

**Innovative Practices in Provisioning IT Services at
the University of Texas at Austin***

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***This document is based on observations made by ITAC members in 2006-2007 and
2007-2008 site visit documents and inputs provided by Technology Deans of various
Schools, Colleges and other units on the UT Austin campus.**

1. Introduction

Provisioning of innovative Information Technology (IT) services within an academic campus entails both the *efficiency* with which such services are provided and the *value* such services may generate for users (students, faculty members and administrators). This document is a compilation of instances of innovative practices observed by Information Technology Advisory Committee (ITAC) members during their site visits to various Schools and Colleges within the UT Austin campus during 2006-2007 and 2007-2008. In preparing this report, we also sought extensive inputs from Technology Deans of various units on the UT campus.

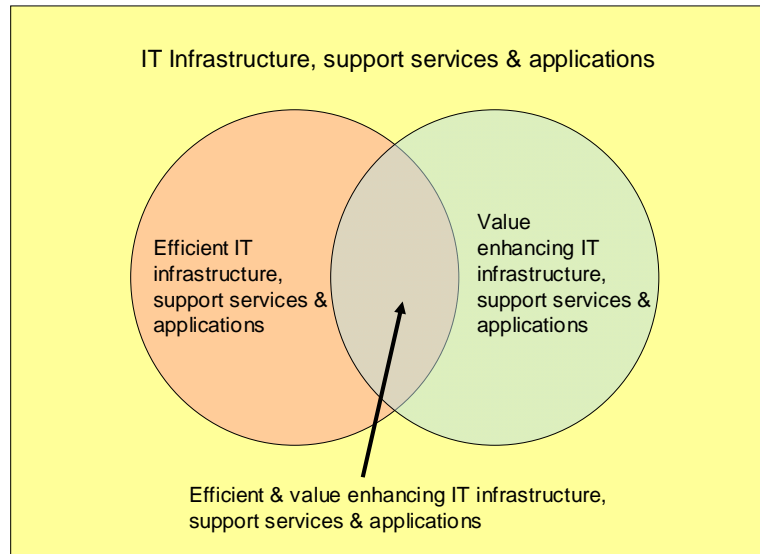
With a rapid decline in IT prices, the demand for IT resources and services continues to climb at an astonishing pace. However, IT budget constraints limit the range and quality of services that can be provided to users. IT resources are scarce in any organization (especially non-profit). It is therefore imperative that cutting-edge innovative practices emerge in the efficient provisioning of IT services to meet teaching, research and administrative goals of a major University. Efficiency results from factors including the shared use of resources, increased utilization, automation, and outsourcing of routine functions.

While efficiency is a key criterion in assessing IT services, the ultimate measure of success of any technology infrastructure, support service or application involves the users themselves. For example, the effectiveness of an IT application may be indicated by actual usage, satisfaction and the extent to which such applications enable users to accomplish their objectives in pedagogical endeavors. During the course of site visits to various Colleges, Schools and units on campus, the ITAC members uncovered many cutting-edge practices on both the efficiency and user value fronts. In order to classify innovative practices on the UT Austin campus, it is helpful to deploy a conceptual framework (shown in the diagram below) that considers both efficiency and value in provisioning IT infrastructure/support services as well as IT applications.

Examples of efficient provisioning of IT infrastructure and support services may involve partnering between schools to provide common storage facilities and shared help desk services. Similarly, instructional technology applications designed in-house in a flexible and scalable manner, may, in certain cases, be more cost efficient than commercially available software packages. Ensuring uninterrupted availability of classroom technologies is an example of IT infrastructure and support services creating value for students and instructors alike. Applications such as online Q&A services for students, recording live lecture sessions, and enhanced access to course content create value for students by enriching their learning process.

Efficient services need not be low on value. In fact, an ideal IT service is one that is efficiently produced and one that also creates high value for users. In the balance of the document, we provide examples of efficient IT services as well as those that create value for students and faculty members.

A Framework for Assessing Innovative Practices in Provisioning of IT Services



2. Efficient management of resources to provide IT infrastructure, support services and IT applications

Two set of efficient practices are described below. One involves innovation in sharing human resources, while the other is related to tracking of IT resources.

2.1 Shared provisioning of IT infrastructure and support services

2.1.1 Providing efficient Help Desk services through partnering

IT Help Desk services are a vital yet labor-intensive service with little scalability. Providing high quality Help Desk services requires a large number of personnel who are skilled in a variety of areas related to computing. This requirement poses a major challenge for Schools and Departments with a small number of IT staff members. The College of Fine Arts explored an innovative idea of directing routine requests for help to the ITS Help Desk, with the notion that the Fine Arts Help Desk would focus more on providing “on-site” assistance for complex problems. This approach seems to have worked very well, for during the last few years, the volume of calls handled by the Fine Arts Help Desk has reduced by seventy percent, enabling consultants to spend more time on difficult problems that require a more hands-on approach. This strategy of channeling

help requests based on a classification of routine versus exception cases appears well-suited for small- and medium-sized Colleges and Schools on the campus.

The idea originated after discussions between the College and the (then) new ITS Help Desk manager, John Hunter. He was visiting colleges and departments to introduce himself, and to learn how his department could address the needs of the campus. The College of Fine Arts discussed the idea of combining efforts, and over the next few months decided to try out the combined-effort approach. After working out the initial “bugs” in the process, the College of Fine Arts saw an overall decrease in the number of support calls that the staff had to handle directly, and noted a marked decrease in the number of complaints about the Help Desk service. Over the last few years since the implementation of this collaboration, the Fine Arts help staff size has not increased (still about 2.5 FTE). While it is sometimes a struggle to address all needs (e.g., new machine deployments, SSN remediation project), the help staff can generally meet college support needs as a result of this partnership.

2.1.2 Partnering between Schools/Colleges to provide infrastructure services

The College of Fine Arts is focused on providing faculty and staff members with secure storage capabilities, and is participating in a Common Storage Area Network project with 15 terabytes of storage capabilities with administrative funding. Storage bays have been added, and licenses have been purchased to serve the needs of Fine Arts. Additionally, IT staff members within Fine Arts have written scripts to manage directory services. Technology Dean Jim Kerkhoff’s office is also working to educate users about safe and efficient storage of content on this network.

As of this writing, the College of Fine Arts is in deployment on this project. Anticipating that new data security measures would be required as a result of recent legislative action, Jim Kerkhoff’s office began looking for secure online storage facilities to work in concert with College systems and desktops. The College of Communication had purchased a large Storage Area Network (SAN), and because of a drop in price, been able to purchase more capacity than it required to meet its needs. After a brief negotiation between the two Colleges, it was agreed that Fine Arts would participate in the project and contribute some additional hardware and software to “piggy-back” on the College of Communication effort.

The main goal of the initiative is to provide some amount of secure, backed-up storage for bulk departmental use and faculty and staff desktops. Currently the system is used to back up some College and Departmental servers (mostly administrative use). Using the campus Active Directory (maintained by ITS) and Apple “Open Directory” (faculty and staff machine population is largely Mac-based in Fine Arts), scripts have been written that automate the process of deploying about 2 gigabytes of storage to participating faculty and staff. The scripts also implement (for the first time in the College) some basic “rules” that enforce, for example, user logon before network access. The same system will also provide some virtualized server capacity. The College expects to reduce

the number of physical servers and substitute the more cost-effective and more easily-managed virtual server instances.

The College of Engineering has been instrumental along with the School of Business and College of Communication in creating the foundation for a “virtual server infrastructure”, which can be a prototype for the entire campus for a distributed data center model. These cooperative endeavors are meeting the business needs of the academic units in a timely and affordable fashion. The increasing visibility and success of this initiative to provide storage and virtualized computing capability have led ITS to offer a set of services to the campus at large, which will help propagate these types of services to various Schools/Colleges. These innovations help drive down the cost models in place both within the academic units and ITS. The cost-benefit comparisons, generally shared amongst the Technology Deans and then with ITS, are informative and compelling.

2.2 Efficient IT equipment reservations/inventory management

At the College of Education, the Learning Technology Center (LTC) developed its own equipment reservations/inventory system after researching various commercial software packages. These were very expensive, and none completely suited the College’s needs. The LTC initially employed student application developers to create its Web-based applications. The student workers created high quality applications at a very reasonable cost. However, since the reservation system is critical to the LTC’s services and must be maintained and improved over time, in 2006, the LTC transitioned to a full-time application developer. Faculty and students can easily access the application to reserve any of the LTC computer labs or media production suites, any of the equipment available for checkout, the Distance Learning Classroom, the Al Kiva auditorium, and the Cissy McDaniel Parker Dean’s Conference Room. Users can also request delivery of equipment to classrooms. Users receive an email acknowledging receipt of their request, and later another email to confirm or deny the request. The system tracks each piece of equipment available for checkout and some of its features are used as part of the LTC equipment inventory system. While online IT equipment and facility reservation systems are available throughout the UT campus, the innovative aspect of the LTC system is its “one-stop” nature that enables users to reserve a wide array of resources from a single web site.

3. Creating value for end users of IT infrastructure, support services and IT applications

We have classified innovative practices in value creation into four categories – (i) Enhancing the student learning experience through innovative applications & services, (ii) creating cutting-edge IT infrastructure for pedagogy, and (iii) providing faculty support for innovative teaching and research, and (iv) tracking metrics to assess usage and user satisfaction.

3.1 Enhancing the student learning experience

3.1.1 Providing enhanced access to course content

The College of Natural Sciences makes live recordings of lecture and related materials in a large auditorium (WEL 2.224, a 500-seat room). No human intervention is required, and there are plans to expand the scope of this project to other auditoriums. This recording consumes 40 Gigabytes of hard drive space per course. The equipment costs about \$15,000 per auditorium. With the consent of instructors, the audio and video (including lecture materials) of select courses are being recorded and made available to students over the Web within 24 hours. This automated recording approach appears to be well-suited for large Schools or Colleges, where scalability is the key to a successful initiative. In fact, the College of Natural Sciences now has five auditoriums in Welch Hall, which are equipped with automated recording systems. This service is used heavily by students, and the College hopes to add another four auditoriums in 2008 contingent on the availability of sufficient funding.

We recognize that the automated nature of the recording process may not work well in all settings. For example, in certain cases, a live recording of a class session may require more of a production approach, and smaller Schools/Colleges may use a human specialist to do the recordings. Regardless of the mode (automated or manual) in which the recordings are made, providing recorded lectures and class content enriches the student experience by enabling him/her to revisit each session of a course. While there is some concern about recorded content acting as a disincentive to attend lectures, the posting time can be delayed to counteract this scenario.

3.1.2 Increased access to instructional technologies for all students

The Accessibility Institute is among a small group of entities on academic campuses around the nation that are engaged in the pursuit of improving the accessibility of various instructional technologies for all students. Particularly noteworthy is the way the Institute brings together faculty members, IT developers, webmasters and students with disabilities to transform its research into day-to-day applications. The research at the Institute is facilitated by a student web accessibility team that points out real issues and problems that disabled students face in using online instructional resources. For example, the student team has evaluated 99 instructional sites and gathered data on (i) sites that passed or failed accessibility guidelines, and (ii) non-compliance issues.

3.1.3 Increasing accessibility of digital and digitizable resources on campus

The Digital Archive Services (DASe) is a collaborative project between Fine Arts, Liberal Arts and General Libraries, which seeks to unify the collection, cataloging and serving of digital media across the campus. This project is related to the Knowledge

Gateway initiative at UT Austin, which aims to provide “access for every citizen ... into resources of our libraries, collections, museums and much more.” For example, Fine Arts has included its Virtual Resource Center collection of 500,000 image records in the DASE project. Digitizing over 17,000 physical objects housed in the Blanton Museum of Art will make them accessible to the entire campus as well as the public at large. The College of Fine Arts is considering several instructional collections to bring under the auspices of the DASE project.

The Digital Archive Service (DASE) continues to grow and improve in capability. A negotiation is currently in progress to move stewardship of the production version of DASE from Liberal Arts to the University Libraries. Liberal Arts will continue development of the application, but the production version will benefit from University Libraries expertise and resources.

A more automatic process has been developed for setting up and administering collections. This will make it possible for collections to be moved into the DASE environment more rapidly, thus speeding up adoption of the application. Along these lines, agreements have been reached to actively start moving the Blanton Museum collection online during the summer of 2007.

The UT Libraries score high on digital services. For example, the Table below shows electronic resources available at UT libraries as well as ranks among 114 academic research libraries in 2004. Over several past years, the UT Libraries have concentrated on electronic publishing, digital collection building, access control, resource description (metadata) and platform management. Founded in August of 2002 as part of the Digital Library Services Division of the University Libraries, the Digitization Center provides digital reformatting services to the library's archives and collections, the University of Texas at Austin community, as well as to others who may have interest in high quality digitization services. The Metadata Services group works in conjunction with the Digitization Center to plan, design and implement metadata strategies for both the Libraries and the University community at large. In addition, the Center coordinates the capture, maintenance and preservation of metadata in order to facilitate the discovery, preservation and management of digital objects.

Electronic Resources, 2004	Rankings Among all 114 Academic Research Libraries, 2004
E-books - 80,000 volumes	Volumes Held 7 th
E-journals - 12,000 titles accessible	Serials Purchased 43 th
E-Journals in full-text databases - 30,000+ titles	Monographs Purchased 16 th
Avg. weekly library web sessions - 16,000,000	Reference Questions 11 th
No. of Web databases 230	Circulation 2 nd
Articles in the Science Direct database- 7 million	Faculty Supported 13 th
Database/e-journal items viewed \$ 1.5 million	Students Supported 2 nd

Source: <http://www.lib.utexas.edu/admin/cird/statisticaloverview2005.html>

3.1.4 Distance learning services

The Learning Resource Center (LRC) within the College of Pharmacy has offered an innovative, interactive distance learning facility on the UT campus for more than 20 years. This system features two-way and multi-point digital video teleconferencing transmission of core courses between the UT Austin campus and the UT Health Science Center in San Antonio, UT PanAm in Edinburg, and UT El Paso. This capability enables faculty members to teach students at up to four locations simultaneously. At the discretion of the faculty member involved, a course can be videotaped and recorded to a DVD and made available for checkout in the Jaime N. Delgado LRC. The content is also available as streaming video on any computer on campus, and with a broadband connection from off-campus locations.

The LRC maintains and supports three distance learning classrooms in the College of Pharmacy. The largest classroom accommodates 136 students and provides desktop power and Ethernet connections at each seat. A state-of-the-art microphone system allows viewers at the distance site to see and hear individual students as they speak. There are three remote-controlled cameras in the room which can be controlled from the interactive teacher's console, which also provides controls for lighting, audio and auxiliary equipment. Students view the distant site, as well as any computer presentation provided by the instructor, on two 6 ft x 8 ft screens. The medium-sized videoconferencing classroom seats fifty-five, while the smallest room, a conference room facility, seats approximately twenty. Additional information on this facility can be found at <http://www.utexas.edu/pharmacy/general/facilities.html>.

3.1.5 Testing services

The College of Natural Sciences runs a homework service which involves a database with over 50,000 questions and answers. Students can bring up problems to solve and check their answers against entries in the database. This service is available for both students and faculty, and is useful for courses involving structured knowledge.

This project originated in the Physics department over ten years ago. Students in Physics, Mathematics, Chemistry, and Biology now use the service extensively. The College is currently investing \$50,000 to have a major new release of the software written, which is expected to be ready for testing in Fall 2007. This project is funded by student fees.

3.1.6 Facilitating student-instructor interaction in classrooms

A best practice involving student-instructor class interactions is the adoption of a standard "student response system" by the College of Natural Sciences, which allows faculty to ask questions in class and obtain immediate feedback from students. Natural Sciences adopted a system from eInstruction, and made it available in 54 general purpose classrooms. Students purchase response pads (often called "clickers") at the Co-Op, which they can keep and use throughout their studies at UT. The classrooms are equipped with receivers and software for the system.

3.2 Creating cutting-edge IT infrastructure

3.2.1 State-of-the-art IT infrastructure for maximizing pedagogical experience

Classrooms and labs in the College of Engineering have many cutting-edge technologies, including high bandwidth wireless access, Tablet PC and PDA based access to learning resources, digital whiteboards, and secure communications/services. Studio classrooms are fitted with dual monitors, which are used for CAD presentation by faculty. Use of Tablet PC got a boost with 26 machines being given to faculty members through the Computer Life Cycle (CLC) program and supplementary funding from the faculty members or their departments. Pilot implementations for wireless Tablet PC based faculty presentations are currently in progress.

The College has hired staff dedicated to the primary purpose of maintaining information technologies in nearly 60 classrooms within the Engineering buildings. This approach has reduced core technology costs for traditional items such as the teaching podium and invest/leverage other sources of funding to improve the classroom tools and resources for faculty and staff. Grants, from companies like HP, also paved the way to prototype and deploy significant technologies such as a pervasive wireless infrastructure early in the advent of the wireless technologies on this campus.

The College of Engineering has also pursued some novel initiatives that enhance the student learning experience in a cost-efficient manner. One such initiative named ELVIS

(with National Instruments) enables students to engage in rapid prototyping of electronic circuits, which results in the efficient use of space and time.

The EDS Financial Trading and Technology Center at the McCombs School of Business is a state-of-the-art trading, research, and teaching facility. Its mission is three-fold: to (i) assist students, faculty, executives and the community to better understand the growing flow of financial data and to manage the impact of that flow on financial markets, (ii) enable users to participate in the development of new applications of information technology to finance, and (iii) to provide technology resources and technical support for the AIM Investment Center, the Center for Energy Finance, Education, and Research, The Hicks, Muse, Tate & Furst Center for Private Equity Finance, and the Center for Real Estate Finance. The activities of the Center include trading by MBA students, teaching and research.

Trading

A portion of the EDS Trading and Technology Center is home to the MBA Investment Fund. Graduate students manage three multimillion-dollar funds from the Center's trading and boardrooms. These facilities emulate a professional money manager's work environment. Student managers rely on the same data feeds, software and video conferencing capabilities as their Wall Street counterparts. More information on the fund can be found at <http://www.mcombs.utexas.edu/AIMCenter/AppInvMan/index.asp>

Teaching and Research

Academic activities supported by the Center included classroom instruction, videoconferences, special presentation/events, data-feed workshops and simulation trading games. A focal point for finance programs at both the MBA and undergraduate level, the Center also serves as a laboratory for the creation of innovative teaching techniques applied to all levels of education.

Cutting-edge audio-visual and distance learning systems are integrated into the three-room, 3,000 square-foot complex. Through its technologically sophisticated classroom, faculty can adapt their pedagogy to the latest educational tools including an interactive blackboard and a high-resolution video projector. With its video teleconferencing capability the Center is an active participant in distance learning programs. Faculty and students have access to real-time data feeds from leading providers of financial information: Bloomberg, FactSet and Reuters. These data flows can be used by undergraduate and graduate students in a wide variety of classes ranging from finance classes on portfolio management to information impact management courses on the financial applications of information technology. The Center also supports teaching and research in areas such as advanced financial modeling and financial risk management. In addition community outreach programs continue to be an important part of the Center's focus. More information regarding the Center can be found at <http://www.edscenter.utexas.edu/>

As part of its ongoing effort to keep pace with industry practices, the McCombs School of Business runs an advanced laptop program. A major goal of this initiative is to keep students abreast of the latest in networking technology—and to increase their productivity. Through the SWAT Shop, McCombs students also have direct access to a computer services team trained and equipped to solve their specific computing problems in-house and on the spot—allowing students to focus on fixing a business problem, not a broken laptop. The School has created the infrastructure in the classrooms and labs so that students would have places they could use their laptops and to provide services (like network storage) that made it more valuable. It also meant that students expected faculty members to bring technology into classes, since they wanted to see their investment in a computer maximized. The most significant aspect of the laptop initiative, today, is service, especially on-site repair and support the School can provide to program systems.

3.2.2 Ensuring uninterrupted availability of classroom technology resources

The College of Liberal Arts employs a large number of student assistants who check technologies in the classrooms before classes begin each day. LAITS has contracted the services of these students to smaller colleges on campus. The student assistants gain valuable hands-on experience in dealing with various technologies.

The technology classroom user support groups in Natural Sciences and Liberal Arts serve faculty from across the University teaching in general purpose classrooms in Natural Sciences and other colleges. For example, the College of Natural Sciences takes care of the classrooms in the Jackson School of Geological Sciences. Hiring students to check the equipment in all the rooms every morning before 8 a.m. constitutes a best practice in ensuring uninterrupted availability of technology resources.

In the McCombs School of Business, there is a red telephone in each classroom that immediately connects a faculty member with a support person who can fix a classroom IT problem. McCombs Tech Dean David Burns feels that another best practice involves removing computers from the classrooms themselves and having faculty members bring their own. Mr. Burns notes that computers in the classroom represent a significant source of problems, and that it is far easier to have faculty bring their own (which they already know how to use and know if it is working) or supply them as needed (check-out from Media Services) than to try to have a general use machine available in a classroom.

3.2.3 Improving security and rapid response to breaches

The College of Education has developed network security policies that enable the College to provide fast response to security breaches, reduce the impact of virus attacks, systems vulnerabilities, and hacking incidents. They are the foundation of the College's response procedures to security breaches, and are designed to reduce the number of security incidents on the College's data networks. Four major components of the policies are:

- 1) Registration of all College of Education computers;

- 2) A centralized computer authentication system;
- 3) Approved settings for operating systems; and
- 4) Administrative access.

Registration. All COE computers must be registered with the Learning Technology Center's (LTC) Technical & Network Services (TNS), so that they are aware of and have information about every computer connected to the network. The Media Access Control addresses of each computer, along with the name and contact information of its users are compiled into a regularly updated database. The database provides the tech team the information they need to quickly locate and respond to security breaches, such as rogue servers and other compromised computers. The TNS also uses special techniques with the College's DHCP server to ensure that any offending computers that try to connect to the network receive non-routable IP addresses. This prevents the computer from reconnecting to the network and compels the user to contact TNS technical support to resolve the problem.

Centralized Computer Authentication System. Complex login passwords (containing a combination of letters, numbers, or symbols and at least eight characters long) are extremely effective at keeping computers secure, and are at the heart of the security policy's centralized authentication system. All College computers capable of running at least Windows 2000 or Mac OS 10.3.3 are configured to verify login credentials with a centralized system using complex passwords, and a new server for this function was installed when the policies were implemented beginning in 2004. Beyond increasing security, the system allows departments to more easily share resources because the same login and password can be used on any computer on the network.

Approved Settings for Operating Systems. Technical and Network Services must approve the settings of operating systems and other network-capable software on all COE computers. They have created a basic security configuration "template" and set up all computers they maintain with this configuration. This measure prevents computers from running as servers, unless there is a valid need and the tech team has been informed in advance. It also ensures that all computers are running up-to-date anti-virus software.

Administrative Access. The system configuration settings also give Technical & Network Services administrative access to all University-owned networked computers, but the security policies protect users' privacy by strictly limiting the conditions under which the access can be used. The tech team generally accesses a computer only at the request of a user, such as during the resolution of a malfunction or other help request, or to install operating system updates or patches. They will investigate a computer's suspicious activity if it could lead to network degradation or violates University policy or the law, but only with permission of the user, or the Director of the LTC, or an associate Dean of the College. Users are informed when their computers have been accessed, and a log of all administrative access use is kept and available for review.

The policies also call for Technical & Network Services to develop a list of devices approved for use on the network; any device not listed must be approved first. Finally, the policies forbid the sharing of login information with those not authorized to use the

College network. To view the entire College of Education Computer Network Security Policy document, go to <http://www.utexas.edu/education/policy.html>.

The McCombs School has a security officer as part of the IT support team, and his/her job is to help develop practices, policy, and procedures for both IT users and the support team. The School has worked to develop a “positive and proactive relationship” with the University Information Security Office, including purchasing equipment to allow them to apply the same monitoring tools they use campus-wide to the McCombs School local network.

3.2.4 Training students and faculty to make best use of instructional technologies

Given the rapid rate of IT innovation, it is critical that students and faculty receive regular training opportunities to be aware of the capabilities of new IT applications. The McCombs School of Business provides a significant number of training opportunities for students throughout the year. Three staff members conduct a summer orientation for all undergraduate and graduate students on specialized topics (e.g., Excel, Outlook, web polishing) each year. They also conduct an orientation for faculty to familiarize them in the use of IT services. Further, faculty members are encouraged to join special classes during the semesters to hone their knowledge and skills regarding various IT applications. All through the year, the IT group communicates with users regarding upcoming training sessions.

The McCombs IT training team makes a great deal of content available online for users to access as needed. Having a training team also means that the School has the opportunity to interact with users when they are not having a problem, and when they are engaged in a positive way with the technology. This enables the IT group to see opportunities and dependencies, as well as places to improve things. The training team is also a great resource to determine how a problem or change would affect users because they get to see, more than others, how people are actually using their tools.

The college of Education is at the frontier of providing faculty support with IT staff members who have content area expertise. The Learning Technology Center’s (LTC) IDEA Studio provides technology integration support for faculty in the College of Education who wish to improve their teaching and research effectiveness through the use of technologies such as digital media, specialized software, and online resources, applications, and collaborative environments. In addition to offering regular technology training opportunities, the IDEA Studio consults with faculty to help them identify or design learning activities and plan technology-infused syllabi. The IDEA Studio provides classroom training for students working on technology assignments, so that faculty can include these types of projects in their courses without having to worry about teaching the necessary technology skills themselves. The IDEA Studio also helps faculty prepare technology related project proposals.

The IDEA Studio is staffed by a full-time coordinator who holds a PhD in Instructional Technology, two part-time Curriculum and Instruction graduate students with expertise in instructional technology and learning theory, and a part-time student associate skilled in Web development and graphic design.

The number of faculty who use technology in their teaching and research has steadily grown since the inception of the IDEA Studio in 2000. Faculty members are encouraged to explore the use of technology simply by knowing that expert assistance is readily available. They know that IDEA Studio staff will listen to their specific needs and goals and help them determine the best approach. The nature of their work with the IDEA Studio has also evolved. As faculty members have become more proficient at using technology, the focus of training has shifted from technical support to curriculum integration support. Assignments that may have begun as “make a Web page” now explore issues of equity in history and social studies education. iMovie projects have become fully curriculum-embedded examples of digital storytelling to support media literacy.

Student Technology Training in the College of Education. Students in the College of Education have many opportunities for technology training. Much of the training focuses on technology fundamentals, and plays an important role in the Laptop Initiative for Future Educators (LIFE). This key technology program in the College, in which preservice teacher education students are required to have a laptop computer, trains future teachers to effectively integrate technology into their own K-12 teaching. When students begin the program, they attend a three-hour orientation on how to use the laptop and its prescribed set of software. A Laptop Help Desk is available in the LTC to provide help with both hardware and software problems and questions. These students also have access to online software tutorials at Atomic Learning (<http://www.atomiclearning.com/>) and a huge library of instructional videos at United Streaming (<http://www.unitedstreaming.com/>). Students in other programs can visit the Laptop Help Desk to receive assistance with software use, and they can purchase Atomic Learning accounts at a reduced rate. All students can arrange for orientations in the Learning Technology Center on how to produce and present a wide variety of multimedia.

Other student training in the College is more closely related to specific curriculum. The IDEA Studio offers in-class training that aligns closely with the learning goals of the assignment and occurs on a just-in-time basis. Faculty in all programs in the College can request training of this kind, and the content of the sessions spans from common tasks such as video editing, to more specialized offerings like using optical character recognition software to collect data from archives.

3.3 Faculty support for innovative teaching

The Faculty Innovation Center (FIC) in the College of Engineering provides media, faculty and instructional development services with the purpose of supporting excellence in Engineering education. It is supported by student fees. HP is a major sponsor of the

FIC Studio facility. Ford Motor Company provides support for distance learning classrooms in Engineering. To enhance innovative teaching and learning within the College of Engineering, the Faculty Innovation Center (FIC) provides resources to support the "signature pedagogies" used to deliver engineering instruction. These "signature pedagogies" (a term defined by Lee S. Shulman of The Carnegie Foundation for the Advancement of Teaching) are specialized forms of instruction appropriate for engineering students. The FIC provides a full range of services to enable exceptional engineering education including faculty development, media creation, distance learning, and technical support.

In the early 1990's, an instructional media lab was established in the College to support faculty's use of instructional technologies. Ten years later, as these tools became more ubiquitous, along with a nationwide push to enhance engineering education, the College moved to expand its instructional technology capabilities. With a grant from HP, the media lab evolved into the Faculty Innovation Center, a full service shop with 10 full-time staff providing expertise in instructional design, assessment, multimedia development, video production, project management, distance learning, systems administration, animations, and faculty development.

The FIC reaches into each of the departments and offers a wide variety of services. For example, when new professors arrive on campus, they participate in a discipline specific orientation offered through the FIC and they continue receiving support with monthly seminars. Faculty members who want to enhance their classes with instructional media work have access to a highly skilled and creative development team in the FIC. This year's IITAP award will showcase an exemplary FIC project developed on building mass and energy balances with two civil engineering professors.

Not only does the FIC help to produce instructional projects, but it has staff trained in evaluation and assessment to help revise and improve these efforts. Engineering professors want to measure what works and they come into the FIC to get assistance in finding out what is working in their classes. Many of the faculty members then share these findings at conferences or in publications. Additionally, the FIC has an award-winning video production team and maintains distance learning facilities for the College. For examples of FIC projects and papers go to www.fic.engr.utexas.edu. Across campus there are units similar to the FIC that represent the diverse requirements of different disciplines. By offering discipline specific support, the FIC is best able to meet the instructional needs of engineering professors and students. The key to a successful operation like the FIC is support from the Dean and policies that support faculty instructional improvement endeavors.

At the College of Education, the support team in the Learning Technology Center's IDEA Studio helps faculty members find and use technology tools in innovative ways. The IDEA Studio staff stays abreast of emerging technology trends and the research on their effective use in educational settings so that they can best help faculty develop a strategy that meets their curriculum goals. Much of the work of sharing innovative practices takes place through simple word of mouth and ongoing informal recruiting

efforts by the IDEA Studio staff, but peer showcasing and teaching are also important dimensions of the College's approach to disseminating innovation. Faculty training offerings often include a demonstration of outstanding projects and practices and an opportunity for faculty to help train their peers.

While the IDEA Studio's general approach to supporting pedagogical innovation emphasizes a "do with" instead of a "do for" approach, the Learning Technology Center recognizes the need for development to support innovation. Faculty with ideas for innovative educational uses of technology that do not call for an extensive development effort can approach the IDEA Studio for help in setting up and implementing the application. Recent examples include forays into weblogs, podcasting, and small-scale implementations of content management systems to support student learning outside of the classroom.

For larger projects, faculty can apply for a Vision Award. The Vision Awards is a critical element in the College's efforts to produce innovation in teaching with technology. The program was initially funded by ITAC, and has since received additional funding from the College of Education Dean's Office. Originally, the program paired a faculty member with a proposed project with 200 hours of a student worker's time to produce technology resources. A modified model of the program was implemented in 2005-2006. The Vision Studio was established, providing faculty members with support from a skilled team of three 0.50 FTE developers, including a programmer, Web developer, and videographer. This team approach brings a wider array of expertise to each project and allows resources that are developed to be used in more than one project. Two rounds of funding in the 05-06 academic year supported a total of 16 projects. Projects have resulted in a number of highly successful products, including a Web-based team learning application, video case-based literacy tutorials, and an online assessment system that has been shared with other universities. The quality of Vision Award projects was recognized this year when two of the six 2006 Innovative Instructional Technology Award winners were Vision Award projects.

Innovative Projects in the IDEA Studio. Innovation in the College is currently focused on examining the uses of video conferencing and electronic portfolios in teacher education. The teacher preparation program's laptop initiative makes these especially suitable topics because all student teachers and recent graduates have Apple laptop computers and iChat AV to support video conferencing. With support from the IDEA Studio, faculty have developed a wide range of educational applications for the technology, including remote classroom observations of preservice, new, and master teachers; remote conferencing for student teachers located at a distance from the university; and live virtual fieldtrips and exchanges for children. The ePortfolio system, with an anticipated rollout in September 2007, is the result of three years of research, testing, and piloting. The initial implementation will allow COE students to store lesson plans and projects and track their progression through the professional development sequence. The system also has an easy-to-use Web page creation tool that will allow students to organize, reflect, and share what they have learned. A three-tiered account management feature will allow students to share their portfolio with potential employers

while avoiding the dangers of posting images of children on the open Internet. The system will be available to every student in the College.

The LTC and the IDEA Studio also support faculty research on the use of technology in educational settings. One past project on the use of digital storytelling in social studies education was highlighted in *The Chronicle of Higher Education* and produced an article published in *Action in Teacher Education* in Summer 2006. See Appendix B, “Enlightened Political Engagement Deep in the Heart of Texas: Teaching for Democracy and Developing Digital Documentaries” for a detailed account of this project. Current research projects include an exploration of the use of content management systems to provide multi-featured forms of support for learning outside of the classroom. The LTC is also playing a key role in the development of the University of Texas Autism Project by supporting the design and development of a series of online components to raise public awareness of the disorder, support parents and families, provide video case-based learning for online teacher professional development, and a video tool for remote consulting to schools.

3.4 Metrics to track usage and satisfaction

Statistics Gathered on Technology Resources and Services. The College of Education’s Learning Technology Center tracks statistics for most of the resources and services it provides. Statistics gathered include information about technical help requests; account statistics for FirstClass, the College’s groupware system; use of the College Web server and number of pages on the College Web sites; data network security incidents; logins and reservation requests for computer labs; checkout of multimedia equipment, such as projectors and digital camcorders; usage of media production areas and the Distance Learning Classroom; and IDEA Studio activities.

The gathering of this type of information has developed over a number of years, and in the beginning, usually involved the manual counting of paper records. Several years ago the LTC developed, and continues to expand and refine a Web-based application for computer lab and equipment reservations and inventory tracking, so it is now easy to generate statistics on the usage of these resources. A broad range of statistics can be tracked, from how many times a piece of equipment has been checked out to how many devices of one type are checked out at any one time. The statistics help staff perform timely lifecycle equipment maintenance and replace older equipment. The statistics also allow LTC staff to forecast future needs for devices that may be in high demand and help identify technologies that are declining in demand, so that resources can be shifted to higher demand technologies. The LTC has also purchased some Web-based applications like Web Help Desk for tracking statistics on faculty/staff technical support and Laptop Help Desk usage. These statistics help determine the best staffing levels for these services.

4. Conclusion

Based on our site visits and inputs received from Technology Deans, we observed some common themes across innovative practices on the UT Austin campus:

- i. Sharing of IT resources to provide services in small or medium sized Schools/Colleges in an efficient manner.
- ii. Assessment of IT requirements in a collaborative fashion between various constituencies.
- iii. Initiatives for enhanced online access to all educational resources for all students.
- iv. Emphasis on measuring usage of IT resources and user satisfaction.
- v. Creation of cutting edge-infrastructure in classrooms and focus on increased availability.
- vi. Training in the latest IT applications.
- vii. Programs to encourage IT innovation in teaching and research.

This document provides a starting point for an ongoing exercise in assessing efficiency and value-enhancing practices related to IT on the UT Austin campus. Such an initiative enables each School or College to learn about best management and use of IT resources on campus, and to assess whether to adopt or adapt similar practices in their own units. However, going forward, we must address certain areas of IT innovation as outlined below.

We did not come across significant initiatives that harness the power of Web 2.0 and social networking for pedagogical purposes. Such technologies provide interesting opportunities for collaboration and teamwork, and may be especially appropriate for certain Schools and Colleges. We did, however, observe enthusiasm over Second Life, a 3-D online world, in some academic units. As noted by the Division of Instructional Innovation and Assessment (DIIA) at UT Austin, applications such as Second Life can provide an unprecedented platform for collaboration, role playing and distance learning, and both faculty and students should be encouraged to assess the suitability of such technologies for their learning environments.

There is also a need for academic units to have mechanisms not only to foster innovation in teaching, but also to help scale up such innovations to be deployed in larger settings. For example, from our interviews with Tech Deans it was evident that there are many innovative practices involving individual instructors and courses, but that processes are not in place to ensure that such practices become known to a wider audience for potential adoption and diffusion.

We must also benchmark ourselves with peer academic campuses around the nation and the world to determine the relative IT intensity in pedagogical and research endeavors at UT Austin, and undertake initiatives that keeps us on the frontier of IT deployment and usage among institutions of higher learning. While we have documented some innovative practices involving the measurement of IT usage, we must also develop and track

additional metrics related to IT spending per student and faculty, as well as the cost of various IT and related services.