from the perspectives of the popular press, education, trusteeship and myriad articles from EduCause publications, whose focus is specific to technology in higher education. These articles about Instructional Technology funding were used to draw together a composite of key points relevant to funding educational technology in a fiscally responsible manner.

The first step in this process was to determine the current funding patterns of educational technology in libraries and campus-wide through a review of cross-disciplinary literature. Theoretical models of cyclical funding were analyzed resulting in five key elements of fiscally responsible funding practice. Finally, findings generated were used to examine the financial implications of funding models for instructional technology on campuses.

**DEFINITIONS**

Brief definitions of key terms used in this article are provided here.

*Digital divide:* patterns of uneven student access to technology along racial, economic, or geographical lines (Phipps & Wellman, 2001, p. 8).

*Educational technology* is defined by the Education Resources Information Center (ERIC) Thesaurus as:

systematic identification, development, organization, or utilization of educational resources and/or the management of these processes—occasionally used in a more limited sense to describe the use of equipment-oriented techniques or audiovisual aids in educational settings. (ERIC, 1969, ¶ 1)

*Funding cycles:* A chronological pattern of proposal review, decision making, and applicant notification. Some organizations set quarterly or semi-annually, intervals, while others operate under an annual cycle (Yellow Springs Community Foundation [YSCF], 2005, ¶ 38).

*Information technology:* the technology involving the development, maintenance, and use of computer systems, software, and networks for the
processing and distribution of data. Referred to as “IT” (Merriam-Webster, n.d., ¶1)

Instructional technology: see definition for Educational Technology. Because the acronym IT can mean instructional technology or information technology, “instructional technology”-will be spelled out and information technology will be referred to as “IT.”

Life-cycle funding: a life-cycle period set at three years; in three years, enough resources will have accumulated to buy a new piece of equipment (Antolovic’ & McRobbie, 2001, p. 30).

Moore’s law states that the processing capacity of computers doubles every 18 months (Antolovic’ & McRobbie, 2001, p. 30).

Replacement cycle: Van Deusen (1995) stated that a replacement cycle for equipment is a schedule identifying which machines to consider for replacement each year. This cycle serves as a guide to replacement and can not take the place of administrative decision making (p. 10).

Strategic planning uses a methodical, step-by-step approach to determining the mission, values, vision and planning (Strong, 2005, p. 4).

Ubiquitous computing, according to Brown and Petitto (2003), is “teaching proceeds on the assumption that every student and faculty member has appropriate access to the Internet” (p. 25).

LITERATURE REVIEW

Goldstein et al. (2004) identified the financial trends affecting higher education including declining state funding, decreased endowment returns, and increased costs for expenses such as health benefits, financial aid, and utilities. These factors have caused virtually all higher education institutions to repeatedly cut budgets, including IT. Keeping pace with these costs varies among institutions—on the average, budgets grew 5%, while more than 40% of institutions surveyed reported flat or declining budgets from 2001-2003 (p. 15). Uneven funding varied both by institution and by institution types. While public institutions typically reported declining or flat budgets, private
institutions reported an average increase of 5.25%. Neither reporting structure nor institutions with influential CEOs affected IT budgets (p. 15). This figure did not vary by Carnegie Classification, the Carnegie Foundation for the Advancement of Teaching’s method of dividing institutions of higher education into six categories.

A digital divide is growing among students (Brown & Petitto, 2003, p. 26), between larger, wealthier institutions and smaller, less well-funded schools (Phipps & Wellman, 2001, p. 6) and within universities at many levels, including some faculty who do not understand the need for a technology strategy (Duderstadt, Atkins, & Van Houweling, 2003, p. 51).

As information technology expenses continue to mount, public support wavers, placing the burden on administrators to educate the public and national leaders about the importance of maintaining an IT infrastructure (Glick & Kupiec, 2001, pp. 36, 38, 42). An environment of increasing expectations by national accrediting boards adds to the need for keeping current with technology (Decker & Neas, 2003, pp. 16, 22; Phipps & Wellman, 2001, p. 9). Antolovic’ and McRobbie (2001) argued that “contrary to popular claims, a careful scrutiny of higher education finances will likely reveal that there is indeed money available for life-cycle funding of desktop computers” (p. 36). In most institutions, some amount of recurring funding is already being spent on computers. The falling prices of computer hardware make life cycle replacement more feasible. Moore’s law, which states that the processing capacity of computers doubles every 18 months, indicates that in the foreseeable future affordable computers will be commonplace.

Library, education, computer science, and business literature all stress the increasing importance of instructional technology in higher education. Phipps and Wellman (2001) noted that instructional technology is bringing “rapid and profound change to higher education” (p. 6). The Association of Research Libraries ([ARL], 2004) reported that expenditures for electronic resources account for an average 25%, of library materials budgets. The cost of electronic serials have increased by 171% since the 1999-2000 survey, and by more than 1800% since they were first reported in 1994-1995. In every year since 1992-1993, average expenditures on electronic resources have increased at least twice as fast, and in some cases more than six times faster, than average library materials expenditures (p. 5).
The Distance Education Report listed funding as the number one of the top ten challenges in educational IT (Maltz, DeBlois, & the Educause Current Issues Committee, 2005, p. 6), and EduCause Center for Applied Research noted that funding IT is one of the top issues facing academic administrations, but noted that a survey revealed that there has been increasing pressure to reduce IT costs (Goldstein & Caruso, 2004, pp. 1, 5).

Library literature has been recently making a case for the library as a place, though many library resources are largely available online (Bennett et al, 2005; Campbell, 2006; Weise, 2004). Tacit in this argument is the idea that the libraries should provide instructional technology in the form of public computers and complementing technologies in reference rooms, computer labs, information commons, and hands-on classrooms for library instruction.

The most detailed article in library literature on renewable funding for educational technology is Hamblen’s 1968 article, which reported on a survey conducted to determine the funding and to characterize the utilization of computers used for research in higher education by type of institution (p. 257). Unfortunately, the Hamblen article is too old to include instructional technology. Van Deusen (1995) discussed a model for equipment replacement in libraries and, though outdated, has some points that remain relevant to the financial implications of educational technology funding in libraries. Casper and Henry (2001) examined methods for allocating instructional resources within a large, public university, offering a performance-oriented model for resource allocations. Schuyler (2002) noted that libraries would have a “never ending four-year cycle,” were there funding available and procedures in place (p. 46).

“Hands-on classrooms” and “information commons” have become buzzwords within the library community. There are many studies detailing the planning, design, funding and equipping of these spaces. The bulk of library literature on funding for these projects focuses on one-time grant opportunities, student technology fees, and on the architecture and design of spaces for public computers. (Carlson, 2006; Culp, 1999; Downes et al, 2004; Landsberger, Krey, & Moorhead, 2001). Squire (1999), in an article about the University of Northern Colorado’s classrooms, noted that “the ever-increasing amount of electronically formatted information has driven the need for libraries to provide access to these materials and instruction in their use” (p. 25). There is a similar trend in computing literature regarding one-time funding (Hutchinson & Engholm, 2000; Landry & Richard, 2004; Ritschard, 2004).
Ubiquitous computing, as defined by Brown and Petitto (2003) assumed “appropriate online access” for students and faculty (p. 25). Access to information has always been important to libraries but there is often a disconnect in how access is defined by librarians and by administrators. This is evidenced by the lack of a cyclical funding plan for computer replacement in most academic libraries.

There is variance in the number of students with personal computers between different programs, for example, business schools and other technologically dependent departments require laptops for students to enroll in their program, while an undeclared freshman or history major may have no such requirement. Additionally, while the number of students entering higher education with a computer has grown considerably—up to 90% in many universities—the computers themselves are not equal. Students may arrive with older models, outdated software, or computers that are not compatible with educational programs, such as course management systems. A student even could arrive with an excellent desktop but no way to print. Because most incoming students have computers, this has created the idea that all students arrive as ubiquitously equipped. The assumption by university administrators of equity is often inaccurate. Many students still rely on computer labs, information commons and general library computer workstations for up-to-date instructional technology to complete their coursework. In a survey comparing the number of computers in libraries to college full time equivalent (FTE), Malone, Levrault, and Miller (2007) found nine factors unrelated to FTE that influenced library technology decisions. Number one was student ownership of desktop or laptop computer. The authors noted that “very few of our responding institutions required their students to purchase personal computers” (p. 181).

A salient issue that library literature fails to address is cyclic or renewable funding for educational technologies, although access to technology has become central to the mission of higher education. There is a dearth of articles in library literature detailing the financial implications for funding instructional technology. Malone et al (2007) reported the lack of quantitative guidelines for the ideal student-to-technology ratio (p. 181). Allen and Dickie (2007) noted that there are few published studies addressing “funding mechanisms for libraries as a whole” (p. 171). The authors advocated a formula-based model for academic library funding in order to move the funding debate away from traditional arguments of stasis (so
many dollars to maintain inflation, etc.) towards output indicators, the measurement method favored currently in higher education (p. 181).

Libraries are mentioned in funding articles and reports outside of library literature. In an EduCause article, Campbell (2006) argued that libraries have historically provided quality learning spaces and continue to do so, though they are “caught between money and icons” or, that libraries serve multiple purposes, stretching resources to the limits (p. 28). Campbell further noted that there is no consensus among librarians about library services for the future (p. 28). Wierschem and Ginther (2002) noted that the library is a separate entity, technology-intensive, with a broad-based academic support mission including specific, unique technology applications (p. 55).

The importance of reliable educational technology funding is underscored by higher education’s primary clientele: the students. The information access expectations of students today are rising rapidly (Brown & Petitto, 2003, p. 32; Duderstadt et al., 2003, p. 52; Glick & Kupiec, 2001, p. 36). An instructional technology strategy and funding cycle is necessary for universities to remain competitive (Brown & Petitto, p. 32; McCredie, 2000, p. 14; Phipps & Wellman, 2001, p. 9). Students themselves are becoming a force for campus transformation because of technology issues (Duderstadt et al., p. 58).

THEORETICAL MODELS OF CYCLICAL FUNDING

Five key elements emerged in the literature on models of cyclical funding: leadership, strategic planning, collaboration, innovation, and transformation of organizational structure and flexibility.

Leadership

Any program for cyclical funding must have support of key administrators including the president or Chief Executive Officers (CEO), and the governing board (Antolovic’ & McRobbie, 2001, p. 36; Brown & Petitto, 2003, p. 32; Duderstadt et al., 2003, p. 50; Maltz & DeBlois, 2005, p. 17;
Ward & Hawkins, 2003, p. 39). It has been documented that leaders see technology as a key issue for their institution’s success (Phipps & Wellman, 2001, p. 6). A major challenge for campus leaders is IT funding, which consumes the greatest amount of the CEO’s time and energy (Maltz & DeBlois, 2005, p. 6). Glick and Kupiec (2001) argued that IT must be part of all key decisions and that leaders must identify essential goals with clear objectives and specific success criteria (p. 40). Further, administrators must lead efforts regarding personnel, and project prioritization in order to ensure that the climate encourages IT innovation (Goldstein & Caruso, 2004, p. 7; Selleck, 1996).

Teams of leaders from across campus must be developed, including the role of central campus IT departments (Decker & Neas, 2003, p. 13), on-campus early adopters to demonstrate success (Antolovic’ & McRobbie, 2001, p. 38), and leadership from all functional areas and departments (Ward & Hawkins, 2003, p. 39). Ward and Hawkins encouraged leaders to transform the campus perception of IT funding by defining IT in terms of its instrumentality rather than as a cost center (p. 39).

**Strategic Planning**

There are time-tested strategic plans throughout finance literature relative to library administration. Elements of a good technology strategic plan focus first on the institution’s mission (Duderstadt et al., 2003, p. 50; Glick & Kupiec, 2001, p. 40; Goldstein & Caruso, 2004, p. 3; Phipps & Wellman, 2001, p. 10; Strong, 2005, p. 6).

The primary components of a sound strategic plan are (not necessarily in this order):

- perform a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis and environmental scan;
- develop a comprehensive plan, set program objectives;
- build on existing strengths;
estimate the costs of the initiatives, develop a revenue strategies, source wisely, but not the institution’s strategic plan; and

view technology as a source of competitive advantage with transformational potential (Brown & Petitto, 2003 p. 32; Duderstadt et al., 2003, p. 50; Glick & Kupiec, 2001, p. 40; Goldstein & Caruso, 2004, p. 3; McCredie, 2000, p. 17; Maltz & DeBlois, 2005, p. 18; Phipps & Wellman, 2001, p. 19; Strong, 2005, p. 6).

Collaboration

Even with leadership from key administrators on campus, and even with an excellent strategic plan, any campus-wide initiative is not going to succeed without understanding campus politics (McCredie, 2000, p. 18; Ward & Hawkins, 2003, p. 38). Strong (2005) pointed out that there are many tested plans but in order to be strategic “a model must fit well with your institutional culture, work environment, and participant mix” in order to generate enthusiasm and buy-in (p. 5).

Communication and dialog are also important to collaboration. Phipps and Wellman (2001) argued that higher education lacks a common language and recommends using national organizations such as the National Association of College and University Business Officers (NACUBO) to clarify terms (pp. 6, 18). Once a common language is identified, it is easier to share educational technology planning responsibilities and not just entrust the entire issue to IT professionals. Decker and Neas (2003) noted that increased campus dialogue regarding the respective roles for researchers, local IT support, and central IT can assist different departments to find their place in educational funding plans (p. 22). Participation can be increased by new policy measures such as rewarding faculty and building incentives for quality (Glick & Kupiec, 2001, p. 42).

Any type of funding, and now particularly educational technology funding, has political baggage. Some of the issues that hinder collaboration are questions about the disbursement of technology funds, balancing campus constituencies, overcoming faculty skepticism of fads/trends from industry, assuring departments of autonomous funding dedicated to acquiring, upgrading, or replacing computers, and fear of instructional technology

Campus politics can be a barrier even on a small level, let alone in a campus-wide initiative. Davis (2005) conducted a powerful qualitative case study about the implementation of course software at a Research I university. Davis examined what conditions played a role in the success of the courseware and how the success of the courseware affected interdepartmental politics. It is impossible to ignore the “human factors and social arrangements” of interdepartmental and administrative interaction (p. 172). Davis pointed out that knowing how university politics work, especially their implicit, rarely acknowledged aspects, seems essential not only to successful projects but also to the survival of such customarily marginalized faculty as coordinators and media lab directors. (p. 173).

Change can be “destabilizing [to] the traditional pecking order” (Davis, p. 175).

Innovation and Transformation of Organizational Structure

Innovation and transformation were the words in the literature that surfaced consistently when discussing organization and governance redesign. The adaptive organization as suggested by Voloudakis (2005) is focused on strengths and building capabilities to rapidly adapt to changes in customer demand, market dynamics, shifting technology, and other unforeseen events through a continuous developmental process. This process is regenerative and engages campus leadership at all levels to make sound, expedient decisions about the selection and use of technologies (p. 48).

Reorganization can transform efficiency for institutions that seek to understand IT cost-benefit characteristics rather than viewing IT as a just another cost (Duderstadt et al., 2003, p. 48). The rapid evolution of technology, the
unbundling of departmental activities and focusing on the true core competencies can create institutional transformation (Duderstadt et al., pp. 50, 52). Duderstadt also pointed out that technology can be viewed as a campus-wide research and design (R&D) project (p. 54). Talk of transformation and reorganization can make departments skittish.

**Flexibility**

Which educational technology capabilities need to be institution-wide? A degree of flexibility and independence must come along with change. When creating any all-encompassing plan, administrators need to ask if a strategic plan provides enough flexibility to adjust to abrupt changes in the organizational environment. In order to avoid obstacles to policy development, Wierschem and Gintner (2002) pointed to territoriality, individuality in departments and programs, control of funds and resource, fiscal constraints, operational constraints, and timing all as important factors to consider (pp. 55-56). McCredie (2000) urged administrators to set a general direction and broad objective, not detailed operation plans (p. 15).

Some methods to attain flexibility include using the budget cycle to plan for broad spending categories rather than line items, allocating funds for specific priorities over time, and not concentrating on predicting specific technological outcomes (McCredie, 2000, p. 18; Voloudakis, 2005, p. 52). Duderstadt et al., (2003) recommended building layered organizational structures based on broadly held values from the top while allowing diversity, flexibility, and innovation at the level of execution (p. 54).

With flexibility comes responsibility. Campuses should use standard protocols and infrastructure to link together lone departments. Setting checks and balances through students, faculty, and consultants can help institutions to commit to a culture of assessment and a view toward total cost of ownership (Brown & Petitto, 2003, p. 33; Duderstadt et al., 2005, p. 55; Goldstein & Caruso, 2004, p. 7).

Because each institution is unique there is no one single recommendation or policy that can be championed. Each institution must examine these five areas and find the best fit for their campus culture.
FINANCIAL IMPLICATIONS OF FUNDING MODELS

Synthesizing the research on best practices in funding models, five broad financial implications emerge. The maintenance of current systems is the first piece of the financial puzzle of cyclical funding. Second, the rate of return on purchasing instructional technology—whether to make large, less frequent purchases, for example—is a second issue in funding models. Next, method of funding has implications, regarding the use of capital and operating budgets, followed by determining a feasible combination of short- and long-term funding plans is essential. A final piece of cyclical funding is managing assets for funding educational technology.

Maintenance

Perhaps the most revealing piece of information gained from this research is the drain that maintenance has on information technology budgets. Maintenance is frequently not part of the planned implementation strategies. This can result in educational technology not maintained; ensuring adequate local technical support as part of the initial plan is essential. The fiscal implications for unplanned costs directly results in diversion of funds from other necessary areas and wasteful spending. Decker and Neas (2003) delineated the indirect research technology costs, including personnel, technology-specific expenses, such as licensing, facilities costs and sustainability, faculty recruitment and retention, research administration expenses, and expenses related to security (p. 18). Rapid and continuous evolution of technology means budgeting for training and other hidden maintenance costs (Phipps & Wellman, 2001, p. 13; Wierschem & Ginther, 2002, p. 53).

Another factor to be considered in technology funding is that the more technology an institution has, the more they have to maintain. Additionally, maintaining an increasing number of new technologies ties up IT budgets at institutions at all levels (Goldstein et al., 2004, p. 16).

Rate of Return on Instructional Technology

How much should an institution spend on educational technology? The failure to develop reliable methods to measure the institution’s return on
investment in technology is a problem in higher education (Phipps & Wellman, 2001, p. 10). The sky is not the limit, but one financial implication for higher education technology is that limited budgets necessitate purchasing in smaller quantities. This is problematic for a number of reasons, such as deciding who gets the newest technology, loss of compatibility due to multiple, small purchases, and less of a discount on purchases, resulting in a decreased rate of return (Wierschem & Ginther, 2002, p. 53).

Another implication on the rate of return is whether to purchase the newest, the fastest, and the most current technology. Edrmann (2000) suggested investigating and experimenting instead of pushing to buy the newest hardware and software for everyone, and to base purchases of hardware and software with capabilities that are likely to persist beyond the next generational change in technology (p. 48). Other authors agree that the solution is not to move faster. Brown and Petitto (2003) warned to keep the focus on pedagogy, not technology and to wait for others to beta-test new products (pp. 32, 33). Equally unwise is to repair technology past its prime. Wierschem and Ginther (2002) noted that costs of associated with using computing technology past its useful life are prohibitively high in terms of dollars and personnel (p. 53). The implication for fiscally responsible purchasing is not to let technology get too old while not jumping on the bandwagon every time something new comes on the market.

How do you determine when technology has outlived its usefulness? Hawkins, Rudy, and Nicolick (2005) reported that two-thirds of all responding institutions surveyed endorse a replacement cycle of approximately three years (p. 25). Failure to adopt a life-cycle approach to technology budgeting is not in an institution’s best interest (Phipps & Wellman, 2001, p. 6). Antolovic’ and McRobbie (2001) suggested that the best investment is a plan to fund a continuous replacement cycle, subject to the same rules as payroll and other recurring expenses (p. 34).

**Capital and Operating Budgets**

Methods of capital financing traditionally used in higher education do not work well in funding technology infrastructure (Phipps & Wellman, 2001, p. 6). The authors explained how most higher education capital financing is based on two criteria. The first is the predicted life cycle of the investment:
30 years for most buildings, 5-10 years for scientific equipments, and between 10 and 50 years for infrastructure such as electricity, sewer systems, and roads. The second is the expected use of the building for instruction, research, administration, or mixed use. Items with life cycles of more than 10 year generally are candidates for debt-based capital financing (p. 10).

Capital budgets are designed to pay for major, permanent items (land and buildings), or for periodic expenditures (every 10 years or longer) on items that retain or increase value over time. Capital budgets are typically funded through bond revenues. Though some elements of technology may appropriately be built into capital budgets—such as when buildings are built or renovated—a substantial portion of technology costs are operating expenses (Phipps & Wellman, 2001, p. 13).

Technology requires repeated cyclical capital investments; institutions should look to new sources of revenue through capital markets. Noncredit courses, some graduate and certificate courses, continuing education and core service areas could be areas for the formation of for-profit subsidiaries (Phipps & Wellman, 2001, p. 13). Goldstein et al. (2004) identified new revenue sources CEOs were pursuing. The five highest scoring strategies, highest ranked first, were: grants, fund-raising, increased student fees, corporate partnerships, and expanded use of charge-backs (p. 15).

Because technology involves both capital and operating budgets, Phipps and Wellman’s (2001) research suggested a menu of options. Debt financing, for example, bonds and certificates, and so forth, along with vendor arrangements such as discounts, leasing arrangements, and service contracts as ways to raise monies. Other methods of budget management can include leasing arrangement and revolving funds: seed money repaid through revenue or budget savings. User fees, such as technology fees and tuition increases are one method of creating funds for instructional technology, though these can be unpopular with students and parents. E-commerce and other revenue-generating activities; creation of for-profit subsidiaries are becoming increasing important to higher education as state funding decreases. Other organizational and budget techniques—consortia, partnerships, funding though internal recharge systems—are cited by Phipps and Wellman’s as being the most fiscally sound method for funding instructional technology (p. 14).
Short- and Long-Term Funding Plans

Institutions tend to fund technology as an add-on, with new money lashed onto existing programs, relying excessively on bond revenues, year-end savings, and other forms of “budget dust” to pay for technology. Not only does this practice limit the adaptability of instructional technology, it also drives up the cost of technology because it prohibits officials from making conscious choices to use technology as a substitute for labor (Phipps & Wellman, 2001, p. 10). This approach to funding has led to institutions that are unable to keep up with the demands of technology.

Antolovic’ and McRobbie (2001) also discussed the detrimental fiscal effects of short-term funding cycle. Departments are unsure from year-to-year about their technology funding. It wastes time of administrators who must agitate for funds for aging equipment. It distracts faculty from teaching and research, and supporting multiple generations of software and hardware is a burden to IT staff (p. 30). McCredie (2000) urged administrators to disconnect one-time money thrown at technology problems and to create a life-cycle funding strategy, in other words, to accept the cyclical nature of strategy formulation process (p. 16, 30).

Long-term costs need to have a clear financial annual mechanism based on policies to identify needs and match them to appropriate funding streams, for example, student fees, operating budget lines, annuities from technology endowments, and so forth. (Brown & Petitto, 2003, p. 32; Phipps & Wellman, 2001, p. 13). Overall, developing constant communication and creating annual fiscal policies will help to create a self-sustaining financial environment and help institutions to move away from one-time, short-term monies.

Asset Management

Goldstein et al. (2004) identified cost-containment strategies based on what CEOs were considering and planning to implement. The three highest scoring strategies, highest ranked first, were: joint consortia or shared purchases, minimize supported technologies, and implement across-the-board cuts. The three lowest ranked strategies were to cut benefits, layoff staff, and outsource (p. 15). Other authors noted that institutions of higher education fail to establish effective asset-management programs for technology. Additionally, universities are most deficient in the areas of cost
reduction, return on investment, and the paperless office, further evidence that better asset management opens up funding for instructional technology (Glick & Kupiec, 2001, p. 34; Phipps & Wellman, 2001, p.19).

One source in the literature pointed to outside consultants as one way to reduce IT waste in academia. Carlson (2004) argued that disorganization and waste is pervasive in information technology in higher education. Carlson noted that the greatest losses consultants see come from technology that is unused such as trendy programs or software that administrators purchase to compete with benchmark universities for prestige. Next, Carlson cites overpaid, internally promoted staff as a financial drain; though this is a difficult position to support given the low salaries academic IT staffs receive in comparison to IT opportunities in the private sector. Overlap of purchasing between departments, for example, several different departments buying site licenses for the same software is inefficient spending, according to Carlson. The structure of universities partially contributes to overlapping purchases. The lack of a central authority—the anarchistic organizational model common at colleges and universities—contributes to wasteful spending. Colleges and universities differ from business models in their purchasing practices due to the collegial organizational structure that involves more meetings, committees, and politics than the corporate environment. Consultants recommend viewing IT from the broader perspective of a university’s mission, development of pedagogy and curriculum. Only after establishing institutional priorities should technology planning begin (Carlson, p. 35).

Ten strategies to contain educational technology costs can be found in the literature from financial experts. The first is to match revenues with specific components of technology. Next, create a method for standardization across departments to increase cost benefits. Use consortia or shared purchases to decrease spending. Outsource when financially advantageous; never outsource work for which that the institution already employs specialists and/or experts. Create policies for purchasing, leasing, and vendor relationships that frequently do not exist in print. Shop around for vendors instead of renewing contracts out of convenience. Negotiate with vendors regarding equipment repairs and replacements instead of signing a ready-made contract drawn up by the vendor. Do not sign long-standing agreements; the cost benefit of loyalty to a business no longer exists. Last, retrench by implementing across-the-board cuts (Brown & Petitto, 2003, p. 33; Goldstein & Caruso, 2004, p. 5; McCredie, 2000, p. 19; Maltz & DeBlois, 2005, p. 18; Phipps & Wellman, 2001, p. 19)
Conclusion

Roles for different campus constituencies arise when looking for financial implications, including roles for administrators, information technology staff, faculty, trustees, and consultants. Other financial implications relate to organizational structure, research in Research I universities, and politics. Bringing these different roles together into one discussion illuminates the different political lenses applied to technology on campuses and ameliorates some of the barriers to a fiscally responsible instructional technology plan.

Educating stakeholders as to the value of strategic, flexible, cyclical, funding for educational technologies is essential. Although environmental scans and reviewing the literature can be a great help, making administrative financial decisions for instruction technology is based on the unknown. Educational technology has grown exponentially in the last ten years. Will technology stay at a stasis point for years ahead or will technology continue to change at the rapid pace established in this decade? Developing long-term funding plans precludes institutions from knowing exact future costs. Convincing governing boards and legislatures that a projected technology budget without specific line items will be difficult: strategies must be developed to accomplish this task. If administrators are to consider cyclical funding for technology, they will have to educate their stakeholders that an airtight plan for information funding is next-to-impossible.

Administrators must consider who is driving educational technology change. Critics have decried that higher education has allowed Wall Street to dictate not only the pace of technological change but also the content and pedagogy of what is being taught. Administrators must communicate to stakeholders that, by following a strategic plan based on institutional mission, business partners will begin to base products predicated on the needs of higher education. Higher education driving technological change is one way to support cyclical funding for instructional technologies. The varying roles of different campus constituents can work together to implement technological transformation. For example, higher education has been a strong supporter of open source technologies, benefiting not only academia but also the public at large.

The financial implications for cyclical funding of educational technology echo five key elements of leadership: strategic planning, collaboration,
innovation and transformation of organizational structure, and flexibility. These leadership elements coupled with best funding practices create the backbone of sound fiscal models for higher education. Synthesizing the literature, best funding practices include planning for maintenance, carefully calculating the rate of return, using capital and operating budgets appropriately, stepping back from short-term and developing long-term funding plans, and managing assets.

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