Chapter 1: Educational Technology

Innovative uses of technology in support of learning and teaching can be found across the entire CU-Boulder campus. From the creation of web-based teaching modules to in-class technology use, faculty are using technology judiciously and effectively to improve both instruction and student learning.

Even as the use of technology in learning and teaching increases, support of it remains fragmented, and largely uncommunicated to the faculty who would benefit from it. This chapter provides recommendations for a broad array of educational technology support and services, and recommendations for better coordinating and communicating them.

Data from 2000 and 2001, as well as from focus groups and spring 2002 data collection efforts associated with this strategic plan indicate that there are several discrete (but overlapping) facets to educational technology. Understanding these facets is prerequisite to providing the most effective constellation of support and services for the use of technology in instruction and research. Our conception of educational technology on the CU-Boulder campus includes the following components.

1. Course Content: Although course content is not a facet of educational technology per se, it is the crucial component. All aspects of educational technology support and services must link back to it.

2. Primary Purpose of Educational Technology Use:
   a. Most faculty members use technology to improve or facilitate course organization and management, by putting syllabi on a course website, or by projecting PowerPoint slides instead of using an overhead projector and transparencies. In this type of use, there are few or no changes in teaching practices, which are merely translated to new media, often with increased efficiencies. Several types of support are available to faculty using technology in this way: production and design support for basic website development, facilities and equipment support in the classroom. Learning Management Systems support also facilitates this use of educational technology.

   b. Some faculty members use technology in ways that require instructional design support. That is, they change their teaching practices in response to possibilities offered by current and emerging technologies. For example, a faculty member might create an interactive, 3-D java applet to demonstrate a scientific principle that earlier could have been visualized only statically or two-dimensionally. Some refer to this as accommodative use—faculty enhance their teaching by making changes, sometimes radical, to their teaching practices as they exploit the full potential of new and existing technologies. Production and design support also can play a role in this type of use if digital media is a component of this type of educational technology use.

   c. Any use of educational technology requires thoughtful integration of content, pedagogy, and technology to be effective, which necessitates a close working relationship between units and programs that provide educational technology support, and those that provide faculty and graduate student development.

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2 Recommendations about commercial digital resources, the acquisition of which may be more cost-effective than a full-array of on-campus support and production, can be found in section 1.6, Digital Content and Collaboration.
3. **Equipment, Facilities, and Faculty Skills**: This “nuts-and-bolts” facet of educational technology also requires support, and training. Faculty, and all instructors, need a minimum skill set to bring technology into their teaching: they need to have at least some skill in using hardware and software, as well as the equipment in technology-enhanced instructional facilities. Beyond the minimum, faculty either need a full array of support (such as production and design, instructional design, and facilities and equipment mentioned above) or a full array of skills, which often take an unacceptable amount of time, money, and effort to acquire (time, money, and effort that further detract from other professional activities that are rewarded in tenure and promotion processes, as use of technology in teaching is not).

The types of support that should be provided at CU-Boulder for effective and broad use of educational technology include:

1. Instructional Design
2. Media Production
3. Learning Management Systems
4. Facilities and Equipment

Support can come in many forms: traditional help-desk or desktop support, short- or long-term consulting, and training. Currently, many units on campus provide one or more types of support with little understanding among them of which unit does what, for whom, and with what effectiveness. All support and training for educational technology must be closely integrated with existing faculty and teaching assistant development programs. The campus should also continue to provide educational technology services, for cases in which a faculty member or a department prefers to have a service unit complete work in support of teaching or research endeavors, for the production of media, for example.

The theme of this chapter is the need for coordination to provide effective, efficient, and broad services and support for all educational technology uses. Several sections of the chapter are clearly related to this theme:

- Educational Technology Support
- Technology-Enhanced Instructional Facilities
- Learning Management Systems
- Digital Content and Collaboration
- Libraries

Two other sections fall into this chapter by virtue of their academic status (I/IT Literacy and Fluency), or of their reliance on similar services and support structures (Research Computing).

In addition to reflecting on the recommendations put forth in this chapter, the campus also must consider the possibility of incentives for faculty use of educational technology in teaching and research. This includes examining how educational technology use fits into salary, promotion, and tenure reviews, and what resources the campus makes available to help people incorporate educational technology.
1.1 Educational Technology Support

Recommendation: The campus should establish a well-communicated and well-coordinated model to provide both high-level support for instructional design and advanced technological and pedagogical innovation, as well as basic-level support for the use of educational technology in course content and/or course management and organization.

The campus also should establish a centralized, online source of information for faculty and a process of communication with faculty, instructors, and student users about educational technology and the resources available for its support.

Discussion of the Recommendation

Current Situation

Support and training for the use of educational technology is provided by several units on campus: ITS, through its Distributed Academic and Campus Technology Coordinators (DACTCs), Bug Busters, and Media Services units; the Libraries; the Faculty Teaching Excellence Program (FTEP); the Graduate Teacher Program (GTP); and the Program for Writing and Rhetoric (PWR). Although there is some overlap in the services each of the units provides, there is little knowledge among the units of respective services offered, and less knowledge among faculty and student users of how the support pieces fit together. In addition, little attention has been paid to fully integrating support and training for educational technology with faculty and graduate student development in the areas of instruction and pedagogy.

In fall 2001, CU- Boulder continued a series of steps to determine its academic goals, priorities, and needs in the broad area of educational technology. A committee of faculty and staff convened to establish a vision for the campus’s use of educational technology. That committee recommended that the campus establish a coordinated support model to provide both high-level support for instructional design and advanced technological and pedagogical innovation, and basic-level support for the use of educational technology in course content and/or course management and organization. The committee’s visioning document can be found at http://www.colorado.edu/Committees/itc/etsp/usesvision.html. This section is a continuation of that visioning work.

Rationale

Across higher education, there is an increase in the use of educational technology in teaching and learning. From course websites to the use of digital media, instructors are using technology as a tool to streamline course management and to produce innovations in learning and teaching. With this increase in the use of educational technology comes a responsibility on the part of institutions to provide adequate support for an increasing number and variety of users.

The campus’s educational technology support model must be coordinated better and communicated better to provide the current and future support needed by faculty, instructors, and students. All three groups need easy access to information about the resources available for educational technology, the infrastructure within which they can use these resources, the projects

3 See http://www.colorado.edu/Committees/itc/etsp.html for information about ongoing educational technology strategic planning.
their colleagues are pursuing, and the support staff who can help them make the most of these opportunities.

**Specific Recommendations Include**

- Continue to coordinate support for the undergraduate student use of educational technologies through the existing Libraries-ITS-PWR partnership. Train staff in Libraries and PWR labs to handle simple, common IT issues and to be familiar enough with the 4-Tier ITS support model to be able to make the appropriate referrals for other technical questions.
- Coordinate, and possibly co-locate, ITS and Libraries media services units.
- Assess the DACTC-FTEP faculty liaison model, and improve communication between DACTCs and FTEP to strengthen DACTC-faculty/department relationships.
- Assess possibilities for increased DACTC-GTP collaboration.
- Assess and formalize DACTC roles as new memoranda of understandings (MOUs) are written between ITS and the campus’s schools and colleges. Take steps to ensure that the distinction between DACTC and desktop support, classroom/lab support, and server support personnel roles and responsibilities are clear and respected. MOUs will formalize, but not standardize, DACTC roles, and will continue to provide local control and local tailoring of DACTC roles and responsibilities.
- Continue the trend of moving support services (e.g., desktop support, classroom/lab support) closer to faculty users, and possibly add desktop support and/or classroom/lab support representative(s) to existing DACTC-graduate student teams.
- Develop a communication plan and centralized source of information to improve faculty, instructor, and student understanding of educational technology resources and support available on campus.

**Steps**

**Implementation**

- Convene a small group of Libraries, ITS, and PWR representatives to create an IT training model for staff in Libraries and PWR labs, and to develop an integrated model to provide both lab-specific and general IT assistance to students using those labs.
- Convene a small group of Libraries and ITS staff to investigate the roles of ITS and Libraries media services units and to recommend a model for the consolidation and/or coordination of those units.
- Facilitate ITS and FTEP discussions to strengthen DACTC and faculty/department relationships.
- Facilitate ITS and GTP discussions to understand possibilities for DACTC-GTP collaboration, and to understand graduate student teaching assistant support and training needs.

**Required Involvement**

**Governance & Authority**

The Office of Academic and Campus Technology will provide coordinating authority for the support of educational technology.

**Required Departmental Involvement & Responsibilities**
Campus-wide involvement is needed for effective support of educational technology. Service units that provide support will be responsible for sharing information and coordinating their services as necessary.

Libraries, ITS, and PWR will work closely to create and implement an integrated IT training model for Libraries and PWR labs staff. Libraries and ITS will work together toward efficient and effective media services. ITS and FTEP will work toward strengthening the DACTC program. ITS and GTP will work toward understanding graduate student teaching assistant needs and roles. The Anderson Language Technology Center (ALTEC) should be included in discussions specific to the needs of foreign language faculty, instructors, and students.

**Expected Costs**

**Annual IT Infrastructure Investment**
None.

**Operating and Maintenance**
None.

**Personnel**
If any, reallocation of existing staff to provide increased levels of desktop support and classroom/lab support. For desktop support specifically, there is the possibility of an addition of 6-10 desktop support personnel to work on DACTC teams. The composition of those teams, which may include instructional design and production support provided by DACT Coordinators and others, will be determined by the MOUs with schools and colleges.

**Funding**
Desktop support and classroom/lab support funding would come from ITS general funds, with additional departmental and/or campus funding as necessary, and, in the case of departmental funding, viable.

**Timing**
- Finalize departmental-ITS MOUs to formalize DACTC roles in schools and colleges by fall 2002.
- Develop a model for IT support in Libraries and PWR labs by spring 2003.
- Determine consolidation and/or coordination of ITS and Libraries media services units by spring 2003.
- Begin ITS and FTEP discussions about DACTCs fall 2002.
- Begin ITS and GTP discussions fall 2002.
1.2 Instructional Facilities

Recommendation: The campus should make effective use of its existing technology-enhanced instructional facilities through more effective scheduling. The campus should designate some ITS-supported computer labs as part-time teaching facilities, and formalize the process for scheduling instructional activities in these specific labs.

To provide reliable, widely available technologies that can be adapted to a variety of teaching and learning situations, the campus should enhance support for technology-enhanced facilities by locating support in proximity to the facilities, and by tailoring the support to the needs of faculty users. The campus also should continue its efforts to identify, plan for, and fund the renewal and replacement needs of technology-enhanced instructional facilities.

Discussion of the Recommendation

Current Situation
The campus has approximately 150 centrally-scheduled classrooms that have some level of technology enhancements. There are several dozen more such instructional facilities that are “owned” and maintained by departments. The recommendations in this section concern centrally-scheduled classrooms only.

Demand for technology-enhanced teaching facilities is growing, and little funding exists to convert traditional classrooms into “smart” classrooms (that is, technology-enhanced instructional facilities that have Internet connections, projection, and other media capabilities). Maintenance and support for smart classrooms are funded with one-time budget requests and from ITS’ classroom renovation account.

The campus also has over 60 ITS-operated computer labs that are funded, in large part, through student technology fees. Although there is a high level of student computer ownership (now approximately 95% for incoming first year students), the need for these labs may remain constant in the coming years. Student computer labs are used because of their convenience and specialized software; some are used on an ad hoc basis as instructional facilities. The campus has not increased the number of student labs in the past several years, and there are no plans to do so in the coming years.

Support for computer labs and computer classrooms is mainly provided by ITS through the Microsystems Group (MSG). Support for centrally-scheduled smart classrooms is mainly provided by ITS through the Classroom Support group. In a limited number of instances, that support is provided by ITS staff located in proximity to the facilities (e.g., in the Humanities Building); otherwise, little support is provided in proximity to technology-enhanced facilities.

Training for faculty to learn to use smart classrooms, labs, and computer classrooms is provided formally only in the Humanities Building. Other training for these purposes is ad hoc.

Last year, the campus undertook its first comprehensive inventory of all—central and departmental—classrooms to determine which facilities had technology enhancements. The Office of the Associate Vice Chancellor for Academic and Campus Technology spearheaded the effort, with significant work completed by ITS and the Instructional Computing Working Group
(ICWG). In addition to that comprehensive inventory, ITS has completed a more detailed analysis of the facilities it maintains, and has begun to assess renewal and replacement needs and costs for them.

The campus’s continued funding for the renewal and replacement of technology-enhanced instructional facilities is inadequate, and there is no reliable, ongoing source of support for this need. While renewal and replacement for labs is funded from student technology fees, that of classrooms is not. Faculty are generally not involved with strategic decisions about the technologies that are needed in instructional facilities, or about moveable technologies that might enhance the capabilities of bare-bones classrooms (those with no technology enhancements).

Rationale
The demand for technology-enhanced instructional facilities is growing and will likely continue to grow. Faculty at CU-Boulder increasingly rely on laptops, projection and sound systems, VHS and DVD players, and other technologies to bring media content into the classroom. A smaller and growing group of faculty are teaching classes in computer labs or classrooms and devoting class time to individual student or group work at computer workstations. Anecdotal evidence and some survey data suggest that, while technology-enhanced teaching facilities are in high demand, campus use of them is not efficient. Faculty who need the technology in instructional facilities have no priority over those who do not; therefore, the technology in such facilities is seldom used to its full potential. Furthermore, faculty who need the technology for only a small percentage of their class meeting times must reserve a technology-enhanced facility for the entire semester.

Some faculty members use student computer labs for teaching purposes. However, this use is not formalized, and the standard configuration of the labs does not lend itself to instructional purposes.

Anecdotal evidence and survey data likewise indicate that support for technology-enhanced instructional facilities needs to be physically proximate to the location of the facilities for ease of maintenance and technical stability and reliability. This is currently the case in only a few instructional facilities.

To ensure that there is a close fit between technologies needed and technologies provided, faculty must be involved with strategic decisions about what technologies will be included in which instructional facilities, and about what moveable technologies the campus should invest in.

The campus’s continued funding for the renewal and replacement of technology-enhanced instructional facilities is inadequate, and there is no reliable, ongoing source of support for this need.

Specific Recommendations Include
  **Effective Scheduling of Technology-Enhanced Instructional Facilities**
  The Office of the AVC, the AVC for Undergraduate Affairs, ITS, and the Registrar will collaborate to establish a thoughtful, effective, and equitable scheduling process for technology-enhanced and computer classrooms, in part by adding the need for technology enhancements to the Registrar’s list of priorities for classroom scheduling.

  **Use of Student Computer Labs for Instructional Purposes**
  ITS and the Office of AVC will work with appropriate student groups and student fee committees to develop guidelines and procedures for the instructional use of student computer labs that are equitable and sustainable, recognizing both faculty and student needs and expectations. These guidelines will formalize the use of some computer labs as instructional facilities for a limited number of class meeting times per week.
**Effective Support of Technology-Enhanced Instructional Facilities**

ITS will work with schools and colleges to determine the most effective model for providing support for technology-enhanced instructional facilities. This model will locate support in proximity to the instructional facility wherever feasible.

**Renewal and Replacement of Technology-Enhanced Instructional Facilities**

ITS will continue its work on the renewal and replacement of centrally-scheduled, technology-enhanced instructional facilities and will continue to search for ongoing funding for the maintenance, renewal, and replacement of those facilities.

### Implementation

**Effective Scheduling of Technology-Enhanced Instructional Facilities**

- The Office of the AVC ACT, the AVC for Undergraduate Affairs, ITS, and the Registrar will add technology-enhancements to the scheduling prioritization formula. Representatives from the three units and from the Faculty Advisory Committee for IT (FACE-IT, a faculty committee that plays an advisory role with respect to campus IT issues in general, and educational technology specifically) will consider other changes to the scheduling process, including the possibility of setting aside technology-enhanced facilities for faculty who need the technologies for limited class meetings. The Office of the AVC ACT also will communicate to faculty the existence and capabilities of technology-enhanced instructional facilities.
- The Office of the AVC ACT and the AVC for Undergraduate Affairs will develop a communication plan for informing faculty about the existence, capabilities, and scheduling of technology-enhanced instructional facilities.

**Use of Student Computer Labs for Instructional Purposes**

- ITS and the Office of AVC ACT will work with the UCSU and the student fee committee to develop guidelines and procedures for the instructional use of student computer labs and to gain formal approval for the use of student computer labs as instructional facilities.
- ITS and the Office of the AVC ACT will develop a process for scheduling designated student computer labs for instruction.

**Effective Support of Technology-Enhanced Instructional Facilities**

- ITS will work with schools and colleges to determine the most effective model for providing support for technology-enhanced instructional facilities.

**Renewal and Replacement of Technology-Enhanced Instructional Facilities**

- ITS and the Office of the AVC ACT will work with FACE-IT to evaluate the nature, quality, and quantity of campus instructional facilities and the emerging technologies installed in them. Moveable technologies (e.g., laptop carts and portable projectors) will be considered at this time.
- ITS will complete its renewal and replacement schedule for technology-enhanced instructional facilities and develop a cost model that recognizes the true costs associated with providing and maintaining computer labs that are used for teaching.
- ITS will continue to fund staff to support basic instructional use of smart classrooms, labs, and computer classrooms.

### Communication

**Effective Scheduling of Technology-Enhanced Instructional Facilities**

- The Office of the AVC ACT and the AVC of Undergraduate Affairs will develop a communication plan for informing faculty about the existence, capabilities, and scheduling of technology-enhanced instructional facilities.
Use of Student Computer Labs for Instructional Purposes
- The Office of the AVC ACT and the AVC of Undergraduate Affairs will develop a communication plan for informing faculty about policy for and scheduling of student computer labs for instructional uses.

Effective Support of Technology-Enhanced Instructional Facilities
- ITS will develop a communication plan for informing faculty, schools, and colleges about the support available for technology-enhanced instructional facilities.

Policy & Standards
Guidelines will be developed to clarify new classroom scheduling processes and the use of student computer labs as instructional facilities.

Required Involvement

Governance & Authority
- The Office of the Associate Vice Chancellor for Academic and Campus Technology, in consultation with ITS and University of Colorado Student Union (UCSU).
- UCSU has authority over Student Computing Fee funds.
- Decisions about technology-enhanced teaching facilities will be made with input from FACE-IT.

Required Departmental Involvement & Responsibilities
- Associate Vice Chancellor for Academic and Campus Technology
- ITS Management and Departments, specifically
  - MSG
  - Media Services
  - Support Services
- Representatives from the faculty
- Registrar and departmental scheduling liaisons
- Deans of the schools and colleges
- UCSU student representatives.
- UGGS (United Government of Graduate Students) representatives.
- Instructional Computing Working Group to provide guidance and programmatic direction.

Expected Costs

Annual IT Infrastructure Investment
- To be determined after analysis of facilities and cost of support.
- Current renewal and replacement for classroom facilities is $500,000 over the next four years.

Operating and Maintenance
To be determined after analysis of facilities and support costs.

Personnel
To be determined after analysis of facilities and support costs.

Funding
The campus should think strategically about diverse funding sources, including central general fund accounts, student technology fees, schools and colleges, the state legislature, and corporate funding for the renewal and replacement of technology-enhanced instructional facilities. Funding for support should continue to come from ITS general funds.
Timing
Work on scheduling processes will begin by fall 2002.
Work on formalizing instructional use of student computer labs should begin fall 2002.
Work on new support models for technology-enhanced instructional facilities should begin fall 2002.
Work on renewal, replacement, and funding for technology-enhanced instructional facilities should begin summer 2002.
1.3 Information and Information Technology (I/IT) Literacy and Fluency

Recommendation: The CU-Boulder campus should establish specific goals for information and information technology (I/IT) literacy, and should facilitate the creation of discipline-specific goals for I/IT fluency for students. The literacy goals should be the responsibility of the campus as a whole; the fluency goals should be formulated and implemented by particular disciplines and departments.

Discussion of the Recommendation

Current Situation

Universities have long worked to ensure that their students are knowledgeable and educated-able to identify the need for information, to know where to find it, to evaluate critically what they find, and to use it effectively and creatively. That is, universities have always taught what we call information literacy. Today, rapid technological change and an explosion of information resources create a plethora of new technology tools, applications, and resources. This current complex information technology environment has led universities to re-evaluate the ways in which they are educating their students in information technology literacy as well as in information literacy.

During the fall of 2001 an I/IT Literacy/Fluency task force was convened as part of the Educational Technology Strategic Planning Process. The basic charges of the task force were to: develop a draft of the elements of campus-wide I/IT literacy standards, and develop an I/IT fluency process for disciplines and departments to use to create specific I/IT fluency goals. The task force, which primarily consisted of faculty from a variety of disciplines, recognized that the Program for Writing and Rhetoric has developed modules that fulfill the foundational information literacy needs of students. Therefore, the task force focused on developing a set of recommendations, primarily on IT literacy, while recognizing the inextricable link between information literacy and information technology literacy. A summary of the task force’s report can be found at: www.colorado.edu/committees/itc/etsp/literacydraftreport2.htm.

The task force did not suggest any changes to the curriculum. It recommended that the campus adopt a set of I/IT literacy goals that outline where a student should be in order to succeed with each stage of his or her CU-Boulder education. While the recommendations did not ask departments to design new courses or to redesign old ones, it was the hope of the task force that the faculty as a whole, if it adopts a set of I/IT literacy goals, would understand that it is the responsibility of the faculty to help students achieve the level of I/IT literacy necessary for success in upper level courses.

The task force also reviewed two different I/IT fluency processes that could be adopted and utilized by all departments. Most notably, the task force reviewed the Planning Across the Curriculum for Technology (PACT) pilot project (the other was developed by the Libraries). The PACT project is a process that identifies the advanced IT skills and concepts that are tailored and

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CU-Boulder defines information literacy as a student’s ability to recognize what information is needed independent of its format, to know where to find it, and to be able to evaluate it and then use it critically and creatively. It defines information technology literacy as a student’s ability to become proficient in new technology applications as they become available for learning and the production of knowledge. Fluency comprises those more advanced abilities that may be specific to particular disciplines or groups of disciplines or to higher levels of learning. Literacy goals need to be common across the campus; fluency goals need to be designed specifically to meet the particular needs of students following particular paths of study and need to be forward-thinking in the sense that they supply students with the requisite skills, concepts, and capabilities for at least the entry-level of their chosen career paths.
specific to students in their discipline. The departments of Fine Arts, Applied Mathematics, Communication, and Astrophysical and Planetary Sciences have participated in the PACT pilot project.

**Rationale**

In order to best prepare our students in an increasingly technological age, a need exists to revisit our standards for information literacy, promulgate goals for information technology literacy, and encourage departments to develop I/IT fluency goals, which are pertinent to their specific discipline. These goals are linked abilities: on the one hand, to be information literate today, one must be able to access and utilize IT appropriately; on the other, there is little point in being able to access and utilize IT unless one can use it critically and creatively.

**Specific Recommendations Include**

- CU-Boulder students, by the time they complete their first-year at the University, will be I/IT literate, or have the ability to be proficient in new technology applications as they become available for learning and the production of knowledge. These abilities are needed across disciplines, and make up part of the education of any well-rounded CU-Boulder student. The I/IT literacy goals should be uniform and common across the CU-Boulder campus.

CU-Boulder students, by the time of graduation, will be I/IT fluent, or have those more advanced abilities that may be specific to particular disciplines or groups of disciplines, or to higher levels of learning. The I/IT fluency goals should be designed specifically to meet the particular needs of students following particular paths of study, and should be forward-looking in the sense that they supply students with the requisite skills, concepts, and capabilities for at least the entry-level of their chosen careers. These I/IT definitions are nested in so far as the literacy goals provide a foundation that the fluency goals then build upon.

**Implementation**

The faculty will be the primary developers and decision-makers regarding I/IT literacy and fluency goals.

Continued development of the information literacy curriculum is occurring through the Program for Writing and Rhetoric and is integrated into the first-year PWR course that eventually will be taken by almost all first-year students.

The next steps for IT literacy are to refine the goals, and to determine the extent to which they may be met by the end of a student's first-year. This will be achieved by determining the IT abilities that students have upon enrollment at CU-Boulder; by understanding what IT skills, concepts, and capabilities are taught in commonly taken first-year courses or can be obtained in non-credit IT instruction offered by ITS; and by identifying what IT abilities students must master in order to succeed in their first-year courses.

Next steps include:

- Work with the A&S Dean's Office and advisors during fall 2002 to determine how the commonly taken first-year courses map to the IT literacy goals.
- Survey a random sample of incoming first-year students in fall 2002 to assess their IT literacy.

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5 See appendix at the end of the report for the suggested information literacy curriculum.
6 The School of Business and the College of Engineering require that their students take a foundational course within their school or college that is similar to the information technology literacy goals in the PWR course.
• Convene a faculty group in fall 2002 to review, revise, and adopt I/IT literacy goals, and
determine the ability of the campus to enable all first-year students to achieve these I/IT
goals through existing courses (this includes focused advising on which core courses will
result in students attaining mastery of I/IT literacy goals in which they are not already
proficient) and support offerings from ITS, the libraries, and other appropriate areas.

The I/IT fluency initiative will be more fully explored after the IT literacy steps taken above are
completed. It is anticipated that this will include a review of the PACT pilot project, which was
conducted during academic year 2001-02, as well as a consideration whether, and how to
continue this project.

Required Involvement

Governance & Authority
The Office of Academic and Campus Technology will provide coordinating authority for
information and information technology literacy and fluency. The Office of the Provost will provide
overall authority for this program. However, the faculty will be the primary developers and
decision-makers regarding the IT literacy and fluency goals.

Required Departmental Involvement & Responsibilities
Campus-wide involvement is needed for successful implementation of I/IT literacy and fluency
goals; however the College of A&S will be heavily involved.

Expected Costs

Annual IT Infrastructure Investment
For information literacy, the Program for Writing and Rhetoric has outlined an
anticipated IT infrastructure investment. For information technology literacy, the
expected IT infrastructure costs if any, are unknown until the recommendations
from the faculty constituency group are developed and implemented. For the I/IT
fluency project, expected costs can be projected: a full-time FTE working closely
with departments.

Operating and Maintenance
A potential need for additional IT resources and support may arise depending on the IT literacy
goals defined by the faculty group. Additional resources might be needed for evaluation and
assessment of this initiative.

Personnel
Not enough information at this time to determine personnel needs for the IT literacy goals. For
the PACT pilot project a half-time FTE was utilized.

Funding
Funding options might be available through the student technology fee and/or Office of the
Provost.

Timing
During summer 2002, the Office of Academic and Campus Technology will work with the A&S
Dean’s Office to determine how commonly taken first-year courses map to the draft IT literacy
goals. During the summer or fall of 2002, incoming first-year students will be randomly sampled
to assess their level of mastery of the draft IT literacy goals. Additionally, in the fall of 2002, a
faculty group will be convened to review, revise, and adopt IT literacy goals. This faculty group
will also determine the ability of the campus to enable first-year students to achieve these IT
goals through existing courses, services, and resources. This group’s conclusions will be communicated to the campus, in order to reach a decision on how the campus should proceed with IT literacy. The I/IT fluency initiative will be further explored after the IT literacy steps are completed.
1.4 Learning Management Systems (LMS)

Recommendation: Develop a robust web-based learning infrastructure capable of supporting every course at CU Boulder, and one that adheres to the following principles:

- Enhances the learning experience for students
- Presents a consistent and branded resource for both students and faculty that integrates with centralized web-based student services

Discussion of the Recommendation

Current Situation
ITS currently supports a single course management system, WebCT (Standard Edition). WebCT has been used on the Boulder campus since fall 1997. Usage has grown dramatically during the last 3 years to approximately 250 courses, supporting roughly 15,000 unique students during the fall of 2001.

WebCT usage is constrained by the hardware and human resources available to support it. ITS currently allocates approximately 2.75 FTE which is sufficient at current usage levels to support the application from a systems administrative perspective. Support for faculty usage of WebCT is insufficient.

Strengths of the current approach include:

- Cost effective—the cost per seat is relatively low.
- Good support from WebCT—the vendor provides good support for the product.
- Stable infrastructure—aside from SIS interface issues, the product is stable and reliable.

Weaknesses of the current approach include:

- Database technology does not provide efficiency of operations or the robustness required for large-scale deployment.
- A lack of SIS integration means that maintaining course rosters of student information is a labor-intensive process and is inefficient.
- No integration with the Enterprise Directory Service or campus authentication: students must maintain a separate login ID and password.
- No integration with current campus email systems: students must maintain an official campus email account and a separate WebCT email account.
- WebCT has expressed a serious concern that we are overworking the version that we are using.
- The current license for WebCT allows the campus to run it on a single server only. The capability to provide truly redundant fail-over service will continue to be lacking in the absence of a significant software and hardware upgrade.
- WebCT is not easy for all faculty members to use effectively. While the interface is simple, it is not efficient. While many of the tools provided with WebCT (assignments; quiz and discussions, e.g.) allow a great deal of flexibility in how the course is presented to students, they are difficult for many faculty to use, and therefore create barriers to the course design process. In addition, WebCT does not support foreign-language diacritics, which limits its use in support of foreign-language teaching.
As a result of these known weaknesses, ITS has limited the deployment of WebCT and has not actively promoted it to the campus. Because of this, many of the campus faculty members create and deploy their own course web sites and may choose to continue to do so, regardless of the campus solution. Support for these sites is varied. In some cases, departmental staffs provide a high level of support for the department’s web presence, as well as system administration for departmental web servers. In other cases, support is minimal or not available. Concerns about these sites include the lack of available professional support, and the lack of adequate security.

**Specific Recommendations Include**

- For academic year 2002/03 maintain the current support for WebCT.
- Engage in a system requirements definition process relying upon faculty and student input to delineate functional needs. The end result will be a set of functional specifications that can be used to determine future direction.
- Utilize the newly formed faculty IT advisory group (FACE-IT) to provide counsel and advice for future strategic directions. Include BFA academic technology committee and the Arts and Sciences Council in discussions.
- Continue to actively research the various CMS/LMS initiatives, such as the Open Knowledge Initiative (OKI), to understand capabilities and determine the appropriate strategic direction for the campus.

**Steps**

Articulate campus vision for LMS that melds with our web services for students, and web infrastructure strategic plans, with the goal of a unified web presence for every course offered. At a minimum, every course should have the capability of providing a course syllabus through the unified student web service.

Plan an LMS architecture that supports the teaching and learning objectives of the campus. In addition, the vision for LMS should be effectively communicated to manage expectations of availability, capacity, and reliability.

Finally, select a LMS direction for the Boulder campus that will take the campus to the desired destination of student web services that enhance learning.

**Implementation**

- For AY 02-03 and 03-04 the campus should continue supporting the standard edition of WebCT.
- Complete full system analysis of the LMS alternatives and determine appropriate campus direction for AY 04-05.

**Policy and Standards**

- Develop a policy regarding the centralizing support of LMS.
- Develop best practices and guidelines for publishing course content through campus supported resources.

**Required Involvement**

**Governance & Authority**

Office of the Provost.
Office of the Associate Vice Chancellor for Academic and Campus Technology.

**Required Departmental Involvement & Responsibilities**

- ITS to provide faculty support for use of the LMS. In addition, ITS will provide the application support.
• Faculty committee and Associate Deans to serve in an advisory capacity for the strategic and operational directions for LMS use.
• UMS, to provide support for integration with the SIS.

**Expected Costs**
Expected costs cannot be determined until the in-depth analysis is conducted.

**Annual IT Infrastructure Investment**
Hardware renewal and replacement and software licensing will be determined after a more detailed analysis is conducted.

**Operating and Maintenance**
Yearly maintenance for the hardware is $25,000. Yearly application costs are currently $7,000. The vendor will not offer this particular level of support next year. Next year’s cost will be approximately $75,000 for the Enterprise version of the application.

**Personnel**
3 FTE for faculty training; currently 1 FTE is funded.
2 FTE for back-end support and SIS information integration; currently 1 FTE is funded.

**Funding**
Current ITS funding for personnel needs to be augmented by campus resources such as the General Fund.

**Timing**
The current version of WebCT and the staff resources are being utilized at maximum capacity. Changes to this program will be reliant upon additional resources and further program analysis slated for next academic year.
1.5 Research Computing

Recommendation: Facilitate distributed research computing through the provision of the following services to interested research groups:

- Centralized space and for-fee operational management for departmentally-controlled high performance computing clusters;
- High capacity networking access enabling connectivity to national supercomputing sites; and
- Centralized support for high performance computing clusters located in research facilities.

Discussion of the Recommendation

Current Situation
CU-Boulder features world-renowned research departments and institutes, many of which rely on high performance computing for intensive data analysis and simulations. Several units and individual researchers rely on access to national supercomputing sites such as the Pittsburgh Supercomputer Center or Los Alamos for their high performance computing needs; that access is often in conjunction with specific grants. Other units, such as Physics, have built clusters of up to a few dozen processors each. The use of these clusters is frequently restricted to the individual researchers who developed them.

Many departments recognize unmet needs for better researcher access to both national high performance computing sites and for departmentally-based high performance computing clusters, and for graduate student access to high performance computing resources for instructional purposes. At present, there is insufficient knowledge of the extent of high performance computing on campus, and no consideration has been given to whether there might be benefits through the coordination of equipment, space, or support.

Rationale
Through judicious use of grant money, several departments and institutes on campus are meeting their high performance computing needs by developing departmentally-based and controlled high performance computing clusters. Although units feel strongly that the control of high performance computing clusters should be local, there may be a need for at least two centrally-provided, for-fee support services: shared central space and centrally-provided operational support, including data back-up and hardware/software support. There is typically little space in departments to expand existing clusters or to build new clusters; space used for clusters means less space for offices and for more broadly accessible classrooms and labs. Where there is space, cooling and wiring are obstacles to optimal design and use of clusters. Additionally, units and researchers find it difficult to back-up and store high performance computing data effectively. They recognize that providing this service centrally might result in efficiencies and quality of service that are not feasible at the departmental level.

Specific Recommendations
- Consider the provision of centralized space for departmental high performance computing clusters.
- Consider the provision of central, for-fee operational support (e.g., data back-up and hardware/software support) for departmental high performance computing clusters.
• Provide, on a for-fee basis, a higher capacity networking connectivity than the campus norm (at least 10 Gb by 2003) for CU-Boulder researchers who require this capacity.
• Provide centralized support for distributed on-campus supercomputing clusters on a fee for service basis.

Steps

Implementation

• Assess the current high performance computing environment, as well as the near-term need for departmental and institute high performance computing clusters. During this assessment process, the campus should determine the optimal model, including fees, for centrally-provided operational support of high performance computing. It also should identify the departments that would be most likely to relocate their clusters to a central space and/or use centrally-provided support for research clusters, and work with them throughout the remainder of the implementation process.
• If there is interest in housing some research clusters centrally, secure adequate and accessible space for the relocation of some of the campus’s departmentally-based high performance computing clusters, and ensure adequate bandwidth to and from sites remote from researchers. A model for remote and on-site access and use of the cluster space should be developed concurrently.
• If there is interest in supporting some research clusters centrally, develop a for-fee operational support model for centrally and departmentally located high performance computing clusters. Address bandwidth, storage space, and operational support processes during this stage.
• Integrate the support of any central physical space for high performance computing, and of any operational support such as data back-up and/or hardware and software support into the 4-Tier IT support model of ITS.
• Work with the Office of Contracts and Grants (OCG) to address any overhead/infrastructure issues that may arise vis-à-vis grants and central high performance computing service fees.
• Assess campus need for higher capacity network connection, and develop strategy to interconnect to the TeraGrid (http://www.teragrid.org/) to provide high capacity networking access.

Required Involvement

Governance & Authority
The Office of the Associate Vice Chancellor for Academic and Campus Technology.

Required Departmental Involvement & Responsibilities
• ITS will work with interested units to develop models for the provision of centralized high performance computing space, and operational support.
• Departments and institutes interested in utilizing central high performance computing operational support will work with ITS to develop, modify, and contract for services.
• Office of Contracts and Grants will provide expertise about the allocation of grant monies to central high performance computing services.
• ITS will work with representative faculty from research groups to develop high-capacity networking strategy and to provide on-going network management support.

Expected Costs

Annual IT Infrastructure Investment
• Dedicated space: TBD
• Bandwidth to and from remote site: TBD
• Server(s) for data back-up and storage: TBD
• Network Service: TBD

**Personnel**

• Scheduling and maintenance of centralized space: TBD
• Management of operational support: TBD

**Funding**

Funding will flow from grants directly to ITS in the form of fees for operational support.

**Timing**

The assessment of the campus’s high performance computing environment should take place spring 2003, with the possibility of a pilot program for centrally-located high performance computing cluster space by fall 2003.
1.6 Digital Content and Collaboration

**Recommendation:** The campus should continue to provide excellent, coordinated, and broad support and services for digital media and videoconferencing. It also should develop support and services for digital asset management\(^7\) and collaboration tools\(^8\) for both instructional and research purposes.

**Discussion of the Recommendation**

**Current Situation**

The campus currently provides several types of support and services for faculty who use digital content in their teaching and research. ITS’ digital media lab in the Stadium provides walk-in service as well as on-site consulting where people can produce, store, and disseminate digital video, images, and audio. The facilities at this site include advanced multimedia development hardware and software, as well as media servers.

The Distributed Academic and Campus Technology Coordinators (DACTCs) provide some support in the form of training and consultation, and in the coordination of multimedia projects. The ITS Courseware Support Coordinator provides assistance for faculty who would like to design course content to be distributed over the Internet. The Technology Experimentation Center provides a site where faculty can create digital media content with the assistance of a DACTC. The Libraries also provide some media services (see sections 1.1 and 1.7). Currently there are limited central services for digital asset management; and only one video server is available to faculty.

ITS videoconferencing facilities in the Stadium allow people to host videoconferences for up to 10 sites simultaneously. The Humanities building has portable videoconferencing capabilities. There are no other centrally-provided (by ITS) videoconferencing services or support.

The campus does not yet provide centralized services or support for collaboration tools for teaching and research purposes. The Electronic Collaboratorium—a virtual Internet space with whiteboard-type capabilities currently in development—will allow small teams of people to collaborate using shared multimedia artifacts.

**Rationale**

Digital multimedia content is rapidly becoming a means by which higher educational institutions communicate ideas. Web sites supporting courses and research projects have become quite common. The use of digital video (including animations) in demonstrating concepts and theories is also on the rise. This increased use of digital media content needs to be addressed with increased support for designing, creating, and disseminating digital media. Key elements of that effort include providing a facility where faculty and students can access state-of-the-art technologies for producing digital content, and providing support for how best to design, produce,

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\(^7\) Digital asset management comprises the collection and repository of digital educational materials used at CU-Boulder, as well as the collective mechanisms and processes that provide effective access to those materials. Two general categories of materials are included in this definition: course and other web pages with syllabi, assignments, etc., which would be organized by course; and visual instructional materials such as slides and digital images, digital video, and applets. The materials of the latter category would be archived in a database, which would allow effective organization, searches, and extraction of the materials.

\(^8\) Examples of collaboration tools, or Computer Support for Cooperative Work (CSCW) tools include Microsoft Word, WebCT, and SmartBoards. CSCW tools allow groups to share and work collaboratively on artifacts. These artifacts can be shared documents, white boards, images, and even video or audio files.
and deliver that content. While it is not economical to provide these technologies on each users’
desktop, it is possible to provide a centralized location where advanced multimedia content can
be produced.

In addition, videoconferencing and collaboration tools are increasingly viable options for
facilitating instruction and research.

Specific Recommendations Include

- Continue to provide digital media services and support centrally through ITS’ digital
  media lab, and coordinate them with those offered by other educational technology
  support units in ITS and the Libraries.
- Assess the feasibility of continuing to fund the Technology Experimentation Center (TEC)
  and expanding it to develop centers specific to schools and colleges.
- Develop a model for effective, centrally-provided digital asset management (see Section
  1.7 Libraries).
- Determine the need for centrally-provided video- and audio-conferencing facilities;
  investigate the viability of centrally-supported desktop videoconferencing capabilities.
- Provide support for Computer Support for Cooperative Work (CSCW) (collaborative)
tools.

Steps

Implementation

- Coordinate digital media support with other educational technology support on campus.
- Support the ongoing use of digital multimedia in teaching at CU-Boulder. Continue the
  RFP process already used to solicit digital multimedia projects to be disseminated on one
  of the three ITS media servers (capra, kubrick, and hitchcock) as well as through CDs
  and DVDs.
- Create a digital media streaming, hosting, and archiving framework that can scale to
  support the needs of campus users for instruction, reporting, and demonstration using
digital media content.
- Establish digital content management policies and procedures to guide the storage,
maintenance, and dissemination of digital media.
- Work with the DACTCs, FTEP, and GTP to make faculty, instructors, and staff aware of
  CSCW tools currently or potentially available on campus.

Communication

- Prepare a communication plan to bring about awareness of:
  - The existence of and services available at the Technology Experimentation
    Center (TEC) and the digital media lab.
  - The services available on existing media servers.
  - The capabilities of existing CSCW tools.
- Prepare a communication plan to disseminate the results of the RFP for digital media
  projects.
- Prepare a communication plan to disseminate digital content management policies and
  procedures.

Policy & Standards

To be determined.
Required Involvement

Governance & Authority
- The Associate Vice Chancellor for Academic and Campus Technology for final authority.
- FACE-IT will play an advisory role in the further development of digital media services.

Required Departmental Involvement & Responsibilities
ITS is responsible for implementing most of the recommendations suggested in this section. Adequate faculty involvement will be solicited for all planning and decisions.

Expected Costs

Annual IT Infrastructure Investment
2003 Hardware replacement for servers/workstations = $41,000 (new)
2004 Centralized server = $100,000 (new)
Software Investment upgrades and licensing = $16,400 (new)
Operating and Maintenance = $5,000 per year central server maintenance

Personnel
Initially Media Production, Engineering, Classroom Design and the Media Collection staff. All positions currently funded

Affiliated staff (listed above) to be determined

Funding
Staff funding will come from existing General Fund positions associated with Media Production, Engineering, Classroom Design and the Media Collection. Funds for additional staff, to be identified, would need new funding or reallocation of resources. Analysis of the relationship with other identified affiliates to be determined.

Timing
1.7 Libraries

Recommendation: Promote a Libraries/IT partnership by focusing on four areas of strategic importance:

- The development of a campus-wide Digital Asset Management plan through joint efforts from the Libraries, the Office of the Associate Vice Chancellor for Academic and Campus Technology, and ITS;
- The enhancement of digital media assets through the consolidation of ITS and Libraries media services;
- An increase in network access to digital information by:
  - Utilizing federated authenticated network access;
  - Upgrading wired network access within the Library facilities; and
  - Deploying wireless network access in all open, common areas within the Libraries.
- The support of campus-wide I/IT student literacy through the continued development of the Program for Writing and Rhetoric as well as through course-integrated library instruction.

Discussion of the Recommendation

Current Situation and Rationale
In January 2002, the CU-Boulder Libraries concluded their yearlong strategic planning process. The plan identified the need to “create strategic service and support partnerships with other campus units, especially ITS, to raise the standard of support the Libraries offer to its users.” The Libraries strategic planning process noted three specific areas as feasible and of high priority: coordinated management of digital media assets; further development of wireless connectivity in the Libraries; and continued support for I/IT literacy for all first-year CU-Boulder students. Data from ITSP interviews and focus groups indicated that digital asset management is a fourth area of strategic importance.

Digital Asset Management
The campus faces a challenge in managing a rapidly growing body of “digital assets” that constitutes significant additions to the campus collections. Digital asset management is best defined as the systematic management of educational digital data, such as text, image, audio, and video files, so that they can be accessed for reuse or re-purposing. Efficient and effective storage and retrieval can maximize the value of these assets. Protection of these assets is essential.

Digital Media Services
A variety of digital media services are offered by ITS and provide access to educational content and electronic collaboration tools (e.g., tape replication and videoconferencing). In at least a few cases, the Libraries and ITS duplicate services (e.g., both units maintain large inventories of videotapes). The Libraries and ITS need to evaluate these types of services to determine if faculty and students can be better served by alternative, combined, and more efficient delivery processes.
Network Access
Network access to Libraries materials has grown in importance as demand for online materials has increased. Also, many access points have changed from in-library access points to in-home, in-office, and in-the-field access. Many of the materials require authenticated access to meet contractual agreements. These challenges can be met by upgrading networking services within the Libraries, including upgraded wire-based connections and wireless access. Authenticated access based upon the campus Enterprise Directory will be essential to enable remote access.

Information and Information Technology (I/IT) Literacy
Both the Libraries and ITS have collaborated with the Program for Writing and Rhetoric (PWR) to support first-year student I/IT literacy. Libraries staff have worked directly with curriculum developers for the PWR writing course to include appropriate information literacy subject matter. In addition, Libraries’ faculty currently teach classes to enhance students’ skills in finding, assessing, and using information. ITS also teaches basic IT skills to students in non-credit Quick Computing classes that cover the Microsoft Office Suite and basic web development.

Rationale
Forming a Libraries/ITS partnership allows for a better utilization of resources in four areas. First, the development of a digital asset management plan can address the growing amount of digital materials that need to be available online. Second, digital media services can be co-managed to avoid duplication while giving the greatest accessibility to students and faculty. Third, network services need to be increased and enhanced to support access to digital materials. Finally, the intertwined relationship of information and IT literacy necessitates a close-knit partnership between the Libraries and ITS. Working together, the Libraries, ITS, and the Program for Writing and Rhetoric can continue to develop an appropriate curriculum that teaches first-year CU-Boulder students how to access, evaluate, and use information in a technological age.

Specific Recommendations
- **Digital Asset Management**: The Libraries will partner with the Office of the Associate Vice Chancellor of Academic and Campus Technology and ITS to develop a Digital Asset Management plan that addresses institutional repository requirements, data storage requirements, data persistence, cataloging, interoperability with other digital libraries, and security. This plan will also include recommendations for centrally organizing and storing content that academic departments currently manage. Finally, this plan will address the complex issues associated with scalability and authentication.
- **Access to Digital Media Assets**: The Libraries will partner with ITS to build and/or co-locate a Digital Media Assets Center that provides a resource for students and faculty to obtain, explore, and apply innovative multimedia technologies that support teaching, learning, and research, with emphasis on incorporating content into each one of these broad areas. This center will provide a continuous Libraries/ITS service presence through virtual and physical help desks.
- **Network Access to Library Materials**: Increase network access to digital information by:
  - Developing federated authenticated network access.
  - Updating the cabling and wiring infrastructure within the Libraries. The current cabling and wiring is based upon older technology that provides basic network access. Unfortunately, this infrastructure is not sufficient to support multimedia access.
  - Increasing wireless connectivity for public areas in all libraries (i.e., wireless for patrons who have their own laptop and/or PDA’s). The Libraries will follow the ITS model with wireless cards for end-users (as used in the Law Library).
- **I/IT Literacy**: The Libraries, ITS, and the Program for Writing and Rhetoric will build and/or co-locate a shared-space, I/IT literacy lab that also will function as a writing center. This lab would be conjointly operated by the College of A&S, the Libraries, and ITS and would function as an academic center for the campus, providing students with a course-
integrated introduction to university-level writing that addresses deficiencies in writing skills, while preparing students to write and research successfully in a technological age.

**Steps**

**Implementation**

- **Digital Asset Management:** The Libraries, the Office of the Associate Vice Chancellor for Academic and Campus Technology, and ITS will begin meeting in spring 2003 to formulate a project plan and a comprehensive strategy to identify issues, requirements, and program needs to develop a digital access management initiative. Some important areas of focus are:
  - Selection of IT hardware and software to match the expected and intended service levels for access to materials, and long-term commitment to renewal and replacement.
  - Data persistence to ensure that the digital assets are accessible in the future, regardless of the file structure or application, and to make certain that the means of data storage is based on open standards to ensure long-term access to materials.
  - Development of a sophisticated storage and retrieval system for academic departments to use for non-published materials (could include such things as course syllabi, lab activities, writing workshop materials, etc.).
  - Cataloging digital materials introduces a new complexity that must recognize the need to include the structural description of the information, e.g., book, journal, MS Word file, database format, image file, video clip, audio clip, or application information.
  - Interoperability of digital libraries is essential to providing widespread access to materials. This includes access between all campus organizations that create systems to store digital materials. It also includes access to off-campus Libraries and providers of digital materials. While the development of extensible and interoperable architectures is early in the stages of development it is essential to include in the planning processes.
  - Control and security of digital materials is a significant challenge given the reasonable expectations of the campus community to have access to digital materials “whenever” and “wherever”. Limiting access to particular groups based upon a definition of “right to access” can be complicated, but relates quite well to the use of the campus Enterprise Directory for identity verification, and as the basis for authentication and authorization. Extending access to related entities, such as other institutions of higher education, requires a trusted relationship that accepts assertions of identity.

- **Access to Digital Media Assets:** The Libraries and ITS will begin discussions to build and/or co-locate a Digital Media Assets Center in the Library during 2002-03 academic year.

- **Network Access to Library Materials:** The Libraries and ITS will begin planning to implement:
  - Federated authenticated network access for digital materials. This will include discussions with current providers regarding contractual agreements and restructuring future access methods.
  - An assessment of the wiring infrastructure within the Libraries, which will be completed jointly by the Libraries and ITS to develop a plan for remediation in areas that require high-performance networking.
  - The Libraries and ITS will continue to identify areas where wireless connectivity would provide enhanced network access within the Libraries.

- **I/IT Literacy:** The Libraries, ITS, and the Program for Writing and Rhetoric will build and/or co-locate a shared-space I/IT literacy lab which also functions as a writing center. Work with the Office of the Associate Vice Chancellor of Academic and Campus
Technology, PWR, ITS, and the Libraries to coordinate how I/IT literacy can be integrated into the PWR course.

**Required Involvement**

**Governance & Authority**
The Office of Academic and Campus Technology will provide coordinating authority between the Libraries, ITS, and PWR (when necessary). The Dean of the Libraries, the Dean of Arts and Sciences, and the Executive Director of ITS will have primary responsibility for initiating these recommendations.

**Required Departmental Involvement & Responsibilities**
The Libraries, AVCACT, and ITS have primary responsibility for the recommendations in this document.

The AVCACT, the Libraries, ITS, and PWR will integrate I/IT literacy goals into an appropriate curriculum which might include the PWR classes, ITS classes, and library-sponsored classes.

**Expected Costs**

**Annual IT Infrastructure Investment**
Please refer to Section 1.6, Digital Content and Collaboration, Section 3.1, Network (Wireless), and Section 1.3, I/IT Literacy, for the annual IT infrastructure investment.

**Operating and Maintenance**
See above.

**Personnel**
See above.

**Funding**
See the funding sections for Digital Content & Collaboration, Networking (Wireless), and I/IT Literacy/Fluency for funding suggestions.

**Timing**
Decisions for consolidating ITS and Library media services and forming the Digital Media Assets Center will occur during the spring of 2003. Wireless deployment is continuing throughout the summer and fall of 2002. I/IT literacy development will also occur during the fall of 2002.