

**FEATURE**

## Academic technology: The convergence of diverse disciplines

*Academic technology encompasses many disciplines and professional fields. While this diversity can lead to an exciting variety of perspectives, it can also produce conflicts in philosophy and differences in terminology. This article examines the major professions and organizations associated with academic technology in higher education. Colleges and universities seek to maintain and improve support services while faced with increasing demands for technology expertise. Understanding the convergence of diverse disciplines related to academic technology and the cross-purposes among their professional organizations might help avoid "turf wars" and lead to fruitful opportunities, partnerships and increasingly important collaborative ventures.*

**P**eople come to academic technology from a broad range of disciplines and professional areas. While this diversity can lead to an exciting variety of perspectives, it can also cause frustration when people are faced with conflicts in philosophy and differences in terminology.

Academic technology administrators as a professional group are not well defined or distinctly bound. In order to provide an understanding of this applied field, this article examines the professional areas and well-known organizations associated with academic technology in higher education.

This article begins by defining the fields associated with academic technology. Following is a review of the professional fields of library and information science, information technology, and instructional technology. The next section explores the well-known academic technology organizations. Finally, the article ends with a brief overview of the cooperation and competition among the professional fields and organizations.

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### **Academic technology defined**

Each discipline or applied field has its own history and terminology. Despite its own emphasis, most fields of study overlap in some ways with other areas. These commonalities can stimulate useful partnerships and cooperation, but they can also spur jealousy and “turf” battles. This situation is increasingly true within the area of academic technology. This applied field includes elements of information science, information technology, and instructional technology.

### ***Information science***

Information science is an all-compassing field that overlaps with both computer science and librarianship. While computer scientists are interested in the study of information related to the transmission, manipulation, storage, and presentation of these data, librarians primarily focus on the application of computers to data retrieval, including the identification, description, manipulation, storage, retrieval, and use of representations of knowledge or information (Buckland, 1999).

### ***Information technology***

Information technology is a broad field crossing many disciplines. Unlike instructional technology that focuses primarily on teaching and learning, information technology encompasses many areas inside and outside education. For example, librarians view information technology as a subset of information science. Business professionals view information technology in the realm of networking and data processing.

Information technology has also been defined as the science and practice of using computer and telecommunications systems to gather, store, apply, and transmit information (*Longman dictionary of contemporary English*, 1987). This last definition matches most closely with the departments for information technology areas in higher education. These units may include administrative computing, academic computing, electronic library services such as online databases and catalogs, campus telecom-

munications, and networking. Albright (1995b) observes that “when information technology is brought to bear on the processes of teaching and learning, it is instructional technology, but the vast majority of information technology is not instructional technology” (p. 4).

### ***Instructional technology***

Instructional technology is defined as the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (Seels & Richey, 1994). Ely (1998) noted that many attempts have been made to study the nature and scope of educational technology under a variety of names. According to Reiser and Ely (1997), the term educational technology is the broad term and is often used as a generic descriptor to include instructional technology, educational media, learning technology, and other variations.

### ***Academic technology***

For the purpose of this article, the term academic technology is used as an umbrella term to describe the design, development, utilization, management, and evaluation of processes and resources for teaching and learning in higher education. The word academic was selected because it is most generally associated with higher education and connotes teaching and learning. The word technology encompasses information, traditional media, computing, and telecommunications.

Albright (1989) developed a model that reflects the broad mission of academic technology in higher education. The model identifies seven basic functional areas that appear on most college and university campuses. These include: 1) learning resources collections for faculty and student use; 2) classroom technologies, including campus-wide media equipment distribution and classroom support; 3) media development, defined as the systematic design and production of instructional materials; 4) instructional and faculty development consulting services to help faculty integrate technology; 5) academic computing services supporting



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computer use in teaching and learning; 6) instructional telecommunications, encompassing what is now known as distance learning; and 7) research and evaluation services such as course evaluation and test scoring.

### **Academic technology foundations**

Many fields of study and professional organizations are associated with academic technology. Although some educators assume that academic or educational technology is a recent development, it has a long, continuous history dating back to ancient times (Saettler, 1998). Ancient Greeks defined technology as a system of practical knowledge not reflected in a particular hardware. This distinction between the process and the product of technology is the foundation for the field and the reason it has endured through the development and implementation of many types of hardware and software.

The origins of academic technology can be found in the overlapping fields of library and information science, information technology, and instructional technology. Following are short histories of each area.

#### ***Library and information science in higher education***

Library and information sciences have a long tradition in higher education. Before digital data and high-speed Internet access, academic libraries focused mainly on books and other print publications as the major source of information. As film and other non-print resources became popular, many academic libraries sought professional media librarians to organize and maintain their non-print media collections as well.

According to Duderstadt (2000), one of the most rapidly changing functions of a university is the preservation of knowledge. Those involved with academic technology play a central role in this function. The digital convergence of various media, from print through virtual reality, will have a tremendous impact on universities. The library has traditionally been the intellectual focus for the university. Today digital representations of this information



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can be distributed anywhere, anytime. The library and other university service organizations have become a facilitator of information retrieval and dissemination ("Books, bricks, and bytes," 1996).

Technology has had a tremendous positive impact on academic libraries (Hardesty, 2000). However, with digital information becoming available virtually on-demand, some people are questioning the need for academic libraries in higher education. This issue has come to the forefront as higher education institutions seek accreditation for distance education programs. Hardesty points out that the question of whether a physical library is needed depends on the learning outcomes associated with a course. At this point, digital collections are not generally complete and permanent enough to substitute for the traditional library. Because of such considerations, Hardesty concludes that traditional academic libraries and the services of librarians are still vital for students in obtaining the benefits of a college education.

### ***Information technology in higher education***

The foundations of information technology are associated with the emergence of early campus computing programs. Four distinct stages can be identified in the history of information technology and management (Marchand, 1985). Before the 1950s, the focus of information technology was the physical control of data. In the 1960s, automated information systems emerged. In the 1970s and 1980s, the focus was on information resources management. Converging computing and communications technologies, exploding amounts of data, and increasing investments in information technology characterized this period. It set the stage for a shift from an operational focus to a strategic one emphasizing how information technology contributes to an organization (Penrod, Dolence, & Douglas, 1990). Finally in the 1990s, the focus switched to knowledge management, including content and how it is used and valued.

Today, whether designing the information architecture of a single Web-based course or planning a campus-wide streaming video program, the goals of the academic technology and information technology areas are strongly connected.

### ***Instructional technology in higher education***

The past 75 years have seen many changes in education, society, and the profession of instructional technology (Ely, 1998). For many, the introduction of film into the classroom marked the beginning of instructional technology as a major force in teaching and learning. According to Kerstetter (1998), film brought the world into the classroom. Documentaries, slow motion, time-lapse photography, and dramatizations helped students understand themselves and their world.

With the National Defense Education Act of 1958, funding became available to train media specialists and conduct media research. This recognition of the field led to the development of job functions still used today, including instructional systems, instructional development, and instructional management (Association for Educational for Educational Communications and Technology, 1977).

Today, computers have become the dominant factor in the field of instructional technology (Ely, 1998). According to Charp (1997), computers began as an object of study and were used to teach programming. More recently education has shifted to a focus on all technologies, not just computers. Also, the emphasis has become the use of technology as a tool for the representation and manipulation of information (Molnar, 1997). Technology is being used to expand educational opportunities through complex data handling, distance learning environments, and real-time, global, inquiry-based learning.

The history of instructional technology in higher education has paralleled that of the more general field. Eidgahy (1991) identified four main areas of technology services in university media centers: traditional audiovisual support, telecommunications, innovative educational support, and computers.

According to Albright (1992), until the 1960s large, centralized media centers held the monopoly on technology-based instructional support services. The evolution of instructional and information technology brought major changes to college and university media centers. As academic libraries focused on growing

the interest in digital information formats, academic computing departments emerged as the leaders in computer-related services. This has led to an unprecedented period of change. Some departments have embraced change and nurtured collaborations with other campus units. However, other organizations have floundered, hanging on to traditional technologies and dated management approaches.

### Academic technology professional organizations

Out of these three overlapping fields have come many professional organizations. The following national organizations are most strongly associated with academic technology: Association for Educational Communications and Technology, Consortium of College and University Media Centers, and EDUCAUSE.

#### *Association for Educational Communications and Technology (AECT)*

The National Education Association (NEA) founded the Department of Visual Instruction (DVI) in 1923. Its focus was the shift from 35mm to 16mm educational films (Zenor, 1998). Although the name has changed several times, the Association for Educational Communications and Technology (AECT) evolved from this early organization. The mission remains the improvement of the teaching and learning process through the systematic integration and application of technology into the curriculum. This professional association views technology as process. According to the AECT Web site (2003), "technology is interpreted as process, not merely in terms of hardware, but in terms of learners and their relationship to the people, events, places, and things through which they learn."

Members come from a wide range of areas including schools, colleges, government offices, business, and industry whose responsibilities include study, planning, application, and production of communications media for instruction.

With thousands of members, AECT has seven special-interest divisions that focus on topics such as design and develop-

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Association for Educational Communications and Technology (1977). *The definition of educational technology*. Washington: Association for Educational Communications and Technology.

ment, distance learning, media and technology, and research and theory. For example, the Information and Technology Management group shares information and provides leadership in the management of resources, people, facilities, process, and services in educational media, technology, and information.

AECT sponsors a wide range of publications and often collaborates with other groups and organizations. For instance, AECT has been involved with a number of the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) grant projects. In addition, they collaborated with the American Library Association on development of the *Information power* publication (1988, 1998) that focuses on school library media programs.

Besides books, white papers, and conference proceedings, AECT publishes two journals. *TechTrends* provides resources for leaders in education and training, while *Educational Technology Research and Development* focuses on research and development in educational technology.

### ***Consortium of College and University Media Centers (CCUMC)***

In 1971, the Consortium of University Film Centers (CUFC) was founded as a collaboration of university film libraries. In 1988, the organization became CCUMC. The current membership of over 500 represents all sizes of higher education institutions that provide media and instructional technology support services, as well as companies providing related products (CCUMC, 2000b).

Many of the professional issues have changed over the past three decades, but the needs of media center personnel have remained the same. Although the technology has changed, access to information, equipment, and facilities that support teaching, learning, and services have remained their primary focus (Kerstetter, 1998).

CCUMC is a professional organization "whose mission is to provide leadership and a forum for information exchange to the

providers of media and technology support for quality teaching and learning at higher education institutions" (CCUMC, 2000a). The Consortium advocates the accessibility and effective use of educational media. In addition, they provide leadership in the development of standards for effective implementation and management of instructional technology in higher education. Other priorities include fostering cooperative efforts among organizations, gathering and disseminating information, developing programs and services to the profession, providing professional development opportunities, and coordinating research and scholarship.

Membership in the CCUMC organization differs somewhat from other professional organizations. Institutional members are individuals representing their institution's technology support unit(s) (CCUMC, 2003b). Membership fees are based upon the numbers of individuals covered within a college or university. There are other membership categories as well; these include persons from corporate and commercial entities, government, public libraries, and students. However, the majority of members in CCUMC are higher education institutional members.

CCUMC began publishing the *College & University Media Review* in spring 1995 (Albright, 1995a). CCUMC also publishes a newsletter and the proceedings of its conferences (now annual), sponsors occasional teleconferences aimed at the professional development needs of its member institutions, maintains a Web site presence, and runs an electronic listserv for its participating members. CCUMC often collaborates with other organizations to sponsor professional events and advocacy activities such as the *Fair Use Guidelines for Educational Multimedia*, which were finalized as part of the Conference on Fair Use in 1996.

### **EDUCAUSE**

The history of information technology in higher education can be traced within two major professional organizations—EDUCOM (Interuniversity Communications Council) and CAUSE (College and University Systems Exchange). Formed in 1966, EDUCOM was dedicated to the idea of sharing ways that comput-

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ers could be used in higher education. It focused on the human goals of education, rather than the “gadgets.” With a grant in the early 1980’s, the organization created the groundbreaking system, Because It’s Time NETwork—or BITNET) providing e-mail connectivity for higher education. With the growth of campus networking and the widespread use of microcomputers in higher education, EDUCOM quickly doubled its membership. In the late 1980s, the group began focusing on issues such as intellectual property in electronic formats and equal access to software for instruction (Heterick, 1998).

CAUSE grew out of a users group at the College and University Machine Records Conference (CUMREC) in 1962. In the early 1980s, it began co-sponsoring an annual institute on computer literacy with EDUCOM. In addition, the organization began using the term information technology instead of information systems when describing its mission (Ryland, 1998).

Ongoing discussions between CAUSE and EDUCOM led to a consolidation in 1998. The new group, EDUCAUSE, was the result. The mission of EDUCAUSE is to help shape and enable transformational change in higher education through the introduction, use, and management of information resources and technologies in teaching, learning, scholarship, research, and institutional management. The broad focus of EDUCAUSE is comprehensively stated as “advanc[ing] higher education by promoting the intelligent use of information technology” (EDUCAUSE, n.d.-a). Each year the organization conducts a survey to explore current issues facing the profession and posts these results on its Web site.

Membership in the EDUCAUSE organization includes institutions of higher education (including systems), corporations serving the higher education information technology market, and related associations and organizations (state agencies, nonprofits, etc.) (EDUCAUSE, n.d.-a, n.d.-b). Each EDUCAUSE member institution is entitled to identify a number of participating representatives based upon their membership dues that are dictated by full-time equivalent enrollment. Today, EDUCAUSE membership

includes over 1,900 colleges, universities, and educational organizations plus another 180 corporate members.

EDUCAUSE publishes a number of books, monographs, and periodicals, many in electronic form. The main journals are the *EDUCAUSE Quarterly* and the *EDUCAUSE Review*. EDUCAUSE is also involved with several annual professional conferences, seminars, and institutes.

Besides the organization's publications and conference activities, the EDUCAUSE Web site offers a forum for sharing ideas and resources. In addition to providing short papers and reports, the Web site encourages its membership to participate through contributing job postings, project descriptions, and participating in forum discussions.

### Competition and cooperation: A brief history of cross-purposes

Parallel development can be seen within the fields and organizations described, while they also show overlap in missions and activities. This has led to both competition and cooperation. For example, in the late 1960s and early 1970s competition emerged between school librarians and educational media specialists over school leadership in the use of media in schools. This dispute led to partnership between AECT and ALA on publications such as *Standards for school media programs* (1969) and *Information power: Building partnerships for learning* (1988, 1998). In the 1980s, a similar territorial dispute arose between library media specialists and computer specialists. Today, other groups including distance educators, curriculum specialists, and information specialists have staked claims to portions of the academic technology field.

Territorial issues become heated on many campuses. For example, information technology specialists are often concerned with maintaining high levels of system security that causes frustrations for instructional technology specialists who envision virtual classrooms with open areas for electronic discussions, document sharing, and collaborative networks.

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Organizations seem to be aware of such overlapping purposes and concerns. For example, the Association of College and Research Libraries Media Resources Committee (ACRL, 1999) developed a set of guidelines for media resources in academic libraries. In this document the Committee acknowledge that within the library, the boundary between media collections and services, and computer software collections and services, has blurred. They also noted that academic librarians are working closely with other agencies on campus to support faculty and student information needs.

When examining the Web sites representing the CCUMC and EDUCAUSE organizations, it is useful to note the similarities in focus. The CCUMC Web site lists current topics regularly presented at CCUMC conferences—including new technologies, copyright issues, multimedia and hypermedia, distance learning, media collection management, applied media research, the changing role of media, diversity issues, budget management, instructional facilities planning and maintenance, instructional media production, and professional ethics (CCUMC, 2003a). Because EDUCAUSE has a much broader focus than CCUMC, their topic coverage extends further into the allied areas of information technology. However, in general EDUCAUSE's concerns are often similar—including funding, faculty development, distance education, e-learning environments, staffing, strategic planning, and online services (Gandel, 2000).

The activities of the two organizations also overlap, as can be determined from their Web sites as well. For example, CCUMC has produced a videoconference on the topic of technology integration and accessibility in the classroom. As noted earlier, in 1996, CCUMC provided leadership in the development of "fair use" guidelines for educational multimedia, and it produced videoconferences on this topic as well. EDUCAUSE sponsors an extensive range of comparable professional activities on similar topics.

The concern of "cross-purposes" among professional organizations with interests in academic technology is a significant one for the future of the field. Albright (1995c) identified an excellent example of the problems that can result. In 1995, the Higher Education Information Resources Alliance (HEIRAlliance) devel-

oped updated guidelines for information technology. HEIR-Alliance consisted of EDUCOM, CAUSE, and the Association of Research Libraries. Although media centers have been promoting similar guidelines for decades, the “guidelines regarding instructional technology that are most likely to reach [university] presidents’ desks and be read and taken seriously have come from an organization representing the academic computing, information technology, and academic library communities” (Albright, 1995c, p. 42). Besides a lack of representation, media services directors should be concerned about the absence of the term instructional technology when such guidelines are rooted in these other fields.

Although many of the encounters of overlapping professional organizations seem to have resulted in positive outcomes, this may not be the case in the future. With the increasing costs of travel, fewer people are attending multiple regional, national, and international conferences. Profits from conferences are an important revenue source for professional organizations. They are experimenting with ways to increase their funding through programs such as streaming videoconferences and online professional development courses. They also seek ways to differentiate themselves by providing new services such as online publications.

Many academic technology professionals began their careers with the surge of technology in the 1960s and 1970s. As more of that generation retire, membership could suffer and overlapping organizations could begin to compete more vigorously for the next generation of professionals in the still-changing academic technology field.

### Conclusion

The academic technology area encompasses varied professional perspectives. The Appendix shows some of the relationships. With increasing pressures for accountability, tightening academic budgets, and competition for limited resources, many campus units are being faced with consolidating services and merging facilities. Although these circumstances are likely to cause conflict, they also present an opportunity to open dialogue

Spring Conference, Point Loma Nazarene College, San Diego, CA.

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Ryland, J. (1998, September). *CAUSE: Notes on a history*. Retrieved February 2, 2001, from <http://www.edu->

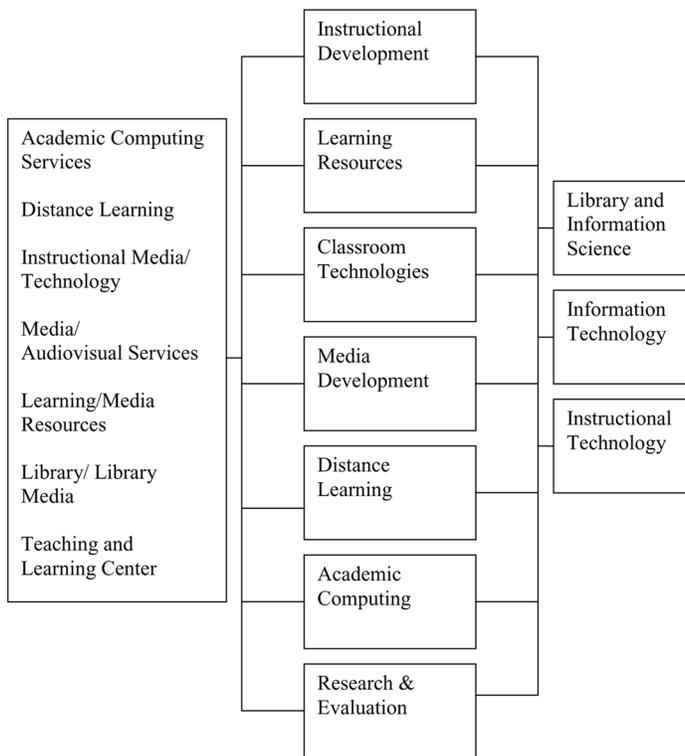
among organizations with a shared vision related to academic technology.

Colleges and universities are searching for ways to maintain and improve support and services while faced with increasing demands on technology expertise. A major dilemma involves the kinds of organizational structures and academic support units that are needed for optimum support. How can the best of the technology support and services perspectives be offered? And faced with limited human and fiscal resources, where should the priorities be assigned? These are questions that must be address by all of those staff involved with academic technology on university campuses. ■

**Appendix**

***Academic Technology Units, Functions, and Fields***

| Common Unit Names | Seven Functional Areas* | Academic Fields |
|-------------------|-------------------------|-----------------|
|-------------------|-------------------------|-----------------|



\* (Adapted from Albright, 1989, fig. 1)

cause.edu/pub/chistory/chistory.html

Saettler, P. (1998, January/February). Antecedents, origins, and theoretical evolution of AECT. *TechTrends*, 4(1), 51-57.

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