A STRATEGIC PLAN FOR INFORMATION TECHNOLOGY
AT CLAREMONT McKENNA COLLEGE
Submitted by the IT Strategic Planning Committee
Executive Summary

Information Technology offers enormous opportunities for the enhancement of teaching and learning at Claremont McKenna College. The Committee sees four general strategic goals. We provide comments on specific key elements to achieve the four suggestions, and list additional resources required to achieve each goal (low, medium, high cost). In our report, we elaborate on additional specific steps to accomplish the goals, as well as greater discussion of their rationale.

Goal 1.To achieve and support student Fluency in Information Technology (FITness).

a. To educate leaders in economics, government, and the professions, CMC must address the challenges and opportunities of new modes of knowledge. CMC should accordingly inculcate a "fluency" based understanding of Information Technology, whose metric is explicated in a report by the Committee on Information Technology Literacy of the National Research Council. (High resources)

b. To support student FITness, or student fluency, concomitant education and support of faculty, administration, and staff will be necessary (see 2.a-b), as will a continued institutional commitment to resources in the classrooms, dormitories, and student labs (see 3.b-d, 4.d). The Committee argues that these are inherently valuable and a commitment to their accomplishment should be independent of any institutional decision on a Fluency General Education requirement.

Goal 2.To support academic teaching and research.

a. The Committee recommends that the College hire additional Educational Technologists, preferably one in Science, a second in Humanities, and a third in Social Science. These Educational Technologists can work with faculty members to create improved course content and support enhanced student education. (Medium resources)

b. The Committee recommends that the College support flexible scheduling, student and faculty access to new research resources, and telecommuting by providing Internet 2 on campus, and off-site VPN. (Medium resources)

c. The Committee recommends the College explore the promises of distance learning to our traditional constituencies. Specifically, the Committee recommends the creation of an on-line Alumni College to continue our educational relationship with graduated students. Furthermore, evidence suggests that fulfillment of GEs inhibits a significant number of students from studying abroad. The Committee thus urges the College to consider supporting on-line CMC courses to ensure fulfillment of GEs so that our residential students are not impeded from the traditional undergraduate experience of study abroad. (Medium to high resources)

Goal 3.<u>To support students, faculty, staff, and administration with smoother and more efficient functioning of the College</u>.

a. Just as we should develop standards of competence for our students, department heads should develop standards of technological competence for positions at Claremont McKenna College. Given the diverse workforce employing different specific technologies, the College can develop differential support training for staff and faculty as appropriate, routinizing skills assessment by department and function. The College should encourage staff and faculty to learn to use what we already support by coordinating a first-rate faculty and staff training program drawing on the talents and proclivities of existing IT and TRC staff, paralleling our expanded student training. (Contingent on 2.a; low resources)

b. More individualized assessment of needs should figure in the standard workstation replacement policy of a three-year rotation. Student computer labs and workstations of some faculty and staff should be upgraded more often, just as continued use of older workstations for less intensive computing needs can help reduce costs. (Low resources)

c. The need to unite Information Technology with improved teaching can be assisted through dedicating more funds to an expanded Teaching Resource Center and modifications in administrative structure. (Medium resources)

d. The Committee reviewed materials that lead us to concur that changes in technology structure and governance may be of great assistance, and we urge the President to consider suggestions in light of this report. (Low resources)

e. The Committee recommends reorganization so that more IST staff could be brought together in a central location to foster better morale, greater communication, and more productivity. (Low resources)

Goal 4.<u>To begin to establish the College as a leader in Information Technology in conformance with its unique mission, which extends beyond consortial relations into establishing a presence regionally and nationally in educational organizations dedicated to issues of information technology</u>.

a. Rapidly changing technologies and ambiguous measurements of the value of laptop requirements convinced the Committee to suggest postponing investment in a laptop program. Instead, the Committee suggests providing recommended standard configurations, as well as discussing with Financial Aid the possibility of a computer loan purchase program to insure that financially needy students have ready access to computer technology at CMC. (Low resources)

b. Nationalize IST in Professional User groups. The Committee approves efforts at CMC to become members in nationally respected Educational Technology organizations. (Low resources)

c. The Committee strongly supports expansion and enhancement of the College website. (Existing staff and monies)

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d. The Committee approves the great strides CMC has made in the last years to upgrade CMC's standing vis-a-vis Information Technology in hardware and infrastructure. The Committee strongly supports shifting new investment into improving support for IT education of staff, faculty, and especially our students. (Medium-high resources)

A STRATEGIC PLAN FOR INFORMATION TECHNOLOGY AT CLAREMONT McKENNA COLLEGE

Submitted by the ad hoc IT Strategic Planning Committee

DRAFT

February 3, 2001

Our Charge

In their September 21, 2000 memo, the Steering Committee for the Strategic Planning Process identified the ultimate strategic goals of the planning process:

- Improve our reputation as one of the finest national liberal arts colleges, with a successful focus on teaching and research.
- Be distinct and second to none in the execution of our focused mission on leadership in business, the professions, public affairs and politics.
- Be second to none in our leadership and effectiveness in operating within an intentional consortium.

In the specific charge to the IT Strategic Planning Committee, a number of issues were broached. (See Appendix 1: CHARGE TO THE COMMITTEE ON INFORMATION TECHNOLOGY.) The Steering Committee added "the charge to the Committee on Information Technology should be modified to expressly provide that the Committee on Information Technology should evaluate what the best model was for performing its functions."

When the members met to discuss the charge, consensus emerged in the Committee on Information Technology that the focus of our report should not be on technology itself, but the functions and needs that can be supported by information or communications technology in light of the college's unique mission. At the first meeting, the charge was thus expanded to clarify a vision of information technology in support of CMC's mission. Our College needs to focus more on opportunities to discuss instructional and learning issues in general rather than information technology in isolation.

The outcome of this realignment resulted in organizing the Committee's response around three central concerns:

- to articulate an expansive vision of Information Technology in support of the College's mission, reflecting trends and developments both within and outside of CMC;
- to identify, assess, and create a list of recommendations detailing specific projects and priorities for the future;
- to anticipate the implications of our vision for College planning and provide guidelines for future planning.

A Vision of Technology in Support of the College's Mission:
Fluency in Information Technology

Claremont McKenna College is a highly selective, independent, coeducational, residential, undergraduate liberal arts college. Its mission, within the mutually supportive framework of The Claremont Colleges, is to educate its students for thoughtful and productive lives and responsible leadership in business, government, and the professions, and to support faculty and student scholarship that contribute to intellectual vitality and the understanding of public

policy issues. The College pursues this mission by providing a liberal arts education that emphasizes economics and political science, and a professorate that is dedicated to effective undergraduate teaching, and by maintaining a close student-teacher relationship that fosters critical inquiry, an active residential and intellectual environment that promotes responsible citizenship, and a program of research institutes and scholarly support that makes possible a faculty of teacher-scholars.

While paying close attention to educational outcomes that relate directly to CMC's core mission, the Committee chose to adopt future-oriented language and to create a compelling vision and strategy at the top level. In particular, the Committee determined that CMC's strategic teaching goal for Information Technology should expand beyond ensuring that students have appropriate technological skills. The Committee thus recommends implementing programs that promise to enhance on-going learning of students, faculty and staff and to improve our college's operations, with the intended result of creating a competitive edge for CMC. To determine what that competitive edge is, the Committee investigated three common measures or metrics of Information Technology at colleges today. We have chosen to fold in our reactions to the most significant findings relative to those metrics within the body of this report, and append our Metrics for Evaluating Information Technology at Claremont McKenna College in Appendix 2. By focusing on clearly stated and measurable outcomes, the Committee believes CMC could occupy a strategic position vis-à-vis technology that builds on our strong reputation as a college educating tomorrow's leaders.

The Committee thus sees four general goals of Information Technology at Claremont McKenna reflecting the constituencies served:

Goal 1. to achieve and support student fluency in information technology;

Goal 2. to support academic teaching and research;

Goal 3. to support students, faculty, staff, and administration with smoother and more efficient functioning of the College; and

Goal 4. to begin to establish itself as a leader in Information Technology in conformance with its unique mission, which extends beyond consortial relations into establishing a presence regionally and nationally in educational organizations dedicated to issues of information technology.

The rest of this report examines these four goals in turn.

Goal 1. Achieving and Supporting Student Fluency in Information Technology

Central to our re-visioning of Information Technology is our recommendation that we expand our notion of what Information Technology is, and what skills we intend our graduates to master. The Committee supports moving from a "skills" based understanding of Information Technology to "fluency." Unlike the expectation of computer literacy which typically requires mastery of computing skills of short-lived currency, Information Technology fluency is achieved when students are current in modern technology and know how to conceptualize information technology so that they can continuously adapt to rapid change. Fluency, as identified by the Committee on Information Technology Literacy of the National Research Council, is composed of three co-equal and interdependent components: contemporary computer skills, foundational concepts and intellectual capabilities.[1]

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[1] "Being Fluent with Information Technology,"
http://books.nap.edu/html/beingfluent/notice.html

It is not the mandate of this Committee to suggest a specific curricular change. What the Committee does suggest is that the Curriculum Committee begin consideration of the merits of developing a FITness requirement. To effect such, the Committee believes considerable work must be done to provide a sufficient basis for Information Technology fluency to flourish. The Committee agrees with our alumni who have commented that "CMC use [FITness] as a starting point for creating CMC's own standard consistent with the mission."

Whether or not we adopt a FITness goal that might be fulfilled by a new General Education Requirement or other major change in curriculum, the College must reconsider how much staff and other support the various members of our community need to keep the education CMC provides competitive with other peer undergraduate institutions. The next sections consider some options of how we might enact the vision of educating students to fluency in Information Technology and create a community empowered to make that a reality.

1. A. A "Fluency"-based Understanding of Information Technology

The concept of FITness has been discussed extensively for the past two years in the Committee on Academic Computing (CAC). Last year, after agreeing FITness was a goal worthy of further exploration, a sub-committee was formed and charged by the CAC to investigate faculty reactions to how FITness might be employed at Claremont McKenna. Additional faculty from the Humanities and Social Sciences divisions were consulted in luncheons sponsored by the CAC. The sub-committee found considerable interest, but also differences in opinion, about how FITness might be achieved. The sub-committee then crafted an application for funding from an anonymous philanthropic organization. This application requests monies to test the concept in a partial implementation. The CAC's IT FITness Grant Proposal for investigating a Fluency in Information Technology program at CMC is appended (Appendix 3).

Should the FITness Grant be funded, the sub-committee which developed the proposal has suggested that Fluency will best be achieved by (a) integrating information technology across the curriculum into multiple subject areas via multiple points of entry, (b) developing tech-savvy teachers by offering focused training, financial incentives, and time-release, and (c) providing students support in newly shaped courses as well as the resources to link with future employment opportunities. Such full-scale integration would allow all CMC students equal opportunity to the promises of technology. The Committee affirms the intentions of the CAC's FITness proposal, and suggests that, should funding of the Grant not occur, CMC representatives investigate alternative possibilities.

There is a growing need for information technology professionals throughout the nation. Increasingly, employers have recognized the advantage of hiring students with a liberal arts background, yet capable of skilled application of information technology.

The Committee studied the top 25 undergraduate colleges and found that none required Computer Science outright, or fluency in information conceived in the ways we describe here. Two allowed Mathematics to be substituted with a Computer Science class as part of their General Education Requirements (Washington and Lee University: Math or Computer Science; Mt. Holyoke College: Math or Computer Science). Only Trinity College required actual proficiency in computing, which could be met by either passing a computer proficiency exam or a computer course.

There are multiple potential strategies to IT fluency. At Indiana State University an Information Technology literacy requirement has been proposed that can be satisfied by either 1) a specific course designed to provide all first year and transfer students "with the basic information management knowledge and skills necessary to function, survive, and ultimately,

thrive in a highly electronic and ever-changing academic environment" (http://web.indstate.edu/fened/itlproposal.html); 2) testing out; or 3) program-based substitutions for the Information Technology Literacy course, allowing different departments to assess the requirements of FITness appropriate for their majors and create courses for their fulfillment. The Committee suggests that interdisciplinary cooperation with possible parallel courses might be considered as well, linking for example sections of our General Education requirement of Lit 10 with an Introduction to Technology course.

Student fluency in Information Technology is an area in which CMC could establish itself as a curricular leader among our peer group. Should Claremont McKenna institute the study of information creation and consumption as a part of the general education of CMC students, and perhaps making these areas also part of each major's requirements for student learning outcomes, the College would heighten student understanding of the impact of information and technology on culture and politics across the curriculum, empowering our students to become leaders in whatever field they choose to enter.

One ambitious future option is developing a comprehensive, competency-based, tiered Information Technology program, working closely with faculty in our current Computer Science major and interested faculty from throughout the College. Colby College currently has a seven course minor and a seminar series emphasizing the social and historical interactions of science and technology. (Bulletin of Science, Technology, and Society 18, no. 6 (Dec. 1998): 45-46, found at http://www.colby.edu/sci.tech/minorforall.htm. Their program illustrates how liberal arts and information technology might be fruitfully combined. This option might not be as costly as one might expect; Colby's program attracts numerous students, and draws on its staff from multiple departments.

In partial response to the question posed in our charge about consortial relations, the Committee discussed the possibility of fruitful connections regarding student development with our sister institutions in the area of Information Technology. Currently, different departments at our College offer 4-1 programs for completion of a Master's degree. Possibly with the Claremont Graduate University or with the Keck Graduate Institute, Claremont McKenna could fashion a tiered curriculum with majors and Master's degrees in fields of Information Technology specific to its mission of educating students in leadership and public policy. This approach would stress technical content, but specifically technical content oriented toward leadership and management, wedding the larger issues of Information Technology within the focus of CMC's mission in the liberal arts. Unlike technical schools, our CMC graduates would be educated such that they would have the skills to enter the job market immediately, and act as leaders within that market, much like our Economics-Accounting Program and Leadership graduates have entered the business world. Collaborative efforts between industry and higher education are vital to the growth of the American economy. With a more focused program and/or a fluency requirement, Claremont McKenna could show leadership in responding to industry needs by forming strong partnerships with the business community in the field of Information Technology, and linking our students with internship possibilities reflecting their various majors. Further, ongoing discussions with the Mellon Foundation about investing more effort and support in the Claremont Colleges would allow Claremont McKenna to contribute in national educational circles as well.

1. B. Building and maintaining the Support for a FITness Program

The adoption of an integrated approach to Information Technology fluency would deepen and broaden the opportunities to study it from a liberal arts vantagepoint. An expansive approach to FITness would prepare all of our students for the increasingly

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technological jobs to which they aspire, and the society they will join and shape. Claremont McKenna could thereby be poised to become an incubator of highly diverse businesses and applications of Information Technology. Emerging initiatives require the ability to think creatively and critically about technology, society, and possible futures far more than simply having technical proficiency.

The manner in which we achieve student FITness requires authentic and widespread input from our faculty, administration and staff, students, parents, alumni, and trustees. Only after building greater awareness and understanding of any possible plan can the Claremont McKenna community implement and evaluate a FITness program. Moreover, the enactment of any FITness program we do shape should be done with self-awareness and assessment, so that monitoring, evaluating, and reporting our progress can be accomplished. By tracking and gauging measures of our success in implementing a FITness program, we will be able to assist the rest of the consortium, and perhaps provide leadership regionally or even nationally as well. Should greater cooperation in the management of academic computing and other elements of Information Technology among The Claremont Colleges (perhaps supported by the Mellon Foundation or other philanthropic organization dedicated to pedagogical innovation) come to fruition, and the Information Technology Fluency proposal be accepted, Claremont McKenna could contribute to the national pedagogical movement evaluating the relevance and significance of FITness for small undergraduate institutions. Claremont McKenna can assume a leadership role in providing research-based information on the efficacy of FITness by developing serious longitudinal research on Information Technology education at the undergraduate level, as well as provide guidance on how the lessons learned might apply to other liberal arts colleges and FITness programs.

To lay the groundwork for any such possible futures for our students, the College must provide concomitant education and support of faculty, administration, and staff, as well as a continued institutional commitment to resources in the classrooms, dormitories, and student labs. The Committee argues that these are inherently valuable and a commitment to their accomplishment should be independent of any institutional decision on a Fluency General Education requirement or some other curricular initiative; we thus treat these goals independently, below.

Goal 2. To Support Academic Teaching and Research

The Committee recommends that the College take steps to improve the successful integration of Information Technology and academic teaching and research.

2. A. Additional Educational Technologists

The Committee examined the level of support offered to students, staff, and faculty at our peer institutions, and in response to external information, decided to create a subcommittee to study the issue of support for faculty. (See Appendix 4.) The outcome of that study was the determination that while the number of staff positions now parallels - and even surpasses - many of our peer institutions in terms of the support for students and staff, the support of faculty is comparatively meager. This becomes most significant in educating our students; our faculty on the whole have been markedly successful in accomplishing their research goals with existing technology, although their research opportunities and support could be improved with moderate resources. (See below, 2.

B.) Moreover, the support afforded students and staff is insufficiently oriented toward their educational experience at Claremont McKenna.

In July of 1999, the Teaching Resource Center became operational with a part-time Director (two-course release) and one Educational Technologist. In late April 2000, an Educational Technology Assistant was added. Their work has helped fuel major changes at CMC in faculty's use and understanding of educational technology. After examining the data gathered by the sub-committee, the Committee recommends that the College hire three additional Educational Technologists. These are recommended to include one in Science, a second in Humanities, and a third in Social Science. These Educational Technologists would work with faculty members to create improved course content and support enhanced student education. This level of staffing would bring Claremont McKenna to a more equal basis with our peers.

2. B. Infrastructure and Scheduling Enhancements

The Committee notes with great approval the phenomenal success in recent years in the development and maintenance of College infrastructure (networking, hardware, and software) and facilities (classrooms and student computer labs). (See the relevant sub-committee report, Appendix 4.) The dormitories have been improved, the classrooms boast top-notch facilities, and faculty offices are wired. (See Appendix 2. Metrics Evaluating Information Technology at CMC.) An external reviewer noted that of twenty-five selective private liberal arts colleges noted for their leadership in technology, Claremont McKenna currently ranks eleventh in terms of the amount of technology funding per student.[2]

This investment is beginning to pay off bountifully for our students. Campus communication is much improved, and the student labs are well equipped and busier than ever. Moreover, in the 2000-01 academic year, there have been over 160 courses[3] with substantial on-line components facilitated by the courseware WebCT, which was introduced in spring 2000 to a group of faculty selected for their history as early technology adopters. Additional courses outside WebCT draw on computer simulations, the World Wide Web, and advanced computer skills and applications. Clearly, many of the faculty are deeply interested in the promises of technology to improve student learning.

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[2] The Institutions used in analyzing CMC's technology funding were: Alma College, Beloit College, Bryn Mawr College, Bucknell University, Colgate University, Denison University, Gettysburg College, Grinnell College, Harvey Mudd College, Holy Cross (College of the), Hope College, Kenyon College, Lafayette College, Middlebury College, Mount Holyoke College, Oberlin College, Pomona College, Reed College, Smith College, Swarthmore, Trinity College, University of the South, Washington and Lee University, Wellesley College, Wesleyan University.

[3] These courses are offered in every department: Civilization (2); Computer Science (2); Economics and Accounting (14); Government (6); History (17); Literature (11); Mathematics (1); Military Science (1); Modern Languages (3); Philosophy/Religious Studies (4); PPE (1); Psychology (7); and Science (12). This semester alone, there are 80 WebCTcourses, some of which have multiple sections. These figures do not include several non-academic courses being used to train staff.

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A major concern expressed among staff, students, and faculty was the need to offer more flexible scheduling, improved student and faculty access to new research resources, and telecommuting. Great advantages could accrue by providing Internet 2[4] and off-site VPN, which at the time of this report entering the final stage of implementation.[5] The costs of providing Internet 2 in Claremont have shifted from the realm of the untouchable to the eminently reachable; in the last year, the costs have plummeted from an estimated $500,000 to $150,000. The value of VPN for Claremont McKenna faculty and staff is the ability to access - even from home - their u: drive, making storage and retrieval of documents from office to home seamless. Indeed, the primary reason that non-WebCT people list for avoiding on-line courses is inability to access the internet and their u:drive from off-campus. These enhancements will also assist our off-campus students, many of whom are asked to do on-line assignments which require access to their u: drives. In addition, it could assist students on study abroad, in the Washington Program, or engaged in internships outside Claremont. The costs of this project have been incorporated into the current IT budget request which is under review.

In their comments on the draft of this report, our alumni remind us that wireless technologies will become more stable, higher performing and more standard in coming years. The Committee agrees with the Alumni subcommittee that future organizations will have a mixture of wired and wireless technologies supporting their infrastructure, and that the potential of having an "untethered" environment has many positive cost and flexibility benefits.

2. C. The Challenge and Promise of Distance Learning

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[4] Internet2, led by over 180 U.S. universities working in partnership with industry and government, is developing and deploying advanced network applications and technologies, accelerating the creation of tomorrow's Internet.

[5] Adapted from http://net21.ucdavis.edu/newvlan.htm - A VLAN is a "Virtual LAN," or Virtual Local Area Network. A Local-Area Network is a high-speed, low-error data network covering a relatively small geographic area (up to a few thousand meters). LANs connect workstations, peripherals, terminals, and other devices in a single building or other geographically limited area. A VLAN is a group of devices on one or more LANs that are configured (using management software) so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Because VLANs are based on logical, instead of physical connections, they are extremely flexible. For faculty working off campus, they require dial-up access or VPN to connect into the systems on campus.   Short for "virtual private network," VPN is "a network that is constructed by using public wires to connect nodes. For example, there are a number of systems that enable you to create networks using the Internet as the medium for transporting data. These systems use encryption and other security mechanisms to ensure that only authorized users can access the network and that the data cannot be intercepted."
http://webopedia.internet.com/TERM/V/VPN.html

The Committee recommends the College explore the potential benefits of distance learning to our traditional constituencies of students, alumni, and parents.

The consensus of the Committee is that Claremont McKenna should not move unilaterally into the type of distance education that involves teaching students who are not part of our residential college community. Our intent with distance learning is to create connections that support a residential learning environment, and to connect the campus with wider intellectual resources.

Yet members of our community are frequently involved elsewhere, for instance, on study abroad programs, at home using Web registration, e-mail advising and mentoring, internships, and doing Web-involved senior theses. The potential for technology to enhance learning activities off campus is likely to increase. In addition, we may wish to reach out to high school seniors in taking language exams on-line, and parents and alumni may also be interested in distance-learning opportunities. The Committee suggests Claremont McKenna explore avenues that distance learning modes might provide to enhance our residential college life.

Evidence suggests that fulfillment of General Education Requirements inhibits a significant number of students from studying abroad. The Committee urges the College to consider supporting on-line Claremont McKenna courses to insure fulfillment of General Education Requirements so that our residential students are not impeded from the traditional undergraduate experience of study abroad.

For alumni, the Committee recommends the creation of an on-line Alumni College to continue our educational relationship with graduated students, a suggestion welcomed by our Alumni Committee.

The Committee suggests that education of Claremont McKenna students need not be seen as a four-year commitment, but potentially life-long, and possibly expanded to include our Claremont McKenna parents. The College already offers considerable service to Alumni, including Alumni Directories, which will be made available on-line. The Committee suggests that distance-learning capabilities already available to faculty might be used to facilitate on-going Alumni College educational opportunities. Alumni courses at Claremont McKenna could be hosted on a website organized by the professor and facilitated by the Teaching Resource Center and Information Systems and Technology. The Committee recommends experimentation with offering several courses that alumni and parents might find appealing, taught by a selection of our many masterful teachers at Claremont McKenna. The classes would contain electronic syllabi, links to sites, discussion forums, e-mail, chat rooms, and on-line readings. (Following the model of other alumni colleges featuring on-line alumni and parent learning at baccalaureate institutions [for example, Wheaton College [http://onLyon.wheatoncollege.net], Alumni or even Parent distance learners would not receive college credit.) The Committee recommends that at the end of the on-line course component, Claremont McKenna host participants on campus, culminating in an entertaining yet educational weekend college event, where the participants meet one another in person and have close interaction with the faculty instructor. By ending with this intensive gathering on our campus, Claremont McKenna preserves our deep commitment to residential learning.

Parents might also benefit. Claremont McKenna could offer on-line distance learning opportunities separate from our Alumni College by inviting alumni and parents to sit in on classes, which might take the shape of partnering alumni and parents with current four-year students to provide real-world experience to the student classrooms. These Distance Learning initiatives would not be costly, and because of the advanced state of our on-line resources, could be implemented within a year of approval.

Goal 3.To support students, faculty, staff, and administration
with smoother and more efficient functioning of the College.

A review of the materials submitted to our Committee have shown a low investment in training of staff and faculty, which clearly needs to be addressed (3.A.). The Committee asserts that more individualized assessment of needs should figure in the standard workstation replacement policy of a three-year rotation (3.B.). Further, there is great need to unite Information Technology with improved teaching, which can be assisted through dedicating more funds to an expanded Teaching Resource Center (3.C.) and modifications in administrative structure (3.D.). Finally, the Committee recommends reorganization so that more IST staff could be brought together in a central location to foster better morale, greater communication, and more productivity.

3.A. Improved Training of Staff and Faculty

Existing equipment and technology are going untapped because there is inadequate training or there are specific barriers to their use. The Committee suggests that in the immediate present, the College should encourage staff and faculty to learn to use what we already have by coordinating a first rate faculty and staff training program drawing on the talents and proclivities of existing IST and TRC staff.

To facilitate the creation of such a training program, the Committee proposes the development of standards of technological competence for jobs at Claremont McKenna. Standard expectations for competence can be streamlined with the assistance of Human Resources staff, with appropriate technical skills for each job listed. Future job descriptions should reflect the expectation that Web development and maintenance will be a component of many positions at the College. The College should make the review of compensation and job descriptions standard practice as positions are vacated.

The Committee recommends that the College develop mid-range processes for training and ongoing skill enhancement which would augment the IST department's staff by designating technical mentors, users, and key contacts within different institutional divisions. The development of a comprehensive training operation must appeal to and meet the needs of a broad range of users and support and encourage experimentation; there will naturally be great variety of skills for the various positions at Claremont McKenna. Providing on going and "just in time training" in the model of many businesses would allow training in immediately relevant subjects as well as a unified management strategy to promote deeper and more department-specific training.

The effects of new technology reverberate through much of the educational environment, from dealing with electronic plagiarism and other forms of academic dishonesty to the lack of clarity in fair use and copyright policies for online courses. Intellectual freedom, privacy and intellectual property rights, and copyright compliance within technology must be addressed in the appropriate committees at the College, and policies that emerge should be disseminated widely, along with appropriate means of redress anticipated, discussed, decided, and enforced.

3. B. Optimizing Use of Workstations

More individualized assessment of needs should figure in the standard workstation replacement policy of a three-year rotation. The Committee further

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recommends the clarification of procedures for how we request upgrades or replacement of equipment.

Not all staff and faculty wish and/or need to upgrade computers after three years. So long as use of equipment does not cause problems (e.g., incompatibility of formats), the College should devote such savings toward updating its resources elsewhere. Student computer labs and workstations of some faculty and staff should be upgraded more often, just as continued use of older workstations for less-intensive computing needs can help reduce costs. Low end or older workstations can be retasked in kiosks as information appliances, rendering them inexpensive and basic. To reduce the population of old equipment with incompatible formats, the College should offer skilled one-on-one conversions as a routine operation. This innovation might convince staff and faculty to upgrade despite past negative experiences.

3. C. Improving Support for the Teaching Resource Center

Throughout its discussions, the Committee consistently sought to base their decisions on Claremont McKenna's primary mission of educating students. The Committee agreed that the need to unite Information Technology with improved teaching could be assisted through dedicating more funds to an expanded Teaching Resource Center and modifications in administrative structure.

Currently, a part-time Director, an Educational Technologist, and an Educational Technology Assistant staff the Teaching Resource Center. The Teaching Resource Center "provides faculty with assistance designed to improve undergraduate teaching at Claremont McKenna College. Toward this goal, the Teaching Resource Center invites faculty to participate in professional development and leadership opportunities, facilitates new faculty orientation and offers assistance in developing teaching techniques, resources and technology."[6] Assisting with technology is only one of a myriad of activities supported by the Teaching Resource Center. The success of the courseware product WebCT (see point 2.B.) has led to a phenomenal explosion of demands on the staff of the Center.

Despite its success, the Teaching Resource Center relies on soft money for its operations. The Committee recommends that the funding of the staff salaries and main costs for the Center be brought into the general operating budget, and staffing of the Center be expanded by adding additional educational technologists discussed above (2.A.).

3. D. Optimizing IT Management

The Committee has determined that a major source of dissatisfaction among constituencies was the lack of information on where the College was headed and which individuals were responsible for completing different tasks in the use of Information Technology. The Help Desk has been an important step in the right direction. In addition, a clear, predictable process for budgetary and managerial decisions regarding the handling of information and Information Technology planning should be an immediate institutional priority.

To build alliances with students, faculty, and staff, the College needs to move beyond merely informing students, faculty, and staff of various committees' deliberations, and empower various constituencies to achieve a truly collective, negotiated vision. Lines of

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[6] http://www.mckenna.edu/trc/mission/mission.html

communication and needs assessment can be improved. Regular forums might be instituted in which faculty, staff, and more students can exchange ideas and practices.

Our alumni suggest that an ongoing process of meeting with department heads to determining and prioritizing needs would be helpful in addressing conflicting priorities and review budget implications, and that the President must be deeply involved in this process.

Offering specific recommendations on governance properly falls outside the charge of this Committee. The Committee was, however, provided confidential relevant materials and invited to comment. Our perusal of those documents has led us to concur that many of the proposed changes in Information Technology structure and governance, including reporting structure, committee formation, and reallocation of resources, may be of great assistance, and we urge the President to consider suggestions in support of improved management seriously.

3. E. Centralizing IT Operations

The Committee recommends reorganization of physical accommodations so that more IST staff can be brought together in a central location to contribute to higher morale, greater communication, and more productivity. As a long-range issue, the Committee suggests that, if the College chooses to expand in student size or to build additional facilities, it makes eminent sense to fold the desirability of centralizing some Information Technology services into the planning process to maximize productivity. Physical centralization might be cost effective for project teams, and possibly the training of new IT personnel. On the other hand, the Admission Office strongly supports the need for having computers and technology used in a disbursed campus-wide manner. Vice President and Dean of Admission and Financial Aid Richard Vos comments, "The visual impact on our campus visitors of seeing technology being used on a daily basis in the classrooms, in various computer labs, and in the residence halls is very powerful."

Another means of centralizing Information Technology is to explore deeper cooperation with our sister colleges. In recent years, consortial cooperation in support of Information Technology at the Claremont Colleges has made remarkable strides. The implementation of the CARS/Jenzabar student administrative system, partially funded by the Mellon Foundation, promises to have a profound and positive impact. Currently, several possible consortium-wide efforts to improve services in Information Technology are being explored. One is a proposal to the Mellon Foundation that would support a cooperative approach to Academic Computing. The second, which came at the suggestion of the Mellon Foundation, is the possibility of a Mellon-supported center located in Claremont on the model of the Center for Educational Technology in Middlebury, VT. (See http://www.cet.middlebury.edu/) These exciting possibilities rest on a relationship of trust and cooperation. The Committee approves the fostering of a more collaborative and partnership approach within the Consortium.

These efforts at centralizing services to strengthen the Claremont consortium as a whole are to be applauded. To promote even greater efficiency, the Committee recommends that the lines of communication among members involved in the construction of consortial agreements be enhanced and further, that a possible institutional "log" be created and stored in an accessible manner so that members on various committees remain aware of on-going developments. (This enhancement of communication may well be effected by the proposed changes in governance.) The Committee supports continued discussion of information storage, retrieval and transfer, as well as the tools that support interaction and creativity at Claremont McKenna. Ultimately, many choices will depend on consortial input.

(Our alumni have suggested a more drastic cooperation, including the creation of a consortium-wide CIO position, and to ensure personalized support at each campus, keeping a small support staff at each campus dispatched by the help desk. Such centralization was discussed in Committee, but the consensus of our deliberations leaned toward retaining much of the current structure.)

Finally, as the web increasingly becomes the principal mode of information transmission, the College would do well to investigate what facilities would be needed to archive and preserve information in all formats for the campus as a whole. Different departments of the College may need their own central storage unit for sharing access to common databases. These data and common databases can possibly be housed together within a newly centralized Information Technology Department.

Goal 4. To begin to establish the College as a leader in Information Technology in conformance with its unique mission, which extends beyond consortial relations into establishing a presence regionally and nationally in educational organizations dedicated to issues of information technology.

Global changes in Information Technology opportunities will affect Claremont McKenna's market niche. Previous undergraduates were expected to be able to read and write well, and to understand the intricacies of library research and the evaluation of books and articles. Current and future graduates will be expected to have basic skills for navigating and evaluating within the wired (and increasingly, wireless) world of electronic information. Not all shifts in our ways of teaching and learning and administering will result from our own planning and testing of new ways of acting. Many changes will be effected by innovations made by other organizations, changing student expectations, or mandates from governmental or accrediting organizations. Claremont McKenna must be prepared to address the challenges of a transforming environment, and to maintain our reputation as a top-notch institution, we must be prepared to excel in the transforming environment.

An example of how the world of learning has shifted is that students today are increasingly encouraged to work in teams, emulating the environment in which they will most likely find themselves after graduation. The student labs now operate frequently at or near full capacity, often with groups of students congregating in the labs to do group projects. To incubate a cooperative mentality in learning, the Committee recommends that the College explore setting aside newly designed technology spaces where students could gather for work in a transformed educational environment. The term "Cybercafes" was also invoked, allowing for a more informal cultural space where students could meet and work. Providing such new spaces would respond to lab crowding and new shifts in teaching and learning.

Although Claremont McKenna does not necessarily have to be the leader in technology among undergraduate colleges, the Committee argues that it should have the goal and strategy of leadership in this arena. To set Claremont McKenna apart from other institutions, several ambitious options were discussed in Committee. Our discussions included:

1) developing special course programs and/or requiring information technology competency requirements, which was sufficiently important we treated it separately in section 1;

2) requiring increased student access to computers, either by inaugurating a "laptop campus," requiring laptops for particular programs, enforcing standards in computer ownership and providing an outsourcing plan, or a fourth option (eventually recommended by the committee) of issuing minimum recommendations for computers, as we note below in section 4.A;

3) becoming more involved in regional and national sectors; discussed below in section 4.B;

4) expanding the role of the claremontmckenna.edu website, discussed below in section 4.C;

4) and redirecting our attention toward improving support for IT education of staff, faculty and especially students, a response that could range from implementing the FITness program, to the founding of an institute of applied research in Information Technology.

4. A. A Laptop Initiative

The Committee noted that nationally, institutions have become increasingly concerned about student access to computers. Some colleges have inaugurated a "laptop campus," requiring all students to purchase or lease computers. Others have required laptops for particular programs. Still others enforce standards in computer ownership and provide an outsourcing plan for students to purchase computers. The most common approach is to issue minimum recommendations for computers.

Although the Committee initially expressed interest in a laptop program, our enthusiasm yielded to skepticism upon investigation.

The estimated annual costs for a laptop program at Claremont McKenna would cost approximately $2.5 million. Committee members were provided a great deal of materials about Laptop Campuses. After reading them, committee members questioned whether a laptop program could really set CMC apart from others, since there are many other schools that do offer the service and have been for years. Yet of the many colleges inaugurating a laptop campus, none was a peer college. Nor were there measures of effectiveness of a laptop campus available, despite searching for such data. Further, even if Claremont McKenna did launch such a program, because students from all seven campuses can take classes here, Claremont McKenna professors cannot assume laptop ownership, regardless.

A sub-committee was charged with contacting laptop campuses to gather more information. Investigation revealed that in reviews of programs felt to be successful, the learning outcome that laptops facilitated was enhanced communication. This insight was confirmed by recent report in The Chronicle of Higher Education,[7] which goes on to question the value of a laptop program. Moreover, in a study of student computer ownership at CMC, statistics showed that the percentage of students with computers approximated 85-90 percent or more.

Given that a) our College has already invested millions of dollars to become successfully wired, b) the vast majority of our students already have computers and live on campus close to one another, and needy CMC students may borrow funds to purchase or lease computers; c) non-CMC students cannot be required to have computers, but have access to labs, and d) there is already courseware that facilitates easy communication, the need for a laptop program at Claremont McKenna - especially at the cost of a yearly outlay of millions - does not appear warranted.

Rapidly changing technologies and ambiguous measurements of the value of laptop requirements convinced the Committee to suggest postponing investment in a laptop program. Instead, the Committee suggests providing recommended standard configurations, as well as popularizing the Office of Financial Aid 's current computer

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[7] "Colleges Differ on Costs and Benefits of Ubiquitous Computing," Florence Olsen, The Chronicle of Higher Education, January 26, 2001, p. A45.

loan purchase program to insure that financially needy students have ready access to computer technology at CMC.

The Office of Financial Aid allows students to adjust their financial aid budget by the cost of purchasing a computer. Students' are permitted to borrow additional loan funds if they have remaining eligibility through the various loan programs (e.g., Federal annual and cumulative loan limits, College Loan funds based on availability of funds). The Federal Student Aid Handbook stipulates and authorizes as a permissible expense effective October 1, 1998, the documented rental or purchase of a personal computer. This program is low cost, already in place, and offers maximum benefit to our students who may determine how much they wish to spend and whether to lease or purchase a computer.

4. B. The Committee approves efforts at CMC to become members in nationally respected Educational Technology organizations.

In the External Review of Information Technology, Claremont McKenna was taken to task for its being out of touch in the regional and national sectors. The Committee agreed that this is a deficiency. The Committee determined it would be strategically advantageous for the College to become more involved in intentional communities dedicated to the use of Information Technology in teaching and research.

Multiple benefits could accrue. For instance, the Mellon Foundation has made considerable strides in the support of language technologies at its center in Middlebury. EDUCAUSE offers Management Institutes to assist colleges in planning how to curb costs and maximize benefits in Information Technology. The Consortium of Liberal Arts Colleges (CLAC) is an organization comprised of many of the top liberal arts colleges in the United States, devoted to the uses of computing and related technologies in the service of the liberal arts mission. Our association with CLAC could be highly energizing. Some of CLAC's activities include "an annual conference, co-sponsorship of sessions with other groups such as EDUCAUSE, electronic data-sharing, hardware and software grant distributions, volume-discount negotiations with computer vendors, collaborative software development projects, multi-campus hardware and software testing, and representation of the interests of liberal-arts institutions on information-technology issues at the national level when appropriate. CLAC also provides referrals for colleges that seek qualified consultants in all areas of uses of information technology in liberal arts environments." (http://www.liberalarts.org/intro.php3)

4.C. The Committee strongly supports expansion and enhancement of the College website.

A top-notch public website can be both an effective marketing tool and a helpful means to achieve multiple goals. Assessment of the website revealed that in multiple categories (viz., on-line Application, Financial Aid Application, Course Catalog, Course Registration, Degree Requirements, Library Catalog, Course Reserves, Academic Journals, Faculty/Staff Directory, Athletic Event Schedule, Alumni Services, Press and Media Services), the current website is inadequate. The Committee notes that the creation of a Web sub-committee appears to have been of assistance, and agrees with the Web Sub-Committee in privileging undergraduate applications, financial aid applications, an improved course catalog and the listing of degree

requirements. All are well-known strategic indicators of increasingly standard technology services among elite undergraduate colleges.

Additional components the Committee believes will be useful for staff and faculty will be the creation of digital libraries of images and streaming video, Java applets that utilize new forms of interactivity, 3-D environments, and other such technology-enhanced instructional materials to enable professors to embrace new pedagogies. The programming experts skilled in technology we describe in 2.A might facilitate assessment of their utility.

4. D. Shifting new investment into improving support for IT education of staff, faculty, and especially our students.

The options and suggestions we have outlined have obvious impacts on our resources - both technological and human. The Committee was asked to consider a range of options, from low to extremely high. This summary section noting the move away from technology as an end to technology as a tool and proper subject of education admits of multiple possible futures. During our discussion of the top concerns to be listed in an Executive Summary, the Committee agreed that the most significant direction they believed the College should take was toward the first set of goals: student fluency in technology.

The Committee believes this orientation properly focuses our resources on the reason why Claremont McKenna exists: to educate future leaders.

Whether or not our recommendation to initiate a FITness program is accepted, however, the majority of our suggestions remain apt if we are to offer our students a rounded education in these times. If FITness is determined to be a proper concern for our students, the success of such a program will depend on the education of faculty and staff as well. Support of these constituencies will depend to a large degree in the success of attaining the goals outlined in Sections 2 and 3. If actual leadership is desired in this area, FITness will accomplish much, indeed far more than most colleges in our peer group.

If, as we hope, Claremont McKenna moves to a more experiential, team-centered learning approach to complement course-based instruction, including laboratory experiences in studio-type settings, field-based learning through internships, and practica in which students work as members of task-oriented, problem-solving teams, possible changes in publication and teaching standards may need to be recommended by the Dean of the Faculty and assessed in light of new criteria for incorporating technology into promotion and tenure decisions. Further, faculty willing and able to devote time to teach in innovative ways through and about technology should be supported in doing so. A publish or perish approach that fails to reward creative teaching in service of our students undercuts the very mission of Claremont McKenna College: to educate our students well.

An extremely high investment, but perhaps not an unreachable one, would be the establishment of an Institute, which could assist, in applied research in Information Technology, or perhaps Information Technology and Public Policy. Such an institute could reflect the special emphases of the College, viz., leadership and business, the professions, public affairs and politics.

The potential benefits of such an institute for students are obvious: it could provide access to research opportunities, facilitate the honing of their skills, and link students to industry internships and other educational opportunities. This would also benefit faculty and staff. Many of our alumni affirm that their job prospects after graduation were expanded exponentially by a well-connected professorate and internship opportunities. If we intend to hope to continue this function in the future, such an initiative might provide the critical link between the academic world and the larger world. Our alumni support this suggestion and add

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some very interesting specific possibilities: " If we are to create leaders in technology," they write, "we believe one can focus on three positions: the Chief Information Officer, the Chief Technology Officer and the Technology Entrepreneur. The subcommittee believes these are the positions for which technology leaders aspire." Such a model might fruitfully be explored if we are committed to retaining CMC's leadership emphasis. The alumni report adds, "real learning will come from further partnerships. We believe a student of Information Technology should have the opportunity to work on joint projects with the business sector, similar to Harvey Mudd's senior year project. Solving real business problems with technology is the best learning for becoming a technology leader."

A distinguishing feature of Claremont McKenna is its commitment to reinforcing superb teaching with superb scholarship. The institutes of the college have served a critical role in providing for the on-going education of not simply our students, but our faculty as well. Considering the explosive growth of technological change, it is logical that Claremont McKenna develop an institutional response to the challenges of educating its faculty in Information Technology.

Existing and future resources have and will continue to accomplish a great deal in terms of technical proficiency. Visiting renowned experts in different fields supported through an Institute could move beyond technical proficiency to offering guidance to the faculty. On-going subjects could include incorporating changing technological advances and concepts into their research and teaching, and exposure and opportunities to deepen their understanding of computing and information technology forces. An Institute could support better teaching by providing course release time and student research assistants as well, in addition to assistance in formulating the IT component of faculty proposals for research funds from external sources.

List of Appendices

1. Charge to the Committee on Information Technology

2. Metrics Evaluating Information Technology at Claremont McKenna College

3. IT FITness Grant Proposal

4. Sub-Committee Reports

5. IT Self-Study Materials

6. A Comment on Growth

Appendix 1
CLAREMONT McKENNA COLLEGE
STRATEGIC PLANNING, 2000 – 2001
CHARGE TO THE COMMITTEE ON INFORMATION TECHNOLOGY

Basic Objective: Develop a strategy for positioning Claremont McKenna as a technology leader in higher education. The Committee will also seek to develop metrics to measure the attainment of its strategic objectives.

Overview of Process

To establish its strategy, the Committee will need to:

1. Establish where we are today.
- Evaluate the environment to answer the question "Where are we now?"

2. Determine where we want to be in the future.
- Develop the strategy and vision to answer the question "Where do we want to be?"

3. Identify the gaps.
- Define the gaps between where we are now and where we want to be in the future.

4. Establish the steps needed to create the environment we want for IT.
- Develop the plan to answer the question "How will we get there?"

Areas to be addressed

The strategy for information technology must include:

1. Evaluation of the appropriate organizational model for information technology at CMC.
2. Developing a plan that supports the mission of the college.
- Careful attention to the unique mission of the college must be employed in order for the plan to meet the priorities of the institution.

3. Assessing long-term opportunities for introducing more effective instructional technologies.
4. Aligning technology with the other institutional entities.
- Information Technology is an integral part of every academic department and administrative office. The planning process must include and be a part of other areas of the strategic plan.

5. Building alliances with students, faculty and staff.
- Key individuals within the student body, faculty and staff must understand the importance of the information technology initiative and take ownership of it.

6. Ensuring that CMC has a competitive edge in the market place.
- Technology-enhanced education will be required in higher education in the years to come. CMC must position itself to be a leader in this area.

7. Disseminating knowledge about technology needs and constraints.
- As part of the planning process, it is important to inform the CMC community about current achievements, operations, and constraints of information technology at CMC.

8. Projecting needed financial support.

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- Deployment of IT will be a critical success factor for CMC. It is expensive and, therefore, must be made a part of the yearly operational budget.

9. Establishing CMC as the Information Technology leader within Claremont.
- In order for CMC to take advantage of the intercollegiate cooperation of The Claremont Colleges, CMC must establish itself as the recognized leader in IT. In this role, CMC can establish the importance of technology in higher education and shape the services needed to support the mission of CMC.

Appendix 2
Metrics Evaluating Information Technology at CMC

There are many guides currently available which purport to measure or evaluate Information Technology on undergraduate campuses. The Committee discussed three: an Appendix of the IT Self Study which combines certain measures from four sources; the Yahoo! Internet Life magazine and its "Most Wired" ranking scales; and the EDUCAUSE Online Guide to Evaluating Information Technology on Campus.

"A Self Study of Information Systems and Technology" (Appendix 5)

The Self Study provides an exhaustive inventory of the technology in classrooms, and includes tables drawn from The Campus Computing Project's 1998 National Survey of Information Technology in Higher Education; The American Fresham and National Norms for Fall, 1998 and The American College Teacher, 1998-1999 by the Higher Education Research Institute of UCLA; and The Campus Computing Project of October 1999. The Self-Study received considerable attention within the Committee and the External Review. The Committee considered the 14 measures listed in the Self Study's Appendix E's tables, and determined the following.

Table 1. Does CMC Have a Mandatory Computer Purchase Policy for All Students?
- No; see discussion of Table 3, below.

Table 2. Does CMC Have a written software piracy policy on copyrighted software?
- Yes. Greater concern with policy consideration is discussed in section 3.D.

Table 3. Percentage of students, faculty, and administrator ownership or access to desktop computers.
- A survey of student computer ownership conducted by IST for the IT Strategic Planning Committee revealed that despite there being no mandatory purchase policy, nearly ninety percent of the student body have computers in their dorm rooms. Consideration of a mandatory policy occupied much of the committee's time; see section 4. Student ownership at CMC is nearly twice the national average: the 1998 Private 4 year College statistic shows 48.3% student ownership. Since last year's policy of providing computers to all faculty, that statistic broaches 100%, far exceeding the national statistic of 62.1%. Nearly 95% of staff/administrators have computers, outstripping the 52.6% national statistic.

Table 4. Academic Computing budgets.
- According to Ringle and Todd's report, funding for technology at CMC has improved considerably (p. ii), with CMC ranking 11th in terms of the amount of technology funding per student. It continues by suggesting that "current budgetary emphasis on hardware spending should be shifted to user services (i.e., staffing) and curricular software acquisition."

Table 5. Operating Systems Issues.
- CMC diverges from other private 4-year colleges by not describing as "important" Mac, Unix, and Linux systems, instead maintaining Windows 98 and now 2000, and NT. The external review "strongly recommends" "adoption of a support policy for hardware and software that permits users to have maximum freedom of choice within the framework of budgetary and staffing constraints". The Committee supports the recommendation to ensure maximum creativity, but also recommends that policy committees review support

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demands occasioned by this change in policy.

Table 6. Single Most Important IT issue Confronting the Campus.
We have used this Table not to determine the single most important issue confronting the campus, but to examine the various issues common at undergraduate institutions.

Access to Internet:
- Like other institutions with which we compare ourselves, in the last year CMC has made tremendous progress in meeting this goal on campus. However, faculty are extremely dissatisfied because of the inability to access CMC u: drives from home. This lack of access is a result of the collapse of the arrangements for Consortium modem banks and the resulting delays in the implementation of a proposed VPN (virtual private networking) system. An important goal should be to provide dial-up access to a VPN network for faculty, staff, and off-campus students. (This recommendation is detailed in 2.B.)

User Support:
- The Committee sees this goal as a "very important" issue that has not been sufficiently resolved, discussion of which appears throughout the report.

Integrating IT in Instruction:
- The implementation of a courseware package (WebCT) and parallel training of so many faculty have resulted in greatly increased integration of IT in Instruction. Much more remains to be done, however, if we are to succeed the next step of incorporating technology issues in the curriculum, and expanding faculty ownership of technology in instruction. The Teaching Resource Center should continue to provide incentives to faculty to spend greater energy on improving their skills. In addition, the Committee suggests exploring the related initiatives of a technology fluency requirement, a possible program in Technology (1.A), and possibly an Institute (4.D) that would contribute to curricular innovation in technology issues.

Replacing Hardware:
- The Committee applauded the recent transition from a 4-year to 3-year replacement cycle of workstations. The issue that concerns the Committee is the planning and process of replacement, and secondarily, the financial costs of achieving replacement. The Committee suggests greater student and faculty representation in the decision-making process on hardware replacement. The Committee agrees caution is necessary for heavy investment in expensive new hardware. Technology is changing so rapidly, that potentially, it might be fruitful to make routine consulting with external reviewers a wise investments as well (3.B).

Expanding Network:
- The expansion of the network was understood by the Committee to be tied to consortial processes and stresses. The Committee supports investigation of faster network capability and expanding CMC's role in determining the Network (2.B).

Using IT in Distance Education:
- This metric was not considered significant for the undergraduates of CMC, a residential college. However, the Committee agreed we should investigate the use of Distance Education among off-campus abroad students, as well as an Alumni College that would have on-line as well as residential components. In addition, members of the Committee suggested it would be fruitful to investigate offering alumni who are expert in certain fields the opportunity to act as "virtual" participants in existing courses with substantial on-line components (2.C).

Reorganizing IT Units:

- The Committee notes with approval that the President has taken steps to increase the efficiency of Information Technology services at the College.

Table 7. Computer Use Among Entering College Students.
- The students on the Committee confirmed that students entering CMC used computers in excess of the reported 1998 national statistics: using the internet for homework - 83%; email - 66%; chat rooms - 54%; and computer games - 80%.

Table 8. Teaching Methods Used in Most Undergraduate Classes.
- CMC prides itself that most courses incorporate class discussions, in excess of the average of 68%. While independent projects may be variously defined (national, 33%), it is likely that CMC has similar percentages, if not more, given senior thesis requirements. By contrast, there are no teaching assistants (national, 9.4%). If courseware is included in the percentages of the category "Computer- or Machine-aided instruction," the over 160 WebCT courses in AY 2000-01 additional Web-based instruction far outstrips the statistic of 21.5% nationally. Indeed, the WebCT courses alone comprise 36% of the 197 courses offered Fall 2000 at CMC (excluding internships and senior thesis), the first semester of campus-wide implementation. By January 2001, 75% of all full-time CMC faculty will have been trained in the last year in web-based course tools, reflecting intense interest and commitment of the faculty in the use of technology to improve teaching, particularly in the lower-level courses.

Table 9. How Faculty Use Computers.
- Prior CMC surveys related to this question determined that CMC use strongly paralleled and in some cases exceeded the rates nationally. In particular, use of e-mail on a daily basis was higher during the workweek, with drop-off on the weekends; conducting research on the internet was correlative; creation of presentations was less than the national average (perhaps because of our emphasis on discussion rather than teaching large sections); commensurate or higher in terms of data analysis; and because of the introduction of WebCT, greater use of online discussion groups.

Tables 10 and 11. Faculty Opinion: Sudents' Use of Computers Enhances Learning, Source of Stress.
- The Committee has not studied these issues in detail. Given faculty interest, a substantial percentage of faculty concur with the statement that "computers enhance learning," and considerable anecdotal evidence reveals faculty also believe the latter; they are not mutually exclusive. Faculty are very concerned about how much time they must expend on computer training and keeping up with technology. In addition, the blackouts caused by the interruptible power agreement of The Claremont Colleges have led some instructors who had used WebCT in the past to distance themselves from on-line resources.

Table 12. [Campus] Website Services, by Sector.

Undergraduate Application CMC accepts an online Common Application, a generic application used by almost 200 selective American colleges and universities as an alternative to its own application form

Financial Aid Application The College Scholastic Profile (CSP) is available and can be completed on the web, and Free Application for Federal Student Aid (FASA) is available on the web.

Course Catalog Poor.

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Course Registration	No; CARS project in place.
Degree Requirements	Not in dynamic form.
Library Catalog	Yes.
Course Reserves	WebCT courses have on-line reserves, and many faculty use the Library ERes program.
Academic Journals	No.
Faculty/Staff Directory	Poor.
Athletic Event Schedule	Yes
Alumni Services	Fastracked behind Admissions.
Press and Media Services	Fastracked behind Admissions.

- The Committee noted that the Libraries of the Claremont Consortium have moved to provide some academic journals on-line, and already maintain an excellent Electronic Reserves System, called ERes, which has been showcased twice in the last year at CMC by the Teaching Resource Center. The CARS implementation will address on-line registration. The Committee strongly urges improvement of the claremontmckenna.edu website in the above areas specific to CMC, as noted in 4.C.: "All are well-known strategic indicators of increasingly standard technology services among elite undergraduate colleges. In terms of priority, the Committee agrees with the Web Sub-Committee in privileging undergraduate applications, financial aid applications, an improved course catalog and the listing of degree requirements."

Table 13. Rising Use of Technology in Instruction.
- CMC is currently ahead of the strategic markers of e-mail, internet resources, class web pages, and presentation handouts. The use of CD-ROM materials has not been studied. The Committee noted that the Teaching Resource Center has sought to construct a digital library to archive streaming video, Java applets, 3-D environments, and other such instructional material to enable professors to better utilize technological pedagogies.

Table 14. User Support Ratios.
- The External Review assessed this ratio and determined that the College has made tremendous strides in this area. The largest omission is in Academic Computing, discussed in section 2.A, and organized plans for training, discussed in section 3.A.

The Yahoo! Internet Life magazine and its "Most Wired" ranking scales.
There was considerable concern expressed in the Committee meetings that CMC did not rank very highly in the study. In an article for The Chronicle of Higher Education, representatives from Yahoo! Internet Life magazine noted that

the most important factors in calculating the rankings were those that showed technology in use to benefit the lives of students. Colleges and universities with *well-developed on-line admissions* and *registration systems* scored high. Having *courses that make extensive use of the Internet* for research or class communication also improved an institution's showing.
This year [1998], Mr. Bernstein said, the survey put *less emphasis on the details of each campus's technology infrastructure*, such as the *number of personal computers*, the *size of the campus network*, and *even the much-vaunted "port-to-pillow" ratio. That ratio, which compares the number of high-speed network connections to the number of students in residence halls, is "a statistic that isn't really valuable at all," said Mr. Bernstein.* "There are certain schools that have 20 ports per student. It doesn't mean that students are using those ports," he said. "It just means that there are a lot of

outlets." Such elements of infrastructure, said Mr. Bernstein, aren't useful in differentiating the top wired colleges, because most of those institutions are now developed to about the same degree. "All the universities are getting wired now," he said. "What makes one different from another?" (Emphasis in italics; see http://chronicle.com/data/internet.dir/itdata/1998/04/t98041401.htm)

The Committee's consensus that the focus of our report should not be on technology itself, but the functions and needs that can be supported by information or communications technology in light of the college's unique mission, agrees with the spirit of the Yahoo! Internet Life magazine representative's comments in The Chronicle. While hardwiring and personal computers are important tools, and the College has made admirable progress in this area, the metrics for success with technology must be tied to student, faculty, and staff benefits accruing from better teaching, service, and efficiency. This concern resulted in the substantial revisioning of our Report, and orienting our metrics. The Committee believes that the shift away from emphasizing infrastructure and hardware, toward services, will likely result in a higher ranking.

[The EDUCAUSE Online Guide to Evaluating Information Technology on Campus](http://www.educause.edu/consumerguide/)
(http://www.educause.edu/consumerguide/)
The EDUCAUSE guide is specific to students, and has become a major source of information for high school students researching potential colleges. The EDUCAUSE Online Guide queries the Academic, Administrative, and Social Experience students might anticipate at a college, as well as requirements, services, and costs students will encounter. IST staff have prepared materials on the EDUCAUSE guide in the past, and Robert Walters reports that their findings revealed current CMC students think poorly of computing on campus in relation to many of these measures. The Committee examined these metrics and agree they reflect important areas of concern to potential students. The issues mentioned in the Guide often overlap those raised in the fourteen tables, hence we have highlighted in italics those issues not yet covered in prior metrics, and provide responses after each section in bullets, as above.

Academic Experience

What percentage of campus courses uses electronic information to enhance the course (for example, syllabi, reading lists, discussion groups, and demonstrations)?
What library resources are available online (catalogs, databases, special collections)?
What electronic reference materials are licensed and how accessible are they from outside the library (for example, in the residence halls or off-campus)?
How does the campus help students develop computer skills?
- There was unanimous agreement in the Committee that helping students develop computer skills was essential.
Does the campus allow students to receive credit for courses taken electronically from other sources?
- The question of allowing students credit for online courses from other sources was almost to the person rejected in favor of continuing to support residential teaching. On the other hand, the possibility of fulfilling CMC courses in an on-line fashion was considered meritorious of review.
Does the campus have a specific computer/IT competency requirement for all undergraduates?
- The Committee suggests the consideration of a specific computer/IT competency requirement.

Are course reserves and other materials available online/via the Web site?
What percentage of faculty has a networked computer available to them?
What percentage of faculty use e-mail regularly?

Administrative Experience

What information about admission and financial aid is available online, and can necessary forms be submitted electronically?
Is the college catalogue, including important campus policies, available on the Web?
Can a student access her personal student information/data online?
- The Committee agrees that providing student access to personal student information/data online would be beneficial, and adds that this will be addressed in the Jenzabar/ATT administrative system supported through the Mellon Foundation.

Can a student find out his grades online or by phone at the end of a semester?
- The Committee agrees that providing grades online or by phone at the end of a semester would be beneficial, and it is hoped that the Jenzabar/ATT project will facilitate this. It is currently available if faculty make use of WebCT.

Is registration, including dropping and adding courses, processed electronically?
Can students pay bills, receive loans, make campus bookstore purchases using online Procedures?
- The Committee agrees that providing students the ability to pay bills, receive loans, and make campus bookstore purchases using online procedures should be explored. The Committee suggests further that it would be beneficial for parents to be able to check their accounts.

What campus and community services do "smart cards" or "debit cards" cover?
- The Committee agrees that expanding campus and community services covered by "smart cards" or "debit cards" would be beneficial, and it is hoped that the Jenzabar/ATT project will facilitate this.

What student information does the campus provide routinely to parents?
- The Committee agrees that the question of providing student information to parents merits exploration, within the constraints of student privacy.

Social Experience

What percentage of students on this campus has full-time use of personal computers?
What is the ratio of public access computers to undergraduate enrollment?
What percentage of students uses e-mail and other software applications on a regular basis?
Does the campus allow personal Web pages?
- The Committee agrees that CMC should continue to provide students the means to create personal Web pages. In addition, the Committee suggests that the College might consider the establishment of a Student IT Committee to work in parallel with the Committees already in place for the Trustees, Senior Staff, and faculty in Academic Computing.

Is contact information for students, faculty, and staff readily accessible electronically?
Is there a campus code of behavior for use of computing and information resources?
What social activities and services are available over the Web?
- The Committee agrees that social activities and services should be integrated into the Web Project.

Are there Web sites for student organizations and clubs, and are these linked to the campus home page?

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- The Committee agrees that Web sites for student organizations and clubs might be appropriately linked to the campus home page or at minimum, maintained at the Student Gateway page.

Requirements, Services, and Costs

What, if any, technology fee is charged by the campus and what does it cover?
- CMC has no technology fee.

Are students required to purchase their own computer?

How does the campus make computing and network access financially available to all students?
- CMC maintains free access to computer labs and has free on-campus network access.

Does the campus assess extra fees for network connections in the dorms or for off-campus access?
- Currently, CMC does not provide off-campus students with network connections; however, there will be dial-up access after July 2001.

If I bring my own computer equipment to school, what kind of support can I expect from the campus?
- The Committee noted that the new RTA program addresses the issue of students bringing their own computer equipment to school. The Committee suggests investigating establishing a list of approved outside support technicians available to students at their own risk and cost.

What hardware and software standards, if any does the campus require, recommend, and/or support?
- The Committee noted that at minimum, the campus should continue to recommend hardware and software standards.

What kinds of services (help desk, training, troubleshooting) are provided by the campus, and during what hours of operation?
- The Committee noted that a help desk has begun, with varying hours of operation. In addition, a number of training workshops is available, and the new RTA program addresses the issue of troubleshooting.

Does the campus have a plan for keeping the hardware current, and, if so, what is the replacement cycle?

How does the campus support printing for the students, and is there a charge for this?
- The Committee noted that printing resources exist for the students in the labs, for which there is no charge. However, there is evidence that students would favor the ability to print in their dorms, a possibility that the Committee suggests be explored.

Introduction

Claremont McKenna College seeks a grant of $1,279,000 over three years to study the most effective means of adapting all or part of the National Research Council's newly developed FITness approach to information technology instruction at a liberal arts college. This novel approach emphasizes the development of information technology *fluency*, suitable for a lifetime of information technology advances and improvements, rather than a narrow skills-based approach. Outcomes from the work under this grant will be made portable within the consortium of The Claremont Colleges (which enrolls approximately 5,000 undergraduates in total) and through CMC's work with The Mellon Foundation to liberal arts colleges around the nation.

About Claremont McKenna College

Claremont McKenna College (CMC) is a highly selective, undergraduate, coeducational, independent, liberal arts college with an emphasis on public affairs and a curriculum designed to prepare students for leadership in business, government, and the professions. Founded in 1946, and with a current enrollment of 1019, CMC is the youngest and smallest college ranked in the *U. S. News & World Report* top 15. Over 83% of the entering freshman class this fall graduated in the top 10% of their high school class and their combined median SAT scores are 1400. We admitted only 29% of the 3,046 students who applied for admission. The student body is remarkably diverse for a national liberal arts college with minority students comprising 34% of the student body. These students journey from 40 states and over 25 nations to study here. They enjoy the benefits of a small college—including a student faculty ratio of 7:1—yet have access to the combined resources of The Claremont Colleges, an Oxford-like consortium of five undergraduate colleges and two graduate institutions, all directly adjacent to each other. Altogether, there are more than 5,000 undergraduate students in Claremont. Many of these students are engaged in the various joint programs offered by The Claremont Colleges, such as neuroscience, drama, media studies, and modern European languages. CMC students also have the opportunity to work directly with faculty on substantive research projects via the senior thesis requirement and the nine research institutes located on our campus.

Claremont McKenna College and the Use of Information Technology

Claremont McKenna College's mission of preparing students for leadership is one that is particularly well suited to a residential college with an emphasis on intensive student-faculty interaction. To accomplish our mission, we must ensure that the quality of teaching at CMC is

second to none and that it makes use of the latest forms of technology, pedagogy, and student learning modes.

The College is exceptionally well prepared to integrate information technology into our students' educational experiences. Our campus has nearly six miles of installed fiber optic cable linking every building on our campus and over 90 miles of copper cable within our academic buildings and residence halls. This cabling provides over 400 data ports in classrooms, over 500 ports in faculty and staff offices and two in every student room. Nearly every classroom on our campus is now a smart classroom with full multimedia presentation and data access capabilities incorporating the latest instructional technologies. Recognizing that the integrated nature of new technologies has blurred earlier distinctions between pedagogical tools and electronic devices, two years ago we integrated computing, information resources, and audio visual departments into a single centrally managed operation, Information and Technology Services. We now have an Information Technology staff of fifteen professionals including a new four-person Web Team and an annual expenditure of over $2 million.

Information Technology and the Teaching Resource Center

We have reached the point where we have the appropriate tools and technology infrastructure in place to effectively incorporate technology into our teaching. All faculty receive workstations and some 90% of our students have computers in their rooms. We have also established a new Teaching Resource Center (TRC) designed to provide our faculty with training and expertise in the use of information technology in the classroom. Our main focus of the TRC has been on training faculty in the use of WebCT and related web-based technologies. WebCT is a software program that assembles an array of educational tools into a single package that works with a web browser. Using WebCT, a faculty member is able to supplement classroom teaching with communications capabilities, such as real-time chat rooms and course-based bulletin boards, e-mail, multi-media capabilities, assessment by means of on-line quizzes, and access to external reference sources. WebCT permits classroom use of any web-based materials such as text, graphics, PowerPoint presentations, and the use of digital images and audio visual files.

In the last year, the Teaching Resource Center has trained nearly 60% of our faculty in the use of WebCT. This response from faculty exceeded our expectations and demonstrates clearly that we have achieved one of our primary objectives of creating a supportive environment for faculty to develop skill in technology applications in the classroom. Equally pleasing is the fact that at least one faculty member from every department in the College has participated in the training workshops for WebCT. Again, this exceeded our expectations.

What we have not done is to integrate systematically an understanding of information technology, or literacy, into our curriculum in order to ensure that our students are fully prepared for the information world they will face after graduation. To do so, we want to examine, test, and implement all or part of a novel concept, information technology FITness, as a basis for curricular change.

The FITness Concept

FITness is a new conception of information technology literacy developed by the Committee on Information Technology Literacy (CITL) of the National Academy of Sciences, and is described

in the Committee's 1999 report, *Being Fluent with Information Technology (http://www.nap.edu/books/030906399X/html).* Traditional approaches to technology instruction in colleges and universities generally take the form of a computer literacy approach that stresses competency in specific applications, such as word processing or the use of spreadsheets. In the world of rapidly changing technology applications, a single computer literacy course familiarizing students with specific current applications of technology cannot serve their long-term needs. A more effective method is needed to provide students with current skills, an ability to adapt to new technologies, and an appreciation for how to use technology. The CITL has developed such an approach. Rejecting the computer literacy concept as a narrow skills-based approach, the Committee developed the broader notion of computer fluency. Students fluent with information technology (what the Committee calls FITness) should be able to know and understand enough about information technology to adapt to new advances and use technology productively, and for their own purposes over an entire lifetime.

As developed by the CITL, FITness involves three interrelated dimensions — an appropriate skill set, conceptual knowledge, and intellectual capabilities. Each of these three dimensions needs to be incorporated into the College's curriculum to implement fully the FITness approach.

With respect to the skills dimension, FITness requires students to develop the ability to use current applications. This is vital both for current labor market readiness as well as a foundation on which to base the ability to adapt to new applications in the future. The Committee included among these ten skills: setting up a personal computer; using a word processor; using a graphics package; connecting a computer to a network; using the Internet; using spreadsheets; using a database; and using instructional materials.

The second dimension, conceptual knowledge, involves foundational concepts, the basic ideas of computing, networks, and data. These concepts are the building blocks for understanding new technology as it evolves. The Committee stressed the inclusion of the following concepts: the idea of a computational task as a sequence of discrete steps; understanding the physical and logical structure of networks; the digital representation of data; modeling and abstraction; algorithmic thinking and programming; and the universality and limitations of information technology.

The third element is the ability to apply information technology to real problems and issues. This is the intellectual component of FITness. Intellectual and analytic skills permit students both to use information technology and to think clearly about information and its manipulation. The Committee included in this dimension: the ability to engage in sustained reasoning; managing complexity; testing solutions; evaluating information; communicating; anticipating changes in technology; and thinking abstractly about information technology. All three of these dimensions as identified by the CITL are needed for FITness. Moreover, they should not be regarded as end state training objectives, but as a foundation that will permit students to learn in their own domains and continue to develop on their own as circumstances arise during their lifetimes.

FITness Considerations for Claremont McKenna College

For a college such as Claremont McKenna, FITness will require comprehensive rethinking of our current computer literacy notions. Entire departments may need to consider how to ensure their students acquire FITness. The CITL recommends a project- based approach to teaching FITness,

an active learning approach involving student discovery of solutions to problems in a laboratory-like setting. But several fundamental issues need exploration before we can successfully implement a FITness approach on our campus.

First, can we assume that faculty are sufficiently computer fluent to permit the successful adoption of a FITness approach to computer fluency? We have begun to explore this question via several surveys of current faculty computing skills and usage. It is clear that there are wide variations among faculty and across and among departments. We will need to develop a plan to address the fluency needed by the faculty to adopt a FITness approach. Our Teaching Resource Center can play a vital role in this faculty development effort.

Second, faculty will need to determine what dimensions of FITness they expect to see among our graduates, and to what level of competency. This will require discussion at the general education level as well as at the departmental level. Determination of the dimensions of FITness we desire will have a profound effect on the curricular implications of adopting a FITness approach to information technology.

Third, should we adopt a single general education course approach as the best means to teach FITness or can we rely on departmental based courses? The answer to this question may depend to a large extent on whether we are able to develop project-based courses in the various disciplines that can incorporate sufficient elements of the three dimensions of FITness. This will require considerable discussion among the faculty as a whole and within participating departments.

Fourth, the skills and conceptual knowledge dimensions of FITness may require a team-taught approach in many instances. What are the staffing implications of such an approach?

The Planning, Testing, and Implementation Program

The College proposes to pursue a planning, and implementation program in the following fashion.

1. <u>FITness Planning Committee</u>. The College will establish this Committee, composed of faculty, staff, and students. The Committee will be charged with the responsibility of leading our efforts to plan, test, and assess the utility of the FITness approach to information technology literacy in the context of a liberal arts curriculum.

2. <u>Project Director</u>. The Project Director will be Dr. Cynthia Humes, a tenured member of the faculty of philosophy and religious studies, the current Director of the Teaching Resource Center, and our Associate Dean of Academic Computing. Dr. Humes is also a member of The Mellon Foundation's national information technology planning group among liberal arts colleges. She also works with the College's President Pamela Gann on teaching technologies and academic computing across the consortium of The Claremont Colleges. President Gann has been assigned the portfolio of information technology in behalf of all the presidents of the various colleges within the consortium. In this role, she is to help set priorities and coordinate the information technology work among the Presidents, the chief academic officers, and the chief information technology officers, and the consortium Committee on Information Technology (a committee of the chief information technology officers from each institution).

3. <u>Consultants</u>. The College will endeavor to obtain the services of at least two of the members of the National Academy of Sciences CITL team that developed the FITness concept and authored the report that informs our proposal. We plan to contact Dr. Marcia C. Linn, Professor of Development and Cognition and Education in Mathematics, Science, and Technology at the Graduate School of Education, University of California, Berkeley; Dr. Alan B. Tucker, Professor of Computer Science, Bowdoin College; and Dr. Jeffrey Ullman, Professor of Computer Science at Stanford University. Additional consultants may be sought as the project unfolds over the three-year period of the grant.

4. <u>Staffing, Software, and Hardware Needs</u>.   In addition to having Dr. Humes be the Program Director, we also will need the following staff: (1) a Program Coordinator to exercise daily management of the FITness initiative; (2) an educational technologist who can assist in direct training of faculty along with a cadre of student assistants; (3) portion of the time of an administrative assistant to provide secretarial, accounting, and budgeting assistance; (3) student assistants to work with the faculty.

Additional software and hardware will be necessary to support this staff adequately.   We propose to develop a mobile computer lab in order to achieve the successful testing and implementation of FITness modules. Each of our classrooms is currently wired at student desks to receive a laptop computer, which is linked to the campus network. By providing a cluster of laptop computers available for classroom use, the College will ensure that students who need to incorporate FITness projects into classroom sessions will be enabled to do so.   We will purchase 50 laptop computers to be placed in a cluster that will be made available for faculty to use in specific class sessions and projects. Further, these computers can also be made available for faculty training purposes.

5.   <u>Detailed Description of the Project to Be Pursued</u>. The mandate for the FITness Planning Committee would be to lead our institutional efforts to examine and test the principles of the information technology literacy concept that lies at the heart of FITness.

First, the Committee would determine our current capabilities of developing information technology literacy among our students. This effort would form the basis of a report to the faculty on the state of information technology instruction on our campus. The Committee would conduct surveys of current students, alumni, and employers to determine the effectiveness of our current efforts to develop literacy among our students and graduates. Some initial surveys indicate that our success is uneven. Most students learn what they know about information technology on their own without systematic instruction from the faculty or others. This makes it difficult to contend that our students share a common level of expertise as they leave the College for gainful employment or for graduate study.

Second, the Committee would also spearhead our efforts to learn what other institutions are doing to develop information technology among their students. To date, members of our faculty have not had the time systematically to investigate the state of the art in this arena. We believe there is much to be gained from a series of visits to other universities and colleges that would be identified with the assistance of our consultants and by other means as leading examples of successful integration of information technology instruction in the general curriculum. We anticipate at least five study visits to other institutions by teams of faculty, staff,

and possibly students. Site visit reports would be produced to inform the perspective of the Committee members.

Third, the initial work of the Committee will be communicated to the faculty by means of updates and briefings at regular intervals, and intensively during at least two off-campus retreats.

Fourth, a dozen faculty members primarily drawn from economics and literature will be asked to participate in a series of workshops during the spring and summer of 2002 to develop FITness based courses. The Planning Committee will extend the involvement of faculty by means of a recruitment drive during the spring of 2002 to attract additional faculty from other disciplines interested in exploring the FITness concept in specific courses over the summer of 2002. The CITL FITness report's authors contend,

> [T]he committee believes the best way to develop FITness is through project-based education. Projects weave together the skills, concepts, and capabilities of FITness to achieve a tangible result. In a project, specific information technologies will be used, motivating students to become skillful with such things as databases, e-mail, and presentation software. Understanding the range of alternatives and implementing the solution will rely on or motivate learning the underlying concepts.

6. Faculty Development

We concur with the authors' belief in project-based instruction as the most efficacious means to develop information technology fluency among our students. As part of our plan, we propose initially to provide faculty in two departments with special instruction through the auspices of the Teaching Resource Center to aid them in developing project-based modules to incorporate FITness into their teaching. For transportability purposes, we have selected the economics department and the literature department because courses in social science and the humanities are traditionally taught in all liberal arts colleges. In order to facilitate the transferability of our efforts to other campuses, it is important to work with disciplines that will have ready counterparts at other institutions. By training faculty in these two disciplines, we will be in a position to offer FITness projects to a large number of our students in their freshman year via one or both of these two classes.

Components of the three dimensions of the FITness approach can be developed for economics and literature courses. We already impart a strong element of the intellectual capabilities dimension in our classes. With the help of the Teaching Resource Center we can redirect some of this existing effort toward those intellectual skills identified in the FITness approach. With respect to the conceptual concepts dimension, we will need to combine the efforts of a computer scientist and faculty drawn from the two departments to determine how much of this dimension can be successfully incorporated into these courses. This is perhaps the most challenging aspect of our plan. At the end of the second year, the results will be discussed, and it may be that the faculty will choose to authorize the development of an entirely separate course for this dimension. It may be that our experience will indicate that we do not need to adopt all ten of the capabilities called for in this dimension.

To test the best approach for the conceptual dimension, we propose several alternatives. First, faculty from economics and literature will participate in workshops to explore the incorporation of this dimension into their introductory freshman courses. A computer scientist and educational technologist(s) will be brought into the program to provide the expertise needed by faculty working to incorporate the information technology into their classes. Additionally, other faculty will be invited to participate in these summer curriculum workshops to develop active-learning, discovery-based projects for inclusion in classes that would test the FITness information technology concepts. These summer grants would be available either for individual faculty or for teams of faculty. The grants would provide faculty with the time and technological assistance to develop one of three means to test the project-based approach favored by the CTL authors:

1) a new general education information technology literacy course suitable for all students and incorporating all or most of the ten information technology skills;

2) a new departmental-based course open to majors and using discipline specific projects to cover the skills; and

3) course modules to incorporate and test parts of the concepts, and skills in existing courses.

The third dimension, specific applications, can be incorporated into economics and literature classes with proper preparation and training for faculty. The ten skills included in this dimension include familiarity with such applications as the use of spreadsheets, presentation software, database usage, and using the Internet. Many of our faculty are already competent with respect to a number of these skills. A survey of faculty conducted last year indicated that nearly all of our faculty use word processing and e-mail. A majority uses spreadsheets and databases, but can benefit from more instruction. However, very few are able to use presentation software, database authoring software, graphics software, or know how to connect a computer to a network. We propose to offer a series of workshops designed for faculty to remedy their lack of fluency with respect to certain computer applications that are part of the ten skills called for in the FITness report.

The workshops would be offered during the spring and summer of 2002. This would permit us to begin offering FITness based courses to entering students in the fall of 2002. The workshops would be organized and conducted by educational technologists with student assistants acting in support functions. The Teaching Resource Center, staffed with two full-time instructional technologists and a cadre of student assistants, can also provide assistance. Outside specialists would be included in the workshops where appropriate for special expertise. We plan to provide the training to the ten to twelve faculty members who will teach the freshman economics and literature courses in 2001-2002, and summer training in the information technology skills dimension to five other faculty. Experience gained from these workshops will permit us to develop additional workshops for other faculty as we develop the FITness concept more broadly, although it may not be necessary to train a majority of our faculty in order to ensure our students gain fluency with respect to information technology.

It is essential to ensure that one of the College's computer science faculty participate in the summer curriculum grants program. Few faculty outside of computer science will have the expertise to work through the ten information technology concepts without assistance. Thus, we

plan to provide a summer stipend for a computer scientist to work directly with faculty as a mentor and co-developer of course components relating to the ten concepts included in FITness. It is also quite possible that we will learn that it is essential to have a computer scientist teaching modules in the general education and departmentally based courses until we can develop sufficient expertise across the faculty.

The faculty from economics and literature departments, as well as those engaging in the summer curriculum grants projects, would teach the new or modified courses in the fall semester of 2002. A specific assessment model to evaluate the success of the courses and modules would be conducted during and at the conclusion of the semester. The results of the assessment of the courses and modules would be available to the Planning Committee and would inform our subsequent judgment about the most effective means of permanently adopting FITness. The assessment would also be instrumental in the development of additional information technology workshops to widely disseminate FITness skills among a majority of our faculty.

We believe that faculty retreats are an effective means of disseminating the benefits of FITness concepts to our faculty. Without an opportunity to discuss fully the advantages of the FITness model, it is unlikely that a majority of faculty will endorse and eventually adopt the FITness approach. After the conclusion of the spring 2003 semester, the FITness Planning Committee would organize a one or two day retreat for the entire faculty. The purpose of the retreat would be to provide a comprehensive report on their findings, and to share the experience of the economics, literature and other faculty members in testing project-based FITness in their classes. Finally, the Committee would make a formal recommendation to the faculty with respect to the adoption of all or part of the FITness approach. The faculty would have an opportunity to discuss the recommendation prior to a formal decision by the College's Curriculum Committee.

7. Student Development Activities

While we believe we can reach many of our students with FITness-based courses through the use of introductory literature and economics courses, our ultimate goal is to spread FITness concepts throughout the curriculum. Our educational technologists, the Program Coordinator, and student assistants will be the principal sources of the faculty training needed for this curriculum-wide process to take place. Student FITness assistants would be selected and assigned to work closely with a faculty member incorporating FITness.

It may be that certain information technology skills may be most effectively passed on to students outside of class in a workshop setting. We intend to test this view by offering students a series of workshops on specific skills sets associated with FITness, open to all students. For evaluation purposes, we will compare the skill levels of students who take a workshop only and students who take both a workshop and a FITness based course.

We believe that substantial support for the FITness concept will exist among our students and faculty. The Teaching Resource Center, founded in 1999, and directed by Dr. Humes, provided individual faculty with instruction in the use of various presentation software now available in our new multimedia classrooms, and trained a majority of our faculty in the use of WebCT to bring their courses on-line. Last summer, the Teaching Resource Center offered a total of eighteen one and two day workshops to faculty on various aspects of WebCT, Power Point presentation skills, Photoshop, Outlook, the use of the Internet in the classroom, basic web page design, and video conferencing.

The real impact of our efforts can be seen in the number of courses offered to students using WebCT. To date, 166 courses have been modified or organized by faculty to be taught using WebCT. This spring, a total of 81 courses are currently being offered to students using WebCT. We are delighted that courses are being offered in every department of the College and include a majority of biology, chemistry, computer science, general science, and history courses, and close to a majority of economics and psychology classes. Student responses to these WebCT courses have been very positive. Indeed, seeveral faculty members have incorporated WebCt at the specific urging of students. Thus, our efforts to extend the use of technology in teaching and learning across the curriculum have been a decided success. This response bodes well both for our ability to recruit faculty for our FITness efforts and for student receptivity to the FITness concept.

Evaluation and Assessment

It will be necessary to conduct on-going evaluation activities during the entire three years of the program effort. We intend to use an outcomes based assessment approach to our FITness efforts. We will assess four specific outcomes. First, we will design an assessment instrument to measure existing faculty FITness skills. This will provide us with a benchmark permitting us to design more effective workshop experiences. Appropriate instruments will be used after each workshop, not only to measure newly acquired faculty skills, but also to refine our workshop techniques and strategies as we move toward a more *fluent* faculty. We also want to assess the three FITness dimesions among the student participants. We will develop separate instruments to measure student performance with respect to a specific information technology skill set, conceptual understandiing of basic computing concepts, and the ability to use information technology to solve selected problems. In addition, we will use the newly developed national Tek.Xam to test student FITness. This exam tests student abilities to problem solve and use technology skills. Because it is heavily web-based, it does not adequately cover all of the FITness attributes we intend to impart to our students. However, within its limited scope, it will afford us a national peer group with which to compare our students progress.

Students who take FITness classes will serve as test subjects to evaluate the extent to which they have become fluent with information technology. We will also test other students who have not taken the FITness related economics and literature classes to ascertain the differences between the two groups. We plan to test both sets of students over the second two years of the grant to determine whether the control group narrows the gap with the FITness students by means of our standard curriculum. In addition, we will create focus groups for in-depth discussion with students regarding their experiences with FITness training.

We intend to contract with the Division of Organizational Strategy and Evaluation of the School of Behavioral and Organizational Sciences at Claremont Graduate University to design the evaluation instruments, form the focus groups, conduct the assessment and analyze the results. This is an evaluation and assessment group entirely independent of Claremont McKenna College. It conducts a number of on going evaluation programs for colleges and universities, businesses, and statewide government and public agencies. Their evaluation efforts will encompass assessment of our programmatic goals, surveys of faculty and students regarding

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FITness concepts and delivery methods, analysis of our planning steps with regard to best practices, and evaluation of our accomplishments with respect to our intended outcomes. We will also ask the evaluators to assess the transferability of our FITness efforts to other institutions.

Tranportability To The Claremont Colleges

The College will work to extend our work and our findings into The Claremont Colleges. The most effective initial approach will be to incorporate appropriate assistance from the Libraries of The Claremont Colleges, because the consortium has successfully developed a single library system for The Claremont Colleges. This library possesses a substantial training capability for faculty and students. Staff have expertise in teaching students to use information technology to find, retrieve, and evaluate information effectively and in working with faculty to integrate these skills into their courses. The Library also possesses teaching facilities for these purposes. The Director of the Libraries of The Claremont Colleges is enthusiastic about the FITness project. This inclusion of the Libraries of The Claremont Colleges is an important step in facilitating possible transportability of our FITness program into other colleges in the consortium.

In addition, we will regularly communicate our progress with the FITness program to the Intercollegiate Academic Computing Committee, composed of the information technology directors and staff from each of the seven campuses that comprise The Claremont Colleges.

Selected faculty from each of The Claremont Colleges will be invited to the retreats that are planned for our faculty to discuss the FITness program.

Finally, President Gann, who holds the information technology portfolio for the Council of Presidents of The Claremont Colleges, will make periodic reports on our experience with FITness to her colleagues on the council.

These steps to inform and invite comment from our colleagues in Claremont should substantially expand the transportability of the FITness program to the other Clarememont Colleges.

Dissemination of Results

Since we believe Claremont McKenna College would be one of the first institutions to attempt to adopt the FITness approach to computer literacy, it is important that we share our findings and experiences with other institutions grappling with the thorny issues of information technology education and literacy. There are several means to achieve this goal. First, members of the Planning Committee (perhaps in concert with other faculty) will commit themselves to making presentations at professional conferences on our experience with FITness. We will submit papers for presentation to conferences such as the Annual Technology in Education International Conference, the EDUCAUSE Annual Conference, and the annual meeting of the Consortium for Computing in Small Colleges. In addition, the Committee members and/or faculty involved in the FITness effort will be encouraged to submit paper/s for publication to journals such as *Innovative Higher Education*, *Technology Trends*, *EDUCAUSE Quarterly*, *Syllabus*, and the British publication *Innovations in Technology and Training International*. Members of our faculty have published previously in *Innovative Higher Education.*

Faculty involved in the FITness program will also be encouraged to make presentations at national and regional meetings including the Modern Language Association and the American Economics Association annual meetings. Papers will be encouraged from faculty participating in the FITness training program for submission to discipline-based pedagogical journals such as the *Journal of Economic Education, Inquiry,* and *The Teaching Economist.*

Dr. Humes, who will direct our FITness intitative, is a member of The Mellon Foundation's working group on information technology among liberal arts colleges. Her involvement with this group provides the perfect opportunity to extend the reach of this project to the other liberal arts colleges around the nation who are involved in The Mellon Foundation's organized effort to experiment and disseminate information technology teaching technologies and approaches among these colleges.

Conclusion

The Fitness approach to information technology literacy appears to be well suited to an undergraduate liberal arts environment. It holds the promise of transforming the way in which our students learn about information technology. It establishes a base level of literacy expected of all of our students. FITness offers a means of ensuring that all of our future graduates are fully capable of meeting the demands of the workplace regardless of their undergraduate majors. Finally, it is a means of providing our students with a comprehensive and life-long capacity for coping with information technology changes in the future. The College has invested in the infrastructure needed to make it work. We have the faculty, staff, and students capable of making FITness work.

We believe we will be one of the first institutions of any size to seriously consider adopting FITness as our model of information technology literacy. Our experiences in this effort should be of great value to other institutions that may become interested in enhancing their information technology instruction, and our linkage with The Libraries of the Claremont Colleges is the logical first step to transporting the successes of FITness at Claremont McKenna to our sister institutions. President Gann will work with the presidents, the chief academic officers, and the chief information technology officers of all of The Claremont Colleges. Given President Gann's information technology leadership role within the consortium, as well as her vision for academic computing, CMC expects to be the leader in the consortium in the development of information technology for academic purposes. Consequently, we are especially well situated to use our proposed grant on FITness to extend the what we learn into the consortium as a whole. We also hope to facilitate the transport of the concept to other institutions through our Mellon information planning membership as well as sharing our experiences with others through presentations at conferences and articles in appropriate journals.

Budget

The budget for the project is calculated to be $1,279,000 as follows:

Item	0
Partial release time for the Director of the FITness Program, 3 years at 30,000	90,000
Released time for faculty members serving on planning committee. Fall 2001 through Spring 2003 5 faculty @ $15,000 per course	150,000
Stipends for economics, literature, and other faculty for first skill set workshop participation during Spring 2002. 12 faculty @ $2,000 per faculty	24,000
Summer 2002 economics, literature, and other faculty stipends for conceptual knowledge dimension (IT) training. 12 faculty @ $4,000 per faculty member	48,000
Summer 2003 faculty development stipends for conceptual dimension courses. 4 pilot projects (5 faculty) @ $4,000 per faculty	20,000
Summer 2002 and summer 2003 stipends for computer scientist to assist in information technology dimension training.	30,000
Travel to other institutions. 5 site visits of two days each by members of the planning committee.	30,000
Two retreats to report to faculty on findings of the planning committee including assessment of program each year and to engage in dialogue on the strengths and limitations of FITness approaches.	30,000
One Claremont symposium to share CMC FITness Program experience with faculty from other Claremont Colleges	1500
Consultants to assist planning committee, assist with course development, and attend symposia.	35,000
Student FITness (IT) Assistants; $20,000 per year	60,000
Software, materials, copying, etc.; 5,000 per year	15,000
Assessment contract	25,000
Tek.Xam administration	150,000
Dissemination activities, including 3-5 conference presentations, stipend for 4 faculty paper preparations	13,000
The Libraries of the Claremont Colleges staff time, $5000 per semester	30,000
Mobile Computer Lab	100,000
Program Coordinator (including benefits) $67,500 for three years	202,500
Educational Technologist (including benefits) 55,000 for three years	165,000
Administrative Assistant (half-time) 18,500 per year	55,500
IT skills for students workshops, $1500 per year	4,500
Total	1,279,000

Timeline

July – August FITness Program initiated

- Meetings of Planning Committee begin

- Probable site visits of two days each by members of the planning committee during the summer

- Assessment of FITness skills of current faculty begins

July 15-August 15

- Training Workshops of current faculty

August 22   New Faculty Orientation

FITness skills evaluation of incoming faculty and FITness workshops

Fall 2001

- Assess workshops and new faculty orientation
- Meetings of Planning Committee continue
- Site visits continue

Spring 2002

- Economics, literature, and other faculty first skill set workshop

- Retreat to report to faculty on findings of the planning committee and assessment results to date

- Assessment of FITness skills of current faculty continues

Summer 2002

- Training Workshops of current faculty

- Economics, literature, and other faculty conceptual knowledge dimension (IT) training

- FITness skills evaluation of incoming faculty and workshops in the New Faculty Orientation

Fall 2002
- FITness based courses begin

Spring 2003

- FITness based courses continue

- Administration of Tek.Xam and first assessment of student FITness learning

Summer 2003

- Economics, literature, and other faculty conceptual knowledge dimension (IT) training

- Faculty development support for conceptual dimension courses. Four pilot projects

Fall 2003

- FITness based courses continue

- Second assessment of student FITness based learning

Spring 2004

- FITness based courses continue

- Second administration of Tek.Xam and third assessment of student FITness learning

- Faculty retreat to evaluate FITness program

- Initital dissemination activities begin

Academic year 2004-2005

- Dissemination activities continue

Appendix 6

A Comment on Growth

The Committee did not spend a great deal of time evaluating this concern in relation to Information Technology, as it was the consensus of this Committee that assessing the desirability of growth would best be considered in other committees.

Clearly, however, there are considerable financial implications for Information Technology if enrollment were to grow to 1200 or to 1400. Any new construction will necessarily entail the costs of infrastructure and maintenance.

Strategic indicators routinely link student body size and IT expenditure exclusive of capital equipment expenditures. Today's figure of the median "funds per student" at comparative institutions is $1,247, and this year's expenditures at Claremont McKenna were $1354. A growth of 200 students at this rate would be approximately $250,000-270,000 per year, and growth of 400 students nearly $500,000-$540,000.

If one factors in the faculty-to-student ratio of 8:1 (currently it stands at 7:1), faculty growth for 200 additional students would be approximately 25 additional faculty, increasing to 50 for a growth of 400 additional students. Since the capital expenses for faculty would increase, this would result in additional sums in that category as well.

Should the College decide to grow, Information Technology would be a ready ally, for it provides an effective means of enhancing the learning experience and communication.