

Final Report of the Chancellor's Educational Technology Task Force

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University of California, Irvine

Chancellor's Educational Technology Task Force

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Preamble

In the contemporary era, computers have become nearly-universal analytic and expressive instruments. Their research use is widespread throughout UCI, e.g., Thesaurus Linguae Graecae in Humanities, art and architecture visual data bases used in the School of the Arts, census and survey research data sets used in the Social Sciences, to name only a few examples. Once, computers were huge machines costing millions that only major institutions could afford. Now, laptop computers more powerful than the early large mainframes can be purchased for a few thousand dollars. Computers abound -- in the home as well as in the workplace. Computers are used to mine information from global networks and to help link it and fuse it into forms that reveal new insights. They are used to wrest the meaning from the data and to visualize the consequences of assumptions. They are used as well for communication and global collaboration, and they have even become the engines of new modes of inquiry in the sciences and new media for creative expression in the arts.

As we move toward the 21st Century, computer literacy has become the equivalent of the 4th R. Those who lack such literacy (at the equivalent of college level skills) will be severely disadvantaged. Both Chancellor Wilkening's ``manifesto" and the APC report on the task force process asserted that, `` *A UCI graduate should be prepared to survive and prosper in the electronic information era.*"

UCI (and the UC system) have already taken critical steps to recognize the role of the computer in education, e.g., the UC Libraries developed MELVYL® and added to it access to a multiplicity of bibliographic and other data, specialized librarians consult with faculty on how best to use the computer as a research tool, IDS and Media Services provide computers (and other media) for the classroom and consult with faculty on how best to integrate educational technology, the Office of Academic Computing (OAC) provides a backbone campus network and terminals to access it, and courses in basic computer literacy such as the new ICS Category V breadth courses and Social Sciences 3A have recently been created. But there is still a long way to go.

We advocate using the computer and other educational technology to improve the quality of education at UCI in terms of the following specific goals:

1. Improve the clarity and impact of lectures.
2. Improve student analytical, expressive, and critical thinking skills.
3. Improve student/faculty feedback.
4. Improve the usefulness of homework exercises for student learning.
5. Permit more self-paced learning to cope with increasing diversity in student skill levels.
6. Provide technological opportunities to link UCI and the community -- alumni, University Extension students, current and potential students, and their families.

Making cost-effective use of educational technology requires four key elements: [1]

1. Basic infrastructure that makes access to educational technology easy for faculty, students and staff. While some of this infrastructure can and will be developed within individual units, the role of OAC, the UCI Libraries, IDS/Media Services and Student Services, will be essential. Infrastructure should be seen not merely as hardware and software, but even more importantly as staff who can do necessary training of faculty and graduate TAs and smooth the way for the integration of educational technology in the classroom.
2. Training of students in fundamental skills of how to use the computer as an aid to find information, organize it, analyze it, and communicate ideas persuasively (including use of graphics) during their first year at UCI. These skills cannot be tied too closely to particular platforms or software, since

technological change is too rapid. The Task Force also recognizes that such critical skills (e.g., asking good questions and avoiding bad data) must be developed in the context of the very different substantive questions in the various academic disciplines. Thus, the responsibility for training must involve all the units on campus, although some units may be used as a campuswide resource, e.g., OAC, ICS, the UCI Libraries, UNEX, and PASS (Program of Academic Support Services) of Undergraduate Studies.

3. Incentives to faculty to make use of the computer in the classroom, along with incentives to academic units to redesign their curriculum to draw on the computer-aided research skills that students have been taught, lest those skills degenerate through lack of use.
4. Integrating the computer more fully into on-going campus life by making virtually all information of interest (e.g., campus calendar, course schedules, syllabi, degree requirements, faculty bio-sketches, etc.) available on-line, and assuring that key secretarial and administrative staff in all the units have basic information skills including the ability to retrieve and enter information into the campus computer net.

We do not wish this report to be merely hortatory. We have four specific recommendations, several of which will require fundamental changes in the way things get done. Some can be implemented almost immediately, others will take more lead time, but we believe that all of our proposals for change can be accomplished within a four year time frame. The strong support for these ideas from Task Force members from OAC, Undergraduate Studies (including IDS and Media Services), the UCI Libraries and Student Services, and from the very diverse faculty on the Task Force convinces us that what we propose not only is feasible but would be enthusiastically received by many on our campus.

Recognizing the incredible amount of coordination and effective advocacy required, we recommend that the Chancellor appoint a Czar (i.e., a strong leader) to oversee the implementation of these recommendations.

In her ``manifesto" document, ``*Growing into the 21st Century: UCI's Opportunities*," the Chancellor quoted the APC report on the task force process as follows:

``If UCI is to have a distinctive undergraduate program of high quality and is to attract students of high quality, then some thought should be given to the adoption by UCI of several programmatic characteristics that distinguish the UCI undergraduate experience from that of other universities." (pp. 5-6)

Both the Chancellor's ``manifesto" and the APC report went on to identify four such distinctive programmatic characteristics, the first three of which dealt with: (i) cultural diversity as an educational asset, (ii) research or scholarly experience, and (iii) communication skills. The fourth distinctive characteristic, identified as a prerequisite for future success, was, (iv) 21st Century electronic information skills.

Achieving the goals of the present Report will address the fourth of these distinctive features of a UCI undergraduate education in a sound and constructive fashion.

Even more emphatically, if we achieve what this report recommends, then, by the year 2000, UCI's distinctive status as a 21st Century university can be proudly proclaimed.

Recommendations

1. The Chancellor Should Urge the Academic Senate to Make the Learning of 21st Century Information Skills a Programmatic Feature of a UCI Education

- **1.1:** The Chancellor should urge the UCI Academic Senate to identify and implement a means to educate all UCI students in 21st Century information skills. Such education might well take different forms appropriate to the differing needs of the various academic disciplines. [2] The goal to be achieved is that every UCI graduate be prepared to survive and prosper in the 21st Century electronic information era.
- **1.2:** One specific proposal is that the Academic Senate establish a new Breadth Requirement, Category VIII: 21st Century Information Skills, to be fulfilled either by successfully completing a one-quarter course during the freshman year or by demonstrating competence in these skills, and that upper-division courses be identified in the various majors which utilize the foundational skills taught in the Category VIII breadth courses to ensure the skills do not atrophy through disuse.
- **1.3:** A second specific proposal is that the Academic Senate devise and maintain a list of recommended courses across the curriculum that both teach and utilize 21st Century information skills, and that the Senate devise a mechanism to encourage UCI students to include one or more of these recommended courses in their curricula.
- **1.4:** A third specific proposal is that the Academic Senate develop and approve a document that describes UCI's goals for students related to developing their competence for the 21st Century electronic information era and inform all students through the most appropriate and effective mechanism.
- **1.5:** If no combination of these specific proposals (in 1.2, 1.3 and 1.4, above) meets the approval of the Academic Senate, we urge the Chancellor to challenge the Senate to devise an effective alternative method of achieving the primary goal that every UCI graduate be prepared to survive and prosper in the 21st Century electronic information era.
- **1.6:** We recommend providing special training and resources to graduate students in 21st Century information skills both for their own benefit and in support of the role they play in the University's undergraduate instructional program.

2. Build and Maintain a Basic, Pervasive Infrastructure [3] to Support Learning and Teaching Based on the Use of Educational Technology

- **2.1:** The Basic, Pervasive Infrastructure should provide universal access for UCI students, faculty and staff to e-mail, the Internet, MELVYL® and modest file storage capacity by September 1996. We voted unanimously to endorse the statement of "Guiding Principles for the UCI Electronic Educational Environment (EEE)" put forth by OAC Director William H. Parker, and to include it as an [Appendix](#) to this Report.
- **2.2:** We urge the Chancellor to develop a special incentive program for departments to integrate computer use for research purposes and computer-mediated homework and grading into their curriculum. Funding (\$100,000 minimum) should be awarded on a competitive basis to a very limited number of departments each year, only to those departments whose members are committed to a full integration of educational technology. Funding would be multi-year and would be renewed yearly only upon evidence that the goals and timetables in the proposal had been achieved. Funding would require that all courses make use of at least a minimal level of educational technology, e.g., e-mail; that more than just a handful of faculty in the department make substantial use of educational technology in the classroom; and that a curricular plan be developed to guarantee that computer labs be utilized and that the computer-mediated research skills taught during students' first year at UCI be drawn upon and further enriched. [4]
- **2.3:** Every four years, a budget of \$2000 should be made available to each UCI faculty member for the acquisition of an adequate desktop computing platform, or the upgrading of an existing one. A minimal set of functions of such platform would include access to the Internet, sending and

receiving of e-mail, and file storage and retrieval. Whenever necessary, the Office of Academic Computing should act as a consultant for such purchases.

- **2.4:** As proposed in the EEE document in the [Appendix](#), the campus should provide computer terminals adequate to allow students to access their computer accounts and adequate modem access to the campus backbone.
- **2.5:** All undergraduate students should be given access to computer facilities and a sufficient number of workstations should be made available to them in various locations and for various purposes including use in the framework of courses.
- **2.6:** Each graduate student should have a dedicated computer in his/her office.
- **2.7:** UC's Intercampus Telecommunications Network Video Teleconferencing system should continue to be developed as a tool for Distance Learning and other applications. Through Media Services, the campus should develop distance learning classroom facilities and provide the necessary technical staff to meet the demands of future academic programs.
- **2.8:** In order to allow the use of computer display and network technologies in the classroom, we recommend that the Chancellor charge:
 - **2.8.1:** The Office of Academic Computing with providing computer network connectivity to all general assignment classrooms.
 - **2.8.2:** Media Services with providing computers and video display devices sufficient to meet faculty demands without recharges.
- **2.9:** We recommend that computer-network connectivity should be a built-in feature of all classrooms.
- **2.10:** We recommend the expansion of services currently offered by the Office of Instructional Development and Media Services into a one-stop service in collaboration with OAC and the UCI Libraries to support faculty and TAs who want to develop new instructional technology-based courses.

3. Help Faculty Identify and Pursue Research Funding and Course Development Opportunities in Instructional Technology

- **3.1:** A number of private foundations, government agencies, and corporations are prepared to invest in the search for solutions that help improve education. The Chancellor should urge the office of the Vice Chancellor for Research to give special emphasis to the task of helping UCI faculty interested in research in educational technology to find and successfully obtain extramural research support. In addition, faculty desirous of developing proposals for outside grants related to undergraduate education should be urged to take advantage of the Faculty Resource Center on Grants for Undergraduate Education in the Office of the Dean of Undergraduate Studies.
- **3.2:** Faculty who desire to explore revolutionary (and thus usually expensive) new instructional technologies may be able to do so via meaningful partnerships and consortia with multiple industry/university institutions. Participation in such consortia may be possible only if high-level administrators endorse and support UCI's participation. Where appropriate, we urge support by UCI's high-level administration. (For example, IBM might agree to support UCI to develop prototype CD-ROM, interactive, computer-mediated courseware at, say, \$4 million per complete course, only if high-level UCI administrators endorse UCI's participation and meet IBM's partnership constraints.)
- **3.3:** Some explorations of educational technology are of sufficiently established pedagogical value for us to recommend application of the results to the Academic Senate for beneficial curricular change. Mature instructional technologies that are candidates for immediate application include, but are not limited to:
 - **3.3.1:** Computer-mediated knowledge assessment techniques (developed by Professors Fried, Falmagne, and Hoffer).
 - **3.3.2:** Multi-media CD-ROM interactive learning technologies (developed by Prof. Bork).

- **3.3.3:** Multi-campus distance-learning technologies (successfully prototyped by UCI Media Services).
- **3.3.4:** Computer-based problem-solving to enhance the quality and vivacity of learning and the productivity of the faculty (developed by Ron Stevens and Sid Golub for teaching UCLA second-year medical students).
- **3.4:** The Task Force recommends continuing support for seed money opportunities to develop innovative instructional technologies, e.g., CID grants for pilot introduction of new technologies. Because of the costs of developing credible proposals, funding of one month's summer salary and some staff assistance would be highly desirable. Thus, there should be the possibility of funding at the \$10,000 to \$15,000 level that now exists for special UCI grants to junior faculty to foster their research. [5]

4. Ensure Extensive Administrative Use of Computers in Support of Education and Support the Use of Technological Resources to Link to the Extended UCI Community

- **4.1:** Administratively, in support of education, UCI should make far more extensive use of computers, especially by making information available to students on-line, but also by working toward the elimination of forms that can only be filled in using a typewriter. [6]
- **4.2:** In particular, we propose that OAC and Student Services coordinate making all of the following available on-line (in cooperation with the academic units): [7]
 - **4.2.1:** course schedules
 - **4.2.2:** syllabi and class notes [8]
 - **4.2.3:** grades
 - **4.2.4:** e-mail directory for all students, staff and faculty
 - **4.2.5:** individual class rosters that list e-mail addresses for students in the class and the automatic creation by the Registrar of a single address that permits a message to be sent to all students in that class
 - **4.2.6:** faculty bio-sketches
 - **4.2.7:** degree requirements
 - **4.2.8:** descriptions of academic programs
 - **4.2.9:** course and teacher evaluations
 - **4.2.10:** campus map, with locations of student access computer terminals highlighted
 - **4.2.11:** pictures of faculty, staff and TAs
- **4.3:** Key secretarial and administrative staff in all the units should be trained in basic information skills including the ability to retrieve and enter information into the campus computer net.
- **4.4:** There should be support for lifelong education using the instructional technology resources of University Extension and the UCI Libraries. UNEX is already playing a role in this arena and can be looked upon to continue it in cooperation with the University and the community.
- **4.5:** UCI should participate in using technological innovations that enhance education and should publicize information about it to faculty, staff, students, and the extended UCI community.

Footnotes

1. There have been previous expensive commitments to educational technology that have failed to live up to their expansive promises. We believe one reason for that failure has been a lack of appreciation that hardware alone is not enough, nor are courses in computer skills when the skills they teach are not used later in the rest of the curriculum. There must be incentives for students, faculty and staff to use the technology and the technology must be easy to access, user friendly, and not constantly changing.

2. Developing an agile ability to use modern computers as analytical, expressive, and information gathering instruments can be of significant, lasting value in cultivating critical thinking skills -- skills serviceable for a lifetime. Expectably, however, patterns of computer use will vary according to the differing special needs of the various different academic disciplines. For example, physics majors may find that training to use *Mathematica*® or *Maple*® enables them later to achieve deeper theoretical understanding in physics, whereas music majors may find training in the use of music composition and synthesis software enables them to develop a better appreciation of nuances, subtleties, and refinements in the relationship between a musical score and its performance. Thus, training in the use of computer-based, discipline-specific research tools, and their use in solving problems in the respective disciplines is important. But such advanced training must rest on a foundation of suitable introductory training. Hence, basic familiarity with elementary uses of the computer as a foundation on which to build the discipline-specific skills is also recommended. At a minimum, such basic skills should cover elementary word processing with a focus on skills that are most relevant to writing research papers; training to access MELVYL® and the various information sources within it; training to use e-mail, gopher, World-Wide-Web, and other Internet resources; and training in various useful information search and display techniques.

3. Infrastructure includes not only equipment, but the staff to support and update it, sufficient funding therefor, and maintaining easy access for faculty, students, and staff.

4. While individual innovators are important, long-term change requires widespread change in standard operating procedures. To motivate such changes, groups such as departments will have to be convinced that there are payoffs for them, collectively, to devote effort to improving teaching in existing courses via the computer and, perhaps, to add new courses that draw even more heavily on computer use. Since entrepreneurs are not evenly spread throughout the campus, it is inevitable that curricular innovation using computers will proceed through the system at an uneven rate. By proceeding one department at a time, and requiring real and continuing curricular change to qualify for this new major funding, we can make it likely that curricular innovations will be continued.

5. A model for this is the \$15,500 funding received by Prof. Grofman to develop Social Sciences 3A.

6. We commend Student Services for pioneering first steps in creating an on-line student admissions application.

7. Some of these data are presently made accessible on-line by some academic units.

8. The World Wide Web (WWW) materials prepared by Professor D'Zmura for the Cognitive Sciences Department and the course description placed on WWW by Professor Robert Garfias for his course in Ethnomusicology are models of what should be done.

Table of Acronyms Used

- APC = Academic Planning Council
- CD-ROM = Compact Disk Read-Only Memory
- CID = Committee on Instructional Development
- COM = College of Medicine
- EEE = Electronic Educational Environment
- EVC = Executive Vice Chancellor
- GSM = Graduate School of Management
- IBM = International Business Machines, Inc.

- ICS = Information and Computer Science
- IDS = Instructional Development Services
- MELVYL® = Automated UC Libraries Index
- OAC = Office of Academic Computing
- PASS = Program of Academic Support Services
- SAIS = Student Academic Information Services
- TA = Teaching Assistant
- UC = University of California
- UCI = University of California, Irvine
- UNEX = University Extension
- VC = Vice Chancellor
- WWW = World Wide Web

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