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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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Editorial

An explanation for this article

Donald G. Perrin

In March 1997, I resigned my position as Director of the Alquist Center for Innovative Learning at San Jose State University to become Dean of Learning Technologies for the Riverside Community College District, located 60 miles East of Los Angeles, California. My role was to develop and implement a comprehensive technology plan to support future growth of its three campuses and enhance employment opportunities for its students. This required extensive collaboration with faculty, administration, students, and community to perform a needs assessment and collaboratively develop a technology plan. This was to provide a state of the art infrastructure and continuing support for faculty development and student learning. This included plans to train faculty and assist them in developing new and relevant curriculum, teaching/ learning materials to support the curriculum; computer laboratories and classrooms, learning resource centers, connectivity between campuses; and Internet services; and a plan for future growth.

By May of 1968 the needs assessment was completed, faculty training was underway, and the computer labs and classrooms were operation on all three campuses. Much of this plan continues to be relevant for institutions setting up comprehensive technology support, especially in developing countries. For this reason, it is published here. Most of the references are working documents not available on the web. Selected documents are linked as appendixes.

The Table of Contents has links to the four basic chapters and appendices. References within the basic document link to appendices and back to the text. Since these documents were produced at different stages of development there are some redundancies. The entire document was produced from a paper copy using Epson WF720 scanner, and Omnipage Professional 18 .pdf to MS-Word. Links were created using the Hyperlink, Bookmark and “Save as.pdf” functions in Word. Some Appendixes were not reformatted, but left in the style of the original document.

This publication is limited to the needs assessment and subsequent development and implementation of the technology infrastructure. Once implemented, it provided new opportunities and enhancements for teaching and learning. A separate paper is needed to determine the long term impact on training and educational programs, job placements, and relevance to community needs and aspirations.

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Technology Plan

for the

Riverside Community College District

Donald G. Perrin
Dean of Learning Technologies

Based on input from RCC faculty, students, administration, staff, and community
with strong support from the administration and the Faculty Senate
research studies including recent publications and Web Pages of the
California Post Secondary Education Commission, California Virtual University, and the
California Community Colleges, Office of the Chancellor.

May 1, 1998

Preface

Technology Plan
Riverside Community College District

Images of the Future – a 1997 view

Image yourself in the year 2001. Then look back to the nineteen nineties. You see a period of economic uncertainty followed by sweeping changes. It is so different now. Look with pride at the role education has played in building Greater Riverside into a prosperous community.

You stand at the entrance to the City Campus in front of the new library— learning-resources building. To your left is a parking lot with an umbrella of trees. As students stream onto the campus, move with them as they file into classrooms, laboratories, the library and learning resource areas, and the technology building . . .

The *technology building* occupies space that was once the library. On the second level there are television studio-classrooms. TV classes are transmitted via cable and microwave to unserved and under-served segments of the community. Two-way television connects the Norco and Moreno Valley campuses to share small enrollment classes as well as popular instructors and courses. A farm of satellite antennas on the roof receive classes from across the hemisphere to expand RCC's curriculum offerings.

In another part of the technology building, faculty develop multimedia courses for Internet II and the World Wide Web. Powerful networks connect RCC campuses to each other and to the Internet. RCC lessons and resources are accessed in schools, businesses, homes and communities across California and around the world.

The third floor of the technology building is a 24-hour computer lab. At one end are classrooms for instructor-led learning. When classes are not in session, these rooms are open to extend the capacity of the lab. Lab-aides and instructors move throughout the lab quietly assisting students. Others instructors support students from their offices via computer-telephone.

The first floor of the Technology building houses file servers, video servers, and technical support. The *Media Center* has been integrated with *Academic Computing.* The familiar equipment carts have disappeared and *Electronic Classrooms* facilitate teaching with computers, television and audiovisual media. Some faculty develop classes on computers in their offices; others prefer the well-equipped Teaching-Learning Center where they receive production assistance and training.

The Library-Learning Resources Center (LLRC) is a hybrid of books and computers. Its electronic information systems, computer commons, multimedia collections, and teleconferencing rooms are linked to quality resources measured in LCs (1 LC = total information resources of the Library of Congress. Everything is state-of-the-art. Even the small group study rooms have computer and television access.

RCCD now provides unparalleled service to the Riverside community. *Passport to College* has become a national program creating a tidal wave of enthusiasm for learning among parents and students. Alternative learning options attract students with a diversity of learning styles. Partnerships with business and industry provide students with internships, work experience, and an easy transition to their chosen careers.

Technology Plan
for the Riverside Community College District

Abstract

The Technology Plan will provide RCCD faculty and students with *Information Age tools* to enrich teaching and learning and to improve employment prospects for graduates. It enables access to computers and the Internet on-campus and throughout the community; it ensures rich and relevant learning experiences to support a diversity of learning styles and cultural backgrounds; it provides training and technical support so that technology is available, reliable and facilitative of the teaching-learning process.

This plan is for the period 1998-2003. Phases One began in the Spring of 1997. Because of dynamically changing technology and uncertain funding, this plan is a work-in-progress that will be continually updated.

Phase I of the *Technology Plan* is a *needs assessment* based on data from faculty, students, administrators, community, professional associations, technology providers, and government. Planning began with appointment of the Dean of Learning Technologies in March of 1997.

Phase II of the *Technology Plan* is installation of computer labs, training and curriculum integration. Equipment was installed in the new open labs and classrooms at Norco and Moreno Valley beginning in August 1997. In all, 60 new computers were added to the Information and Systems Technology Lab on the City Campus. Norco and Moreno Valley used Secondary Effects funds; City campus used Block Grant funding.

Phase III builds infrastructure and support staff. A broadband network was designed for installation on the fiber optic backbone. In Fall 1997, ATM networks were installed at Norco and Moreno Valley using Secondary Effects funds. Funds are being sought to install a similar network on the City Campus in Summer or Fall of 1998.

Technicians with skills in hardware, software, programming and networks are being recruited to build and maintain functionality of computer labs and classrooms. A faculty-trainer is being sought for the Teaching Learning Center.

Phase IV strengthens support for students and instructors, optimizes services, and contains cost. Proposals are being written to augment funding for online courses and telecourses for distance learning.

Information technology has a high priority in local, state and national education programs. Successful implementation of the RCC Technology Plan will enrich teaching and learning and enable RCC graduates to compete successfully in the global marketplace.

Introduction

The **Technology Plan** is designed to support the mission and goals of the California Community Colleges and the Riverside Community College District. The plan advocates technology to resolve problems of access, scheduling, and communication. It integrates technology with best practices in teaching and learning to provide students with knowledge, experience, and the critical thinking skills necessary for productive employment.

The Mission of the California Community Colleges focuses on *advancement of California's economic growth and global competitiveness through education, training, and services that contribute to continuous work force improvement (Appendix A).*

The Riverside Community College District mission statement emphasizes *intellectual and cultural awareness, critical and independent thought, and self-reliance (Appendix B).* The RCCD Goal Statement focuses on specific local needs and concerns — *student retention and success, institutional accountability, information technologies, economic and community services, relevance of programs,* and *increasing the college going rate (Appendix C*).

Information technology plays a dual role.

- Computer and Internet skills are necessary for RCC graduates to be competitive in today's job market.
- Information technology is a facilitator of learning that can significantly accelerate achievement of RCCD's mission and goals.

The Technology Plan is intended to:

- Focus major issues about adoption, implementation, and evaluation of teaching and learning technologies for deliberation by RCC administration, faculty, staff, students, and the community at large.
- Provide policy guidance, a design model, an implementation plan, and a budget plan.
- Anticipate and plan for teaching and learning needs of faculty and students in a wide variety of disciplines.
- Ascertain cost and cost-benefits of current and emerging technologies.
- Explore options that can result in higher quality of service and substantial long-term cost savings.

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Chapter 1

The Rationale

The purpose of the Technology Plan is to promote orderly growth and successful integration of technology into teaching and learning throughout the Riverside Community College District. Today, communication technologies are the focus of activity in commerce, government and education. It is imperative for RCCD graduates to be computer literate to meet demands of their chosen vocations and professions in the information age.

Computer literate means to be **skilled in the use of computers for research, data acquisition, data entry, and writing reports.** In technical terms this requires ***ability to use a computer, network, printer and scanner.***

Computer literacy requires:

> ***Basic knowledge of hardware, operating systems and software***
>
> ***Ability to copy and back-up files, do simple troubleshooting when problems occur, and determine what hardware, software and networks their job requires.***
>
> ***Specific knowledge, skills and experience with programs such as Microsoft Office 97 with its word processing, presentation, spreadsheet, database and scheduling programs.***
>
> ***Expertise in using Internet browsers such as Netscape and Microsoft Explorer.***
>
> ***Skill to efficiently search the Internet for specific data and resources and extract the most relevant information.***

Many public and private K-12 schools are beginning to implement computer literacy programs. Some students have access to computers at home; some have their own personal computer PC). The reality in 1998 is that the majority of RCCD students are not computer literate so that computer training must be designed to serve a spectrum of users from novice to expert.

The Planning Group for the *California Virtual University* graphically describes the transitions we are facing as we move into the Information Age:

> First, the national economy is closely tied to advances in information technology and telecommunications. As the Golden State takes a central role in the Information Age, our companies and industries increasingly depend upon employees with high levels of training and educational attainment.

In 1960, only 41.1% of the nation's population had completed high school, and only 7.7% had a similar amount of college. By 1992, 79.4% had completed high school and 21.4% had completed college. Individuals without some college education will be unable to compete with their better-educated peers and will fall further and further behind on a variety of economic indices. Further, the existing gap in wages between high school graduates and college graduates will increase dramatically as we enter the 21st century.[2] Nationally, there has been a significant decrease in unskilled jobs that might be offered to individuals with only a high school education.[3] In essence, Californians of the 21st century will need to be well educated to succeed financially.

A second trend is a corollary of the first and reflects the rapid changes in a "knowledge society" that depends on and benefits from technological development. Adults in the workforce are finding it increasingly necessary to upgrade their educational skills in order to advance in their careers. They are also changing jobs and careers with surprising frequency.[4] In many cases, the success of a planned job or career change depends on the availability of additional educational opportunities, either in a degree program, in a continuing education certificate program, or in specific courses.

And demand for education among adults is not limited to skill development and job training, but includes a range of civic and personal subjects — from history and political science to music appreciation and parenting. The combined effects of these two trends, one affecting the college-age student and the other affecting the working adult, can be expected to expand sharply the demand for services from California's institutions of higher learning.[5]

Initial needs assessment and priorities for RCCD

When the Dean of Learning Technologies was appointed in March 1997, he conducted an initial assessment and set priorities for tasks to be accomplished. Construction was underway on large open labs for Norco and Moreno Valley and bid specifications were needed to purchase equipment for installation prior to the Fall 1997 Semester. That meant setting up an initial standard for computers, printers, servers and networks. (*Appendix D*).

An assessment was made of existing computer, television and audiovisual equipment and the way in which they are used by faculty and students. Substantial funding for technology was expected in the 1997-98 academic year, so it was important to set up initial priorities for use of those funds. There was broad consensus that development of computer labs should take precedence over upgrades for television and audiovisual technologies (*Appendix E*). There was concern that City Campus did not have enough state-or-the-art equipment to teach Office 97. This problem was corrected prior to the Fall Semester.

Next Steps

Attention was focused on preparation of a Preliminary Technology Plan for presentation at the President's Retreat on July 31, 1997. This required in-depth understanding of RCC's needs and the RCCD culture.

Some students learn their computer skills in English and Writing Labs and in computer labs for Information Systems and Technologies (Business Education and Computer Information Systems). There is no organized attempt to determine computer literacy of incoming students or to ensure that students learn computer skills prior to graduation.

The collective participation of faculty, staff, administration and counselors is needed to affect this change. Assessment of computer skills as part of the admissions process would facilitate early intervention so that students exceed a threshold or minimum skill level and benefit from technology throughout their program of study. To achieve this requires courses, instructors, state-of-the-art computer labs, networks, file-servers, and Internet access to support the student population. Initial barriers were lack of computer labs, computer literate faculty, academic networks, and internet connections

The first priority is labs for students. However, without computers and training for faculty these labs cannot be fully utilized.

Faculty must learn basic applications such as word processing and email. They must learn how to use these tools to facilitate teaching and learning. Faculty must become expert in applications such as Word and Excel, choose off-the-shelf learning-ware (interactive courses delivered online or on multimedia CD-ROMs), and learn how to prepare online lessons for the World Wide Web. Off-the-shelf and instructor-prepared materials can be combined to accommodate a variety of student needs, goals, competencies and learning styles.

Preliminary Technology Plan

A Preliminary Technology Plan was presented by the *Dean of Learning Technologies* at the President's Retreat on July 31, 1997 (*Appendix F*). Its purpose was to focus major issues for deliberation by administration, faculty, staff, students, and the community at-large. The plan

initiated a dialog that continues to guide planning and implementation. It proposed an initial emphasis on large open labs for students, a lab for faculty training and production, and future-oriented standards for computers, networks, servers, operating systems and software. It explored the possibility of distance learning to extend college access throughout the Greater Riverside Community. It made ten recommendations to stimulate a dialog on projected changes. The recommendations related to policies, procedures and priorities, hardware and software standards, development and operation of computer laboratories, faculty training, television outreach, and distance learning.

Faculty input

Presentations on the emerging Technology Plan were made to chairs and faculty at retreats, department meetings, and the Academic Senate (*Appendix G*). The Dean met on several occasions with the ***Faculty Senate Committee on Computer Technology and Equity*** and with the Faculty President. The Committee prepared a survey to determine the technology needs of faculty, perspectives on technology-based learning, levels of experience, requests for training, and intention to use computer technologies for teaching and learning. The survey was administered to the total faculty.

More than half of full-time faculty and about twenty percent of adjunct-faculty responded from the three RCCD campuses. Responses supported the need for computers in instruction. Faculty emphasized their need for access to computers, training, mentoring and support to develop interactive lessons using computers, multimedia, and the Internet. They requested computers in faculty offices and faculty work-areas, reported their current level of experience on a specific list of hardware, software and authoring skills, and listed skills they would like to acquire. (*Appendix H*)

Administrator input

The Technology Plan was presented to the President's Retreat, the Budget Bunch, and the Cabinet (*Appendix I*). From an administrative point of view, there were five reoccurring concerns:

1. What does technology do to improve teaching and learning?
2. What does technology do for recruitment, retention, transfer, and future employment?
3. What does technology cost? How will it be implemented? What funding is available?
4. What happens if we fail?
5. What must RCC do to ensure success?

Detailed answers are provided below for each of these questions:

1. What does this technology do to improve teaching and learning?

Discipline requirements. Computer skills are integral to many disciplines: Applied Technology, Business, Computer Science, Engineering, Graphic Arts, Information Systems, Journalism, Manufacturing, Nursing, and Science. It enriches courses in Writing, verbal and visual communication, performance and information based technologies such as Broadcasting, English, Criminal Justice, Foreign Language, Music, Political Science, Theatre, and Television Production. It is vital to disciplines dependent on numbers and graphical representations such as Accounting, Economics, Engineering, Geography, Mathematics, and Political Science. The above represent more than 90% of Community College curriculum. Disciplines least dependent on computers (at this time) are Athletics, Auto Shop, Cosmetology, History and Philosophy. As a minimum, these disciplines require ability to do research on the World Wide Web and use word processing to write reports and class papers.

What the Research Says. Research demonstrates media and distance learning to be equal to or better than traditional methods.[6] The next section explores logistics and other benefits that are powerful reasons for adopting information technologies and distance learning.

2. What does this do for student recruitment, retention, transfer, and future employment?

Access and flexibility are a driving force to support student recruitment, retention, transfer, and future employment. Technology can provide access to unserved and underserved students by reducing barriers of time, distance, and inflexible schedules. Just as short courses and weekend courses have caused an explosion of enrollments on RCC campuses, online courses will attract a significant number of students who otherwise could-not or would-not attend College. It also gives program flexibility to on-campus students.

A recent study at the University of Colorado found that its regular student body combined on-campus and online courses to overcome problems in scheduling and reduce the time to graduation

Colleges can also use distance learning to expand on- and off-campus course offerings, provide alternative teachers for students with different learning styles and take care overflow enrollments.

Recruitment: An increasing number of entering students learned to use computers in school, at home, or at work. They will tend to select colleges with expert faculty, state-of-the-art computer labs, and opportunity to develop their computer skills.

Retention: Computer excellence will positively impact retention. Inadequate computer resources could be a significant reason for abandoning a college course or program and/or moving to another education provider. This is especially true of students who enroll in computer related disciplines.

Transfer: Transfer students are more academically oriented. In addition to the requirements of their discipline, they need better research tools including electronic libraries and better report writing and presentation tools. The school systems and universities surrounding RCC have, or are in the process of developing, excellent computer labs and information technology services.

Future Employment: As we move into the information age, computers are becoming integral to almost every part of the economy. There are few jobs, even at the basic wage level, that do not require some level of computer skill. Such skill is increasingly important for upward mobility in vocations, careers and professions and will undoubtedly be more important in the future.

3. What does it cost? How will it be implemented? What funding is available?

What does it cost? Computer technology requires a level of budget that is without precedent for education providers. For this reason, State and Federal governments are currently providing substantial support.

How will it be implemented? The Dean of Learning Technologies has four departments — Academic Computing, the Teaching-Learning Center, Distance Learning, and the Instructional Media Center. He will collaborate closely with teaching departments and faculty to provide the necessary level of support.

What Funding is available? State and Federal governments are providing special budgets, incentives, and support systems for computers and distance learning. This

includes new infrastructure, faculty training, and positions for technical support, lab assistants, and faculty training. The faculty computer training and production lab on the City campus was opened in March 1998 (*Appendix J*).

Careful planning and coordination is essential to optimize use of the new resources. A well-articulated plan will benefit both college and community as we progress into the new millennium.

4. What if we fail?

It is clear that some institutions will lead and others will be laggards in adoption of information technology. It is essential that RCC provide its students with information technology skills equal to or better than those provided by other California colleges and universities. Economic development of the Greater Riverside Area requires a technology literate workforce and RCC is positioned to be a key player in this scenario.

Failure may be represented by unfavorable feedback from students, by unfavorable feedback from employers, by RCC graduates not being employed, not being retained after employment, and/or by loss of enrollments at RCC. Clearly, RCC will want to benchmark its graduates against the ***best*** colleges in the region and in the State of California.

Success will be measured by:

- Favorable feedback from students
- Favorable feedback from employers
- RCC graduates receiving preference in employment
- RCC graduates receiving rapid promotions
- Increase in RCC's enrollment based on success in placement

Assuming that technology will expand access to new student populations, another measure of success is participation of previously unserved and underserved segments of the population.

5. What must RCC do to ensure success?

First, we must be aware of community and statewide needs and trends in order to be proactive. We train and educate for jobs that are only now being created. The California Postsecondary Education Commission (CPEC) is studying the implications for colleges and universities:

> *In many respects, the technological society of the future is already upon us. California's global economy is increasingly becoming knowledge-based, where all workers in every sector are expected to possess the technical and analytical capacity to reason, make informed judgments, and solve problems of varying complexity. The manner in which workers collaborate and communicate is becoming richer and less tied to location and occupational rank. In response to changing work force needs, and in order to expand access and learning, higher education institutions are beginning to consider a fundamental restructuring of the ways in which they provide instruction, research, and public service.*[8]

State and Federal resources are providing an infusion of technology into all levels of education. Technology components developed for on-campus learning may support distance learning and *vice versa.* Private, corporate, online and virtual colleges and universities are flourishing because they provide easy access, flexible schedules, and support for the non-traditional learner. They already offer short courses, Weekend College and online learning. RCC is following this same strategy with positive results.

In March 1998, the Board of Governors of the California Community Colleges scheduled a public hearing on Title 5 regulations for distance education (*Appendix K*).

The new information economy

The California Postsecondary Education Commission (CPEC) interprets the changes taking place as a paradigm shift from an industrial economy to an information economy:

> *If the Information Age is the name most often given to the social and economic organism that is to replace the Industrial Age, then the computerized network will represent its central nervous system. The Internet and hundreds of other networks are changing the way people perceive reality, just as the assembly line and bureaucratic organizations changed the way people behaved and lived during the Industrial Age that is now winding down. Dolence and Norris believe that almost every aspect of life, including education, will be changed by this one fact, and they constructed a matrix to illustrate it, which is shown below.*

The matrix suggests a change in the way we do business, with new criteria for success. This should be reflected in our curriculum, the way students learn, and in evaluation methods and criteria. This is not a simple change. Colleges that can negotiate this transition successfully will have the advantage as we enter the new millennium.

Differences between Industrial Age and Information Age

	Industrial Age	Information Age
Nature of Jobs	Tightly defined positions within an organization	Knowledge workers who are mobile
Nature of Organization	Rigid, formula-driven	Fast, fluid, flexible
Source of Organizational Value	Physical assets	Intellectual assets, group-centered knowledge
Pattern of Learning	Time out for training	Fusion of work and learning
Competitive Advantage for Education	Virtually exclusive teaching franchise. Clustering of instructional resources is a major competitive advantage	Network scholarship the measurement of competence; certification of outcomes establish competitive advantage
Defining Educational Roles	Provider	Facilitator, knowledge navigator, and learner/ service intermediary

Source: Dolence and Norris, 1995. (9)

Dolence and Norris provide a matrix to highlight the changing metaphors for the information age that affect education.

> *Immediately obvious from this array is that the new paradigm is not just about technology, but about structural reform; it is equally clear, however, that those reforms cannot succeed without technology. Current technology systems in higher education are totally inadequate for the needs of knowledge navigating learners in the Information Age. . . by tomorrow's standards, today's academic and administrative software, enabling systems software, and learning ware are inadequate both in concept and implementation.*

Technology will improve efficiency and performance, but initially the price will be higher.

Changing metaphors for learning organizations

Industrial Age Classrooms, libraries, and laboratories	Information Age Networks
Teaching	Learning
Seat time-based education	Achievement-based learning
Classroom-centered instruction	Network learning
Information acquisition	Knowledge navigation
Distance education	Distance-free learning
Continuing education	Perpetual learning
Time out for learning	Fusion of learning and work
Separation of learners and learning systems	Integration of learning systems

Source: Dolence and Norris,

> *. . . technology will not be a short-run solution to the dilemma of limited resources and strong enrollment pressures, but also that the advent of technology may actually increase costs throughout education before any savings can be realized. To be sure, many see electronic networks as a way to deliver education far more massively than in the past, but for that to occur, the networks themselves will have to become far more ubiquitous than they are at the present time. Education remains very far from the day when everyone will have the potential to be connected to nearly universal educational opportunities at a reasonable cost, even though almost all forecasters believe that ubiquitous networking is inevitable. For that to occur, however, there will have to be major infrastructure expenditures to expand telecommunications capacity, or bandwidth as it is now commonly called.*[8]

If cost-saving is not realized by the paradigm shift to information technology, then access, relevance, quality of instruction, effectiveness of learning, time to learn, retention, and employment of graduates become the criteria for program evaluation. Partnerships between RCC, business and community will ensure quality and relevance as we move into the information age.

Drucker's *Theory of the Business*[10] rates success of an institution by its ability to match institutional mission and resources to the needs of its environment. Assuming that enrollment is linked to the relevance and accessibility of courses and programs, the explosive growth in enrollment from RCC short-courses and weekend programs is a response to a previously unserved need. Specifically, it opens up college programs to commuters who would like to attend but cannot attend during the week. Online courses and telecourses can similarly extend community access through learning at a distance and flexible time-frames.

Definitions:

For the purposes of the *Technology Plan,* technology is defined as information technology — technology that is used in support of one-way and two-way instructional communications, teaching and learning. This includes:

> **Audiovisual** technologies such as film, slides, audio and video using traditional audiovisual projectors, players, and television equipment

Broadcast (analog) technologies such as radio, television broadcast via satellites, earth stations, cable and fiber. It includes telecourses, teleconferences and interactive (two-way) television and electronic libraries

Computers and related digital technologies involving hardware and software:

Computers, printers, scanners, computer networks and related equipment

Computer operating systems, programming languages, authoring systems, software, learning ware and applications for word processing, desktop publishing, graphics, slide presentations, animation, digital audio and video editing, interactive multimedia, web page browsers, web pages, email, listservs, and other programs for creation, storage and manipulation of data, page/screen layout and display

Distance learning involving electronic communications for print, graphics, one- and two-way audio and/or video, interactive multimedia, and networked media communications.

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Chapter 2

Needs assessment

This chapter reviews RCCs current technology resources as a baseline for future planning. It describes technology functions and identifies needs and possible organizational changes for the future. It sets goals and schedule for introduction of new technologies. It will be a phased development that rolls forward as each phase is completed. Levels, time frames and priorities will be adjusted as required.

Overview of technology by district and campus

Instructional Media Center (IMC) provides classroom support with projectors, sound and video playback, public address systems, production of audiovisual materials for instruction, a learning resources center, and technical support for campus events. Until recently, **audiovisual** and **television** were the principal communication technologies for instruction in the Riverside Community College District.

Television via videotape is used in classroom instruction. Each campus has a satellite downlink connected to a few classrooms and an interactive television system that works on digital telephone lines. There are no campus cable systems.

Computer laboratories have been developed to support interactive learning in applied technology, art, engineering, english, computer and information technologies, music, science, social science, and writing. Computers are now integral to teaching and learning in almost every area of the curriculum. The marriage of computers with telecommunications has created networks. The Internet, a global network of networks, has caused the computer to take center stage as an emerging educational technology.

Distance learning currently uses cable television to distribute tape-recorded television lessons via local cable and wireless-cable. Over 1,000 students enroll each semester in approximately 22 courses. Broadcast lessons are complemented by 15 hours of on-campus instruction. The new infrastructure for computers will facilitate development of online courses and programs for distance learning.

Current technology services and identified needs

This section will deal with technologies under the organizational units that manage them and in some instances propose alternative organizational structures.

Instructional Media Center (IMC)

The IMC is responsible for the following functions:

1. Acquire, manage, setup, operate and maintain audiovisual equipment and systems for use in classrooms, laboratories and auditoriums.
2. Provide media, equipment and operator support for classes, meetings and special events in classrooms, meeting rooms, auditoriums and stadiums.
3. Set up and operate public address systems, audio and video recording; schedule, downlink, record and distribute satellite videoconferences and lessons to classrooms/conference rooms; schedule, setup and operate two-way interactive video between campuses and with external organizations.
4. Maintain equipment.
5. Design, install, support and maintain specialized classrooms for television viewing and display of computer and Internet presentations

6. Produce media — design, produce and duplicate graphics, slides, overheads, audio, videos, and multimedia; produce video lessons in collaboration with faculty, record off-air programs; edit and/or copy audio and video-cassettes
7. Provide training sessions for faculty in classroom use of media and media production. Provide a laboratory to enable faculty to produce their own instructional materials using audiovisual and computer-based materials.
8. Manage the Learning Resources Center — provide media and equipment support for students to view and listen to prerecorded materials
9. Operate video library — select, acquire, catalog, store, loan, and maintain videocassette titles. Note: Discussion is underway with the Librarian to transfer functions 8), 9) and to the proposed Library-Learning Resources Center in 2001.

Positions to support technology-based learning

The IMC has six positions on City Campus — 1.0 manager, 2.0 technicians, 2.0 assistants, and 1.0 clerical. The IMC is open from 7:30 am to 9:30 pm Mondays through Fridays. Moreno Valley has one full time technician; Norco has two classified hourly positions. The majority of classroom support is provided by student assistants and classified hourly personnel.

The IMC supports classroom instruction with equipment such as television receiver/monitors and overhead projectors, slide projectors, audiocassette and videocassette players, videodisc players, CD players, public address systems, and other AV equipment items as needed. TV, VCR and overhead projectors are permanently installed in some classrooms. The instructor must initiate the request for media, equipment, and operator assistance.

With the exception of the newly purchased interactive video system, the equipment at the City Campus is quite old. Many projectors and television sets are more than l5 years old and breakdown of such equipment occurs with increasing frequency. In some instances parts are no longer available for repairs. Moreno Valley and Norco have more modern equipment.

The one media library is housed on the City Campus. It has approximately 6,000 videocassettes that include lesson materials previously supplied as 16mm films, slides and filmstrips. Videos are reserved by instructors for students to view in the Learning Resources Center. To receive credit (and funding), students must log in, view the assigned video, and log out.

The greatest immediate change in IMC function is installation of new television monitors, computer connections, computers and digital video projectors in classrooms. In the interim, carts with videocassette players, computers and digital video projectors can be checked out for classroom use. Services and equipment will be available on all three campuses.

Part of the IMC space on the City Campus is being shared with the new Teaching-Learning Center (faculty computer training and production lab) described later in this section.

At Moreno Valley the IMC houses the head end for cable television. This may be extended with additional educational channels and a public access channel. This Campus, in conjunction with the City of Moreno Valley, is seeking a grant from TCI Cablevision television for a television studio as part of the new Cable Franchise Agreement (Appendix L). The district is planning to contact local cable companies for cable head-ends on the City and Norco Campuses.

Identified needs:

1. **Video collection:** Weed the video library. Archive or eliminate titles that have not been used for three years. Convert catalog to MARC system and combine with library catalog. Set up an online ordering system for media, equipment, operators and technicians and specialized facilities. Set up video distribution between campuses via

the Intranet. Review the wisdom of transferring the video collection and distribution functions to the Library.

2. **Equipment:** Update inventory of heavily used equipment. Phase out old and unreliable equipment. Reduce portable equipment to minimum to reduce setup and service costs. Review the wisdom of simplifying the equipment inventory and assigning little used items to faculty and/or classrooms that still use them. Review the wisdom of supplying laptops for faculty use from the IMC and/or the Teaching-Learning Center.
3. **Classroom networks:** Install telephone, video (coaxial) cable, category 5 computer wire and fiber optic to selected classrooms and connect to campus hub. Connect satellite and cable systems to campus classrooms and the Intranet. Review the wisdom and cost of installing telecommunications in all classrooms, laboratories and conference rooms.
4. **Classroom equipment:** Install computer, digital projector, television, and overhead projector in selected classrooms. Install public address systems where needed. Have room scheduling assign these rooms to frequent users of technology. Design carts that are similarly equipped for use in traditional classrooms. Review the wisdom of taking (some) electronic classrooms from room scheduling and scheduling them from the IMC or *Distance Learning.*
5. **Two-way videoconferencing:** Review cost-savings of owning a video bridge for multi-campus connections. Review the wisdom of converting all videoconferencing and distribution equipment to MPEG II video standard. Review the wisdom of combining this function with *Distance Learning.*
6. **Cable head-end:** Review the wisdom of having a cable head-end on each campus, and whether or not public-access can effectively be handled by each campus. Review the wisdom of assigning head-end and public-access functions to *Distance Learning.*
7. **Professional production:** Graphic production capabilities of the IMC should be increased to support development of World Wide Web pages and Television Courses. Review the wisdom of combining the production functions of distance learning, telecommunications and graphics.
8. **Faculty production:** Review the wisdom of combining faculty AV production with the Teaching Learning Center.
9. **Space requirements:** Review the wisdom of a dedicated classroom for videoconferencing (remove from room scheduling); restoring the classroom to IMC so that the Teaching-Learning Center can occupy the space it now shares, and remodeling work areas to use space more efficiently.
10. **Personnel needs:** Initiate training and restructuring to efficiently provide a comprehensive and quality support to classrooms, laboratories, auditoriums, and special events in a variety of on- and off-campus settings. Review the wisdom of combining some of the user-support aspects of media services with academic computing (academic computing and media).

Distance learning

Distance learning serves the following functions:

1. Distribute RCC courses and programs, using a variety of technologies, to unserved and underserved segments of the Riverside population. This includes students who are *geographically* remote from the campus, those with *schedules* not compatible with class times, persons who are *physically* unable to attend for a variety of reasons, and

non-traditional learners whose learning styles are not well supported by traditional methods of teaching.

RCC currently offers up to 22 telecourses each semester via cable television. One 0.2 position is allocated to coordinate acquisition and scheduling of telecourses, faculty, classrooms and times for class meetings on-campus and at regional sites; preparation of data for the catalog and other forms of marketing; preparing reports; and resolving student and faculty problems.

Telecourses are prerecorded and distributed to cable companies or cable head-ends. Moreno Valley is a head-end for TCI Cable. The head-end for Cross Country Wireless Cable is at the University of California, Riverside. A head-end for Charter Communications was proposed for the City Campus in the recent Franchise negotiations with the City of Riverside. If Public Television broadcasts any of these courses, they are listed in the schedule provided to students. Each course is complemented by five three-hour sessions on-campus that include interactive, tutorial and testing components of the class. Two telecourses have been produced by RCC, Math 51 and PhysEd 22. A third course, Guidance 45, is currently in production.

Each Semester, approximately 1,200 students enroll in RCC telecourses, receiving the television segments in classrooms, industries, and homes. Television classes link people together according to a fixed schedule. Whenever possible, televised lessons are repeated throughout the day and week to support different learner schedules. Videotapes extend television courses to anywhere-anytime learning.

Television has the advantage of low cost distribution on broadcast and cable television channels. These courses can be viewed by the public at large as well as those who enroll for degree or certificate credit. The "drop in" audience is often larger than those who enroll. About 20% of students who enroll in telecourses become certificate and degree students. Thus, television provides a community service, extends college attendance, and recruits new students.

A broader definition of distance learning

Distance Learning is defined as learning that occurs when instructors and students are geographically separated. Instruction is accomplished using print, broadcast and cable video, videotapes, audiotapes, telephone, fax, computers, CD-ROM, email, listservs, and the Internet. It may be synchronous (students and instructors meet at a specified time as with a television class) or asynchronous (students set their own schedule to interact with lesson materials, the instructor and with other students using discussion boards, chat, forums and emails). Often these are combined, e.g. television for instruction with computer forums and email for interaction. In the future, television and online courses may be shared with collaborating institutions and consortia. Students can access distance learning courses on-campus, in the workplace, or at home.

Computer and internet courses at RCC

Community Services recently introduced online courses and RCC faculty are beginning to prepare online courses. There are three steps to a fully online course:

1. Most faculty start with a syllabus and handouts online. Class interaction is enhanced by email and chat rooms, discussion boards and forums on the Internet. Students may attach their class projects to email instead of presenting printed copies.
2. Parts of the curriculum are transformed into interactive learning experiences on the Internet. Links are provided to major resources for the course. Interaction via the Internet plays an increasing role in teaching and learning and takes a larger segment of instructor time.

3. Some courses may be suitable for development as stand-alone courses. Lessons are revised based on student performance data. Frequently Asked Questions (FAQs) are built into the online course and improved through developmental testing. As better presentation and interaction capabilities are built into the web lessons, the need for instructor intervention and interaction is reduced.

Other ways to use distance learning

Distance learning is a way to expand course offerings, support students with different learning styles, and to serve students who need entry to a course that did not make because of insufficient enrollment, or as an alternative to a course that is already closed. It is a way to extend RCC's facilities to the workplace and the home. It enables the College to share its best instructors with on-campus and off-campus populations.

By supplementing local curriculum with distance learning, even small and rural colleges can be full service institutions offering a complete range of courses to serve each student's needs. It is a logical means of offering college courses to high schools, and for colleges to receive courses and programs from universities.

Distance learning is projected to be a major area of future growth for postsecondary education. It may be the only practical way for many people to attend College because of their complex lifestyles and time and geographic barriers. Based on its ability to supply quality programs and services, Distance Learning is potentially the fastest growing segment of instruction at RCC.

The cost of telecommunications technology infrastructure needed to support distance learning is partially offset by substituting virtual classrooms for brick and mortar costs. The cost of courses licensed through consortia is based on the overall number of students enrolled in distance education courses. The cost of courses licensed from other sources includes a term license fee and a per-student enrollment fee.

Identified Needs:

1. **Needs Assessment and Planning:** Conduct surveys to assess the current and future need for distance learning in the greater riverside community. Determine the market for broadcast and cable courses and online courses. Review and update the current policies and procedures for distance learning for the RCCD. Coordinate with faculty and administration to develop a long-term plan for distance learning with a comprehensive set of policies and guidelines.
2. **Television Studio-Classrooms:** Construct and equip studio-classrooms to ***originate*** live television lessons and two-way (interactive) video lessons and teleconferences. Consider the wisdom of locating these classrooms adjacent to the Telecommunication department to involve the expertise of telecommunication's faculty and provide production experience for student interns. Also, the production studio(s) may be used for RCC to produce courses to be marketed or shared with collaborating colleges and consortia.
3. **Management of Two-Way Interactive Television.** Consider the wisdom of moving scheduling and support for both origination and receive aspects of interactive video from the IMC to Distance Learning.
4. **Television Viewing Classrooms:** Set up classrooms to ***receive*** satellite classes and teleconferences, broadcast and cable classes, and videos from the RCC video library. These rooms would have permanently installed monitors and/or projectors and telephones for scheduling and feedback. . Consider the wisdom of moving scheduling

of classrooms and satellite teleconferences, off-air recording and playback from IMC to distance learning.

5. **Television Network:** Design a network for central distribution of video lessons on each campus, between campuses, and to cable head-ends. Review the wisdom of having this function moved from IMC.
6. **Online Courses:** Determine the role of distance learning in developing and distributing online courses. Collaborate with faculty in selecting externally produced courses and in developing RCC courses for external distribution.
7. **Production:** Set up a professional production facility to produce, in conjunction with faculty, distributable online and television lessons and courses from prototype lessons produced by faculty.
8. **Personnel Needs:** One or more full-time persons are required on each RCC campus to develop a comprehensive set of distance learning programs and services linking RCC campuses with surrounding communities; train faculty to use the internet to augment interaction with and between students; train and support faculty to design and produce tele-lessons; 2-way interactive video; and online courses;
9. **Staffing:** Immediately increase staffing to 1.0 with classified hourly help to coordinate assessment and program development as outlined above. Prepare a Distance Learning Plan for the District and for each campus.

Computer labs and networks

Networked computers serve many functions for faculty and students including the following:

1. Learn how to use computers and networks
2. Learn how to use general purpose computer applications for word processing, spreadsheet, database, printed reports, graphics, visual displays, presentations, project organization, scheduling, and accessing information on the Internet.
3. Learn special purpose applications related to career or vocational needs.
4. Learn computer languages for creating programs, authoring multimedia; searching, organizing, and transforming data; artificial intelligence, and robotics.
5. Learn to design, create and format text, graphics, desktop publishing, animations, sounds, video, multimedia, interactive media, hypermedia, and web pages.
6. Create interactive multimedia for communication, teaching, learning, research and user interfaces for rapid storage and retrieval of information.

Computers are important to support individualized learning in every discipline. Online courses do not depend on the presence of a live teacher so that learning can occur anywhere and at any time (asynchronous learning). Feedback is achieved through telephone, email, chat and discussion boards.

Visual and interactive learning ware accommodate different learner preferences, pace and schedules. This moves control and responsibility for learning from the instructor to the student. It opens educational opportunities for care-givers, persons with disabilities, business people who travel, or others who cannot participate according to a predetermined schedule.

Academic Senate resolution

In 1996 the RCCD Academic Senate set up two goals for computer technology:

- Create open computer labs on each campus to provide students in all disciplines access to computer technology to complete academic assignments and projects.
- Acquire and implement state-of-the-art technology to support student access to computers with word processing and software, in-class computer demonstration equipment with digital projectors, and campus wide access to the Internet.

Computer labs are attached to teaching departments except for large general-purpose (open) labs recently installed at Moreno Valley and Norco as a result of Secondary Effects funding. On the City Campus the Information Systems and Technology lab on the first floor of the Business Education building is being extended to serve as a shared (open) lab.

Infrastructure and equipment — Fall 1997

There is a fiber backbone on each campus with shared-ethernet networks. With the exception of the English/Writing labs, the best equipped computer labs and teaching classrooms are at Norco and Moreno Valley. The City Campus has a computer inventory dating back to 1983 (286, 386, 486) and some older Macintosh computers. Shared Ethernet was replaced with 10/100 Switched Ethernet at Moreno Valley and Norco. Approximately 300 new computers were purchased for open labs and teaching classrooms at Norco and Moreno Valley. There were no construction related funds on the City Campus, so the differential was partially made up using Block Grant funds.

The table below shows the resulting number of computers for instructional use by Campus as of October 1997. After eliminating obsolete computers in the shaded columns, there are 740 computers to support more than 16,000 Full-time-Equivalent Students (FTES) on three campuses — a college ratio of one computer for every 23 FTES.

Computers and Computer to FTES ratios

Campus	Obsolete Macintosh	Macintosh	Obsolete 8088-486	Pentium	< 5 years old	Est. 1997-98	Ratio
City Campus	14	60	107	180	240	11000	1:50
Moreno Valley			38	242	242	2600	1:11
Norco	21		17	280	280	3000	1:11
Total	35	60	163	702	762	16,600	1:23

Computing this statistic separately for each campus gives a different picture. The computer to FTES ratio at Moreno Valley and Norco is of the order of 1:11 while on the City Campus it is about 1:50.

If labs are open for an average of 60 hours/week; that equates to a maximum of 14 minutes per course per week for students on the City Campus and one hour and ten minutes per course per week at Moreno Valley and Norco. In practice, how many computers are needed?

One way to determine the required number of computers is to total the number of computer laboratory hours for class and study needed to support each course.

Time should be allowed for novices to learn to use the computer and applications (gain computer literacy) and for students to do research on the Internet; participate in lessons

whether live, web, or interactive multimedia; complete class projects and assignments, and take tests. Data derived by this method tends to be as unreliable as estimating traffic on a highway that is not yet built.

Another approach is to benchmark equipment levels against organizations with comparable courses and programs. This produced the statistics shown below:

Computer:FTES ratios for selected schools and colleges

Institution	Number of Computers	FTES	Ratio
Ngee Ann Polytechnic-Singapore	5,000	12,000	1:2.4
California State University, San Bernadino	4,000	12,000	1:3
Goal for State of California K-12			***1:4***
Redlands East Valley High School	400	2,000	1:5
RCC Norco	280	3000	1:11
RCC Moreno Valley	240	2600	1:11
State of California K-12 — current ratio			1:14
RCC City Campus	220	11,000	1:50

For planning purposes, a goal of 1:4 was initially proposed for the RCCD, the ratio proposed for the State of California K-12. This would require 4,150 computers compared to the present inventory of 740, an increase of nearly five times. An Excel model was created to explore short term and long term costs.

Cost model for computer labs

The 1997 totals were entered for each campus. Growth formulas were based on the number of Full Time Equivalent Students (FTES) on each campus during 1997. For simplicity, the first iteration used the following assumptions:

1. All existing inventory is obsolete
2. Computer purchased should be state-of-the-art (Pentium II or above)
3. The useful life of computers is five years
4. Inventory will build for five years, and beyond this time
   20% of the inventory will be replaced each year
5. FTES is constant at 1997 levels
6. The desired computer to FTES ratio is 1:4.

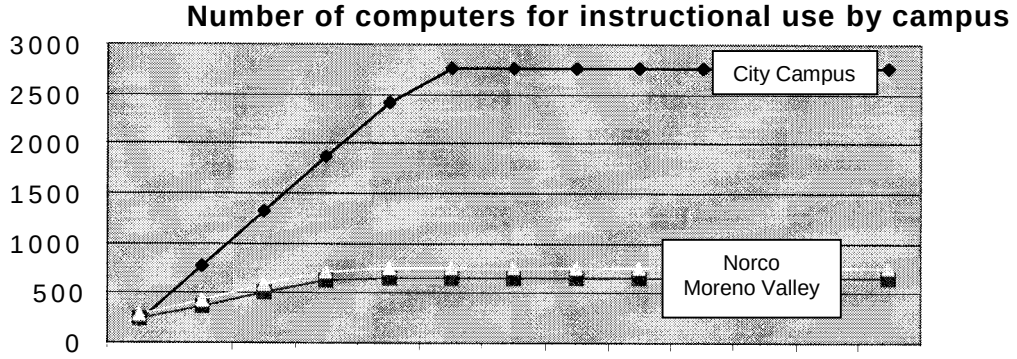
The spreadsheet was set up using formulas so that results for different ratios could be quickly displayed.

The result is shown below. A total of 830 computers will need to be purchased each year to achieve and maintain the 1:4 goal. The number required for City campus will be twice the number for Moreno Valley and Norco combined.

Number of Pentium Computers

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Annual Purchase
City Campus	220	770	1320	1870	2420	2750	2750	2750	2750	2750	2750	2750	2750	550
Moreno Valley	240	370	500	630	650	650	650	650	650	650	650	650	650	130
Norco	280	430	580	710	750	750	750	750	750	750	750	750	750	150
Total Inventory	**740**	**1570**	**2400**	**3210**	**3820**	**4150**	**4150**	**4150**	**4150**	**4150**	**4150**	**4150**	**4150**	**830**

The growth curve shows a steady increase until leveling occurs in year 5. Beyond this point 20% of the oldest computers would be replaced each year.



A standard configuration for student computers was set up in conjunction with faculty from *Computer and Information Systems and the Computer Technology and Equity Committee of the Faculty Senate. The Provosts* of the Norco and Moreno Valley campuses were involved in the process. All student computers will be Pentium II with MMX technology, minimum of 64K RAM and ZIP drive. The bid specification is described in *Appendix D*.

The price a 300Mhz computer workstation on January 2, 1998 was $3,106. By May 1 the price had fallen to $2,266. The price is entered as a variable at the top of the spreadsheet. The gray center-column is used to input other price data. The boldface numbers in the right-hand column are results based on an annual purchase of 830 computers. The bottom line is the total cost of ownership.

Many costs originally estimated were replaced with accurate data as it became available. For example, network, server and printer cost was estimated at $1,000. Initially, network cost was $900 per workstation, server was $500 per workstation, and printer was $200 per workstation. Total cost for network items totaled $1,600.

First Trial Spreadsheet — Total Installed Cost of Workstation

Purchase Price per Pentium computer	$3,106	Total annual cost for Pentiums	**$2,577,980**
Specialized computer equipment (Mac, Silicon Graphics, etc.) calculated at 5% number of Pentiums purchased and 10% of cost			**$257,798**
Network, server & printer cost per computer	1000	Total network/ servers/printers	**$830,000**
Electrical and computer wiring/fiber	100	Total electrical	**$83,000**
Software and licenses	500	Total software and licenses	**$415,000**
Internet Services	150	Total Internet services	**$124,500**
Faculty training & production lab	350	Total faculty training & production	**$319,550**
Furniture and installation	250	Total installed cost	**$207,500**
		Annual Total	**$4,815,328**

The required number of technicians and lab assistants was calculated based on the total workstation inventory each year. Assumptions for this spreadsheet were:

- One technician can support computer, server, networking, and printer hardware and software for 300 workstations
- Only 50% of the campus labs (the open labs) will have lab assistants
- Open labs will be open 80 hours per week for 50 weeks each year
- There will be one lab aide for every 50 workstations in open labs (this is less than the current operating ratio of one lab aide for 30 workstations)

Technicians and Lab Assistants

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Computer Inventory	740	1570	2400	3210	3820	4150	4150	4150	4150	4150	4150	4150	4150
Technical support based on one technician for 300 networked computers													
Technicians	2	5	8	11	13	14	14	14	14	14	14	14	14
Number of lab assistants to support 50% inventory based on one lab aide for 50 computers. Computer labs will be open 80 hours each week for 50 weeks.													
Lab assistants	30	63	128	153	166	166	166	166	166	166	166	166	166

The next step was to reduce the bottom line to an acceptable cost while optimizing *Return on Investment.*

Optimizing Cost and Function

The first item challenged was the district wide 1:4 Computer:FTES ratio. Would on-campus utilization be that high? How much computer time would actually be used? How many students would use computers at work? At home? Laptops?

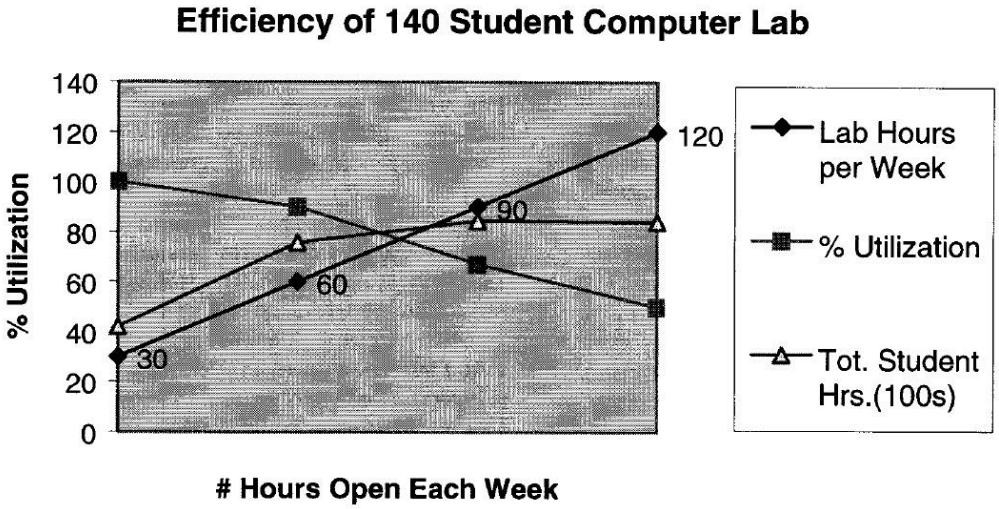
The ratio was dropped to 1:5.

The second item compared K-12 with college use. K-12 would be limited to school hours and school days — a maximum of 40 hours per week. Open labs at RCC would be open sixteen hours a day for 7 days — a total of 80 hours. On the other side of the coin, college courses may be much more demanding and require a student to spend much more time on the computer.

The ratio was dropped down to 1:7 for extended hours and back to 1:6 for more demanding projects.

The third item compared open labs with teaching labs where instructors use part of each lesson time for lecture, discussion and demonstration. If students, on the average, use those computers for 50% of class time, they could be used as little as 5 hours per day and for only 4 or 5 days per week. Compared with 80 hours per week for an open lab, equipment use in a teaching lab is only about 30%. Initially only one third of classrooms will be lab classrooms where every student has a computer. The remaining two thirds of classrooms will have an instructor computer with a digital projector.

High tech programs at Norco and Moreno Valley may require more computer access while City Campus, with more academic and transfer programs, may require less. The recommended ratio for Norco and Moreno Valley is 1:6 and for the City Campus1:8. This maintains a district-wide ratio of 1:7. Further optimization may adjust these ratios based on actual use data. For example, lab hours can be increased to accommodate more students. This is illustrated by this hypothetical graphic:



Optimization reduces the per student cost of physical plant and support personnel to 60% of the original estimate. That is an acceptable planning goal.

Growth and growth inhibitors

Up till now the plan assumed level enrollment. Growth factors are simple multipliers. Other variables include faculty training, faulty adoption of computers for instruction, and availability of large spaces that can be converted to computer labs. Space is so impacted on the city campus it is a major deterrent to growth.

Identified Needs:

1. **Large general purpose labs.** Set up a large open lab on each campus that is accessible to students for extended hours six or seven days each week. Equip the labs with state-of-the-art hardware and software. These labs may not support specialized programs such as Computer Assisted Design (CAD) and multimedia authoring programs, but should serve greater than 90% of student needs.
2. **Establish a faculty lab on each campus.** This lab will support faculty development and training and faculty production.
3. **Provide computers for faculty.** Initially it will not be possible to provide all faculty with individual computers. In the interim, faculty will be encouraged to use the faculty lab. Eventually, full-time faculty will need computers, printers and networks for email, access the Internet, handouts and presentations, review media, and correct homework. Adjunct faculty will use the faculty labs unless they have shared offices that are suitably equipped.
4. **Connect the Internet to all student and faculty computers.** The Internet is a fundamental research tool for almost every discipline. It is important for faculty and students to have access and use it effectively. A code of ethics is needed to guide faculty and students in responsible use of this valuable resource.
5. **Develop services for faculty and students.** In addition to technical support and training, logon systems and needed for security and to record *positive attendance,* and other network services such as email, web access, 24-hour help desk, and monitoring to detect and resolve computer and network problems before they occur or before they impact a significant number of users.
6. **Personnel needs.** Academic Computing needs personnel for technical operations and laboratory support. A digital video engineer, network technicians, programmers and computer technicians are required to support computers, servers, printers, scanners, networks, hubs, routers and associated telecommunications equipment and services such as Intranet and Internet, and to test, troubleshoot and maintain operating systems and software applications on all computers.
7. **Lab assistants** are needed to assist students and faculty in the laboratories and classrooms. The assistants must be computer literate and have adequate experience with the hardware and software used in the classes.
8. **System reliability.** Workstations and networks should be 99.9% reliable to minimize interruption to work schedules and loss of data. This means that networks and servers should be of high quality, with redundancy, backup, and hot swappable components so that equipment can be run 24 hours X 7 days each week without interruption.

The teaching-learning center

Faculty computer training & production lab

Instructor training is a prerequisite to effective use of the new student computer labs and classrooms. All three campuses will require student and faculty labs to develop computer literacy and basic skills with word processing, spreadsheets, databases and web browsers.

Specifically, the Faculty computer training and production lab will train faculty to:

- Use computers, computer applications, networks and the Internet.

- Design, produce, implement and evaluate printed materials, instructional presentations, and interactive teaching and learning media developed on a computer.
- Acquire or develop, implement and evaluate lessons segments, lessons and courses that involve computer text and graphics, presentation graphics, color overhead projectuals, desktop publishing, 3-dimensional graphics, digital audio and video, animations, interactive multimedia, CD-ROMs, and Web pages.
- Teach advanced workshops and assist individual faculty to design, produce, implement and evaluate media to enhance lessons and courses.
- Test, demonstrate, implement and evaluate new and emerging learning technologies

Advanced workshops will be conducted on scanning, optical character reading, image capture, creating graphics, digital photography, digital image processing, digital audio and digital video editing and conversion, PowerPoint presentations, creating interactive multimedia, CDs and CDROMs, authoring multimedia programs using Authorware, Netscape, Explorer, and HTML, and authoring courses for the World Wide Web.

The faculty lab on the city campus will have 12 networked Pentium II computer stations with Internet access, a WWW server, flatbed scanner, slide/negative scanner, color printer, high speed B&W production printer, and an extensive variety of applications software and authoring programs. This facility will ***be*** replicated with smaller numbers of computers at Norco and Moreno Valley.

Identified needs

1. Faculty must have ownership and a controlling interest in development and use of the Teaching-Learning Center.
2. A faculty person should manage the lab on behalf of the faculty.
3. The lab must be accessible on a 24 X 7 basis.
4. Equipment and software should be state-of-the art and well maintained.
5. Assistance should be always available during regular business hours.
6. The faculty lab should be a model classroom and operate in the same manner as the computer classrooms and labs used for instruction.

Priority for computer labs and networks

For the foreseeable future, the major focus of activity will be installation of computer labs and networks, training faculty, and development of online courses. Television technologies will have lower priority for available dollars.

It is important for every graduate of RCCD be computer literate and skilled in use of the Internet. This will be an expensive venture for RCC, but the alternative is not consistent with our mission as a Community College.

Transition to Information Age technology can be successfully accomplished by the year 2001. It will require careful planning, good teamwork, community industry collaboration, and success in generating additional sources of funds.

Doing more with less

Computers are a scare resource and will continue to be so. It will take four more years to build the inventory assuming that sufficient dollars are available. This will parallel faculty development activities. Initially there will be shared access for faculty in the Teaching Learning Centers or a

shared office environment. Power users will receive new computers and those whose primary need is word processing and Internet will initially receive lesser computers.

There will be a strong emphasis on large open labs because they are efficient and relatively economical to maintain. Priority will be given to open labs with extended hours, labs shared by several departments such as the physical sciences and mathematics lab, and consolidation of small labs in order to extend lab hours and minimize supervision cost. Scarcity mandates a lower priority for departmental labs open a few hours a week and teaching labs where the primary use is demonstration and discussion. (*Appendix M*)

Internet access at home and at work can reduce pressure on campus labs. This requires changes in policies and procedures for measuring positive attendance. These changes are already underway for Distance Learning. In the future, performance measures will replace seat time while tutoring and mentoring that now require line-of-sight supervision will be replaced by reasonable access using email, bulletin boards, listservs, chat rooms, and computer forums. There are now video-phones (Skype) and 2-way television for the Internet that allow the instructor and groups of students to see and hear each other and conduct discussions. Online systems enable participants to, write and sketch on a common white-board, and make presentations to each other.

Economy can also be achieved through specialization. If present trends continue, Norco and Moreno Valley will be high tech campuses that require a large numbers of computers compared to their FTES. Norco will specialize in engineering, computer science, computer-assisted design, graphics and multimedia. Moreno Valley will specialize in high-tech medical sciences. If the mission of the City Campus is to support more academic courses, it may need a smaller computer-to-student ratio.

The gap analysis between needs and available resources (space, infrastructure and budget) suggest that it is impractical to achieve the 1:7 ratio on the City Campus prior to construction of the proposed LLRC in 2001. Many of the steps recommended in the report of July 31, 1997 have already been implemented enabling this report to prepare RCC for the next stage of development.

RCCD Educational Master Plan

Learning Technologies created two documents for the 1997 – 2005 Master Plan for the RCCD.

Chapter 10: Requirement for staff and facilities – learning technologies (Appendix nAppendix N)

Chapter 11: Overall Technology/Equipment Requirements (Appendix OAppendix O)

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Chapter 3

Implementing the vision

In Chapter One a rationale was developed relating technology to the mission of the College. RCC students need information technology skills to be effective and to be competitive in Information Age society. Faculty need information technology skills to make teaching and learning more effective. The College needs an information technology infrastructure to improve learning and provide learning technologies to meet the needs of the 21st century. It is being asked to handle larger numbers of students from diverse cultures and educational backgrounds, provide higher quality graduates, and to achieve this with proportionately less funds.

Chapter Two examined the technology resources of the District for supporting teaching and learning. It found an aging audiovisual support structure, a distance learning program without a clear role in the College mission, computer labs and networks that were substandard, and lack of a mechanism to support faculty in learn and use the new technologies for instruction. As a result, a Division of Learning Technologies was proposed with four departments: Academic Computing, the Teaching-Learning Center, Distance Learning, and Instructional Media Center.

Developing support for teaching and learning

The clients for *learning technologies* are students and faculty. A Task Force with representation from students, faculty, administration and community should be convened to continually refocus the technology plan to support the teaching and learning mission and the needs of the community.

Academic computing

This is a new unit concerned with teaching and learning in classrooms, laboratories, auditoriums, library, faculty labs, faculty offices, community settings, and online activities of Distance Learning. It collaborates closely with *Computing Services* which supports business and administrative offices and functions of the College. Computing Services provides network and telecommunications support for instruction.

Academic Computing and Computing Services collaborate closely in the design of networks, setting technology standards, and troubleshooting system level problems where they occur. Jointly they design new networks that keep administrative and instructional information electronically separated. They will plan and implement a broadband Intranet connecting the three campuses that is capable of transmitting video, voice and data. They are planning extensions of the network infrastructure so that all faculty offices and areas used for teaching and learning will have high quality connections to College resources and the Internet. They are planning higher quality support for all areas of the college by providing a better infrastructure, state-of-the-art technology, and excellent technical support.

Unresolved issues that require collaboration include a campus wide *Acceptable Use Policy,* a Post Office Protocol (POP) server for student email, community wide connectivity to Web Servers for online courses, and community access to electronic library resources. As new technologies emerge, new challenges will be presented for joint resolution.

Most areas of instruction are expected to use computers and the Internet in instruction. It is a matter of some urgency to provide the necessary computer facilities and courses.

Academic computing is conceived as a District wide unit. It is responsible for:

- Support the academic mission on the three RCC campuses;
- Develop a large general-purpose laboratory on each campus with computer classrooms and specialized laboratories as needed;

- Plan, install and maintain computers, servers, networks, and computer laboratories for instructional programs; install, configure and maintain hardware and software; provide internet support;
- Provide programming and maintenance for academic file servers, WEB servers, CD-ROM servers, email servers, routers, switches, concentrators, and other networking equipment within labs and classrooms;
- Hire, train, schedule and manage technical support and lab assistants to support computer laboratories, classrooms, smart classrooms, auditoriums, library, faculty offices, and faculty training and production areas;
- Interface classroom networks and services with the Intranet, Extranet, and Internet.
- Ensure security and acceptable use of RCCD academic computer resources.

The Teaching-Learning Center

The Center will facilitate faculty development and training, and support faculty production of materials including online lessons for use on-campus and for distance learning. It is designed to assist faculty to learn to use computers in instruction, preview and select off-the-shelf courseware, and develop lessons and courses in interactive multimedia formats for distribution via CD-ROM and Internet. On the City Campus, this lab will be housed on the first floor of the present library building. It will begin operations June 1, 1998. Sites are being identified to replicate this function at Norco and Moreno Valley.

The Center is designed to provide a non-threatening environment where faculty and staff can learn to use computers, software, networks, and related equipment. It has a wide range of software and courseware for faculty to try out and adapt for their own instructional purposes. It will provide the opportunity for faculty to hone computer skills and develop computer related instructional materials involving word processing, desktop publishing, databases and spreadsheets, computer graphics, slide presentations, animations, digital audio and video, interactive multimedia, web pages, and online lessons and courses.

It is proposed that the lab will be staffed by one district level instructor, a lab manager, and lab assistants. Assistance will be available to faculty at all times during regular business hours. Faculty and faculty groups will be given 24-hour and 7-day access when required.

Distance learning

Distance Learning will collaborate with faculty and teaching departments to select and / or develop online and television lessons. It will promote, distribute and manage distance learning programs, collaborate in production of telecourses, provide technical support for two-way interactive television, and provide training for faculty in teaching via television.

At this time, distance learning is based primarily on videotaped lessons from the Community College Consortium, the Annenberg Foundation, Miami-Dade and Dallas Community College District. Each video course is complemented by five three-hour sessions conducted live on campus. The Coordinator sets up class times and instructors in conjunction with teaching departments, provides schedules and class data for the catalog, coordinates duplication and distribution of tapes and broadcast schedules to three local cable operators, and plans future improvement and expansion of distance learning services.

Distance Learning is projected for rapid growth. It uses communication technologies to reach learners who cannot attend on-campus classes at the time they are scheduled, or who for reasons of time and distance do not have access to a college education. Distance learning includes: 1) television based programs that broadcast on-campus classes and/or combine classes using two-way interactive video; 2) Internet based programs developed in conjunction with the instructional

computing unit; and 3) Combination of Internet and/or television based classes produced by RCC or from other educational providers.

Television classes require studio-classrooms for program origination and teleconferencing, and media classrooms for viewing live and recorded lessons and courses. Studio classrooms will be supported by control rooms and a master control center for recording, playback, and routing television signals to broadcast transmitters, cable companies, telephone companies, and Internet Service providers. There will be lesson preparation rooms, rehearsal rooms, administrative offices, faculty offices, conference rooms, and storage areas for classroom sets, props, backgrounds, and equipment. All television classrooms will have conference telephones and digital video projection displays.

At this time, one classroom in the Instructional Media Center has been converted for interactive video and teleconferencing. It is proposed that television classes will be located on the second floor of the present library building when the new LLRC building is constructed. In the interim, videotaped classes will continue to be produced in the Telecommunications TV studio and the IMC.

Instructional Media Center (IMC)

The IMC is housed on the first floor of the present library building on the City Campus, and has assigned spacer on the Norco and Moreno Valley campuses. It will continue to provide classroom services, media distribution, technical maintenance and support for campus events. Based on the recommendations of the Learning Technologies Task Force, some of its present functions may be reassigned to the Library in preparation for the proposed restructuring for the new Library-Learning Resources Center. The media library, media catalog, and the learning resource center are designated as part of the new LLRC.

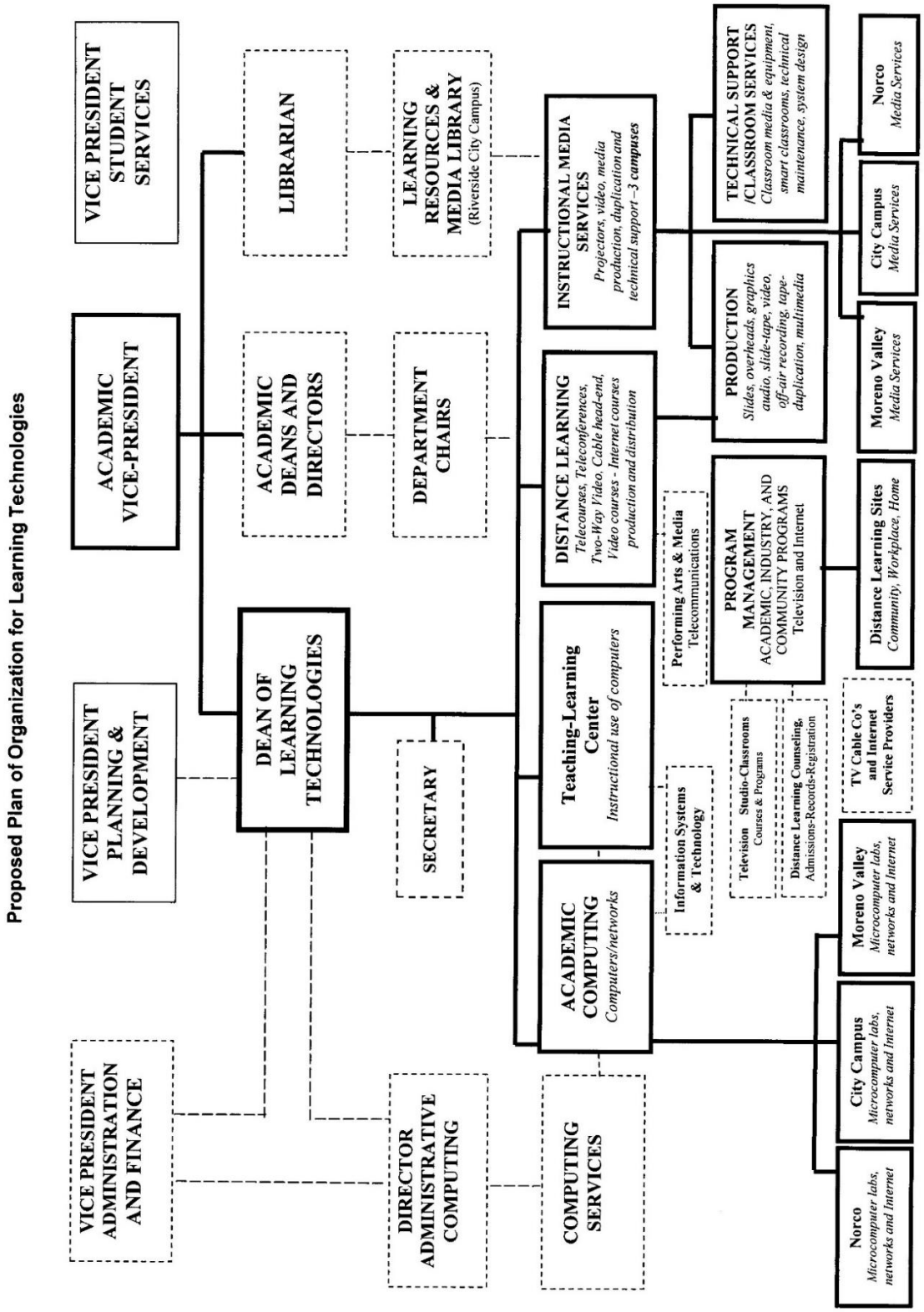
Media distribution will be increasingly electronic and on-demand. Since the media library catalog and collection is projected to become part of the LLRC, electronic distribution will be a joint IMC-LLRC activity. Live video and recorded video from the videocassette library will be supplied to classrooms and libraries on all three campuses from the City Campus facility. IMC technicians will be responsible for operation and maintenance of the video distribution system and provide technical support for two-way interactive video.

Classrooms will have installed technology commensurate with instructional needs computers, networks, Internet, digital and video projection will find increasing use in RCC classrooms and require quality service and maintenance for effective operation. The IMC will continue its role of training faculty and students to use audiovisual and television equipment.

Production services will be expanded to provide digital imaging, graphic, photographic and on-location video support for Internet, multimedia and television courses and presentations, including editing and duplication of video and digital media.

The relationship of these four departments to other operations of the College is shown in the Organization chart on the next page.

Proposed Plan of Organization for Learning Technologies



Personnel Plan

Creating a new organization requires new positions and reassignment of existing positions as roles are changed or expanded. It is expected that district staff will play a significant role in improving teaching and learning through technology. It will be responsible for district wide services such as computer and television networks, and district wide programs such as distance learning. It will be responsible for long term planning, proposal writing, partnerships, identifying and obtaining new sources of state and non-state funds, and optimizing support for technology related programs throughout the District.

1. **Current personnel.** The Dean of Learning Technologies is supported by 1.0 Secretary. Academic Computing has one district level position. Its classified hourly help and student assistants are funded through the Information Systems and Technology departments. The Teaching-Learning Center has no positions or funding. Distance Learning has 0.4 position and classified hourly help. The Instructional Media Center has five positions on the City Campus, one position at Moreno Valley, and classified hourly persons at Norco.
2. **Scheduled personnel additions.** A faculty trainer position and three full-time Computer Programmer and Network Specialists were requested in the 1997-98 budget so that one technician could be assigned to each campus to support instructional labs. These positions were given top priority in Fall 1997 and are not yet filled.
3. **Projected growth.** Personnel levels will be based on priorities of the college and availability of funds. Some personnel requirement will be formula driven. For example, one technician is needed for each 300 networked computers to ensure an acceptable quality of service. By the year 2000 the college will be teaching certification courses for troubleshooting and maintenance of computer hardware, software and networks. At this time expansion of the technician pool can be accomplished using interns from the certification program supported by RCCD technicians and instructors. Every economy that can be accomplished without loss of quality or loss of service will be implemented. For example, fewer lab assistants are required in proportion to the number of students in large computer labs.
4. **Priorities: District.** In 1997-98, Academic Computing is in crisis mode awaiting funding for technician positions. A large amount of equipment was procured, installed and tested but networks are not functional on the City Campus.

   A full time position is needed to develop Distance Learning. Funds are needed for networks, Internet connections, and distance learning classroom-studios and teleconferencing rooms.
5. **Priorities: City Campus.** Labs, equipment, and personnel are very limited on the city campus. With favorable budgets, this condition can be corrected in two to three years. Major effort must be given to getting the fullest possible utilization out of this scarce resource.

   Space is a serious problem. Operation and maintenance is greatly simplified where equipment is concentrated in a few large laboratories. Such spaces do not exist on the City Campus. The nearest approximation is the Computer and Information Science labs in the Business Building, and the computer labs operated by the English Department and Writing Center. Special purpose labs should be kept to a minimum because the large general purpose lab is staffed and more efficient (Appendix P).

   A space has been identified in the Instructional Media Center for the Faculty Computer Training and Production Facility.

Many present needs cannot be resolved until construction of the new LLRC in 2001. Collaborative use of resources will simplify the growth and transitions that must occur in the intervening period.

6. **Priorities: Moreno Valley:** Technicians and lab assistants are needed immediately to develop the capabilities of the new general purpose lab in the Science building, and to properly maintain the other computer laboratories on the campus.

   The addition of the cable head-end for TCI Inc enables Moreno Valley to broadcast a variety of educational and cultural programs direct from the campus. Communication systems are being developed to connect to the County Hospital to support the new Physician Assistant program.

7. **Priorities: Norco:** Technicians and lab assistants are needed immediately to support development and operation of the new general purpose lab in the Humanities building, and to properly maintain the other computer laboratories on the campus.

   The specialization in engineering, computer science and multimedia should provide a resource for distance learning in the State of California. It is suggested that, in addition to the regular distance learning courses via television and Internet, that Norco originate distance learning courses in engineering, computer science, megatronics, and related technologies.

1998-99 Priorities for Technology Personnel

Refer to chart — Organization Plan for Learning Technologies on page xxxx.

Academic Computing:

1.0 Manager, Computers and Networks — Mark Oliver

1.0 Technician — City Campus — new position

1.0 Technician — Moreno Valley Campus — new position

1.0 Technician — Norco Campus — new position

6.0 Hourly Classified Technicians for three campuses

Lab Assistants / Student Assistants for open labs — 3-campuses - new

Note: This will not provide sufficient technical support for more than the large general purpose labs, nor will it provide adequate support for the installation and testing of systems to be installed before and during the Fall Semester of 1997. The academic network will continue to be dependent on the Administrative Computing unit for network support, maintenance of computers for faculty and instructional specialists, and support for equipment maintenance.

Teaching-Learning Center

1.0 Instructor (new)

1.0 Lab Aide / Student Assistant (new)

Note: The instructor will train faculty in the use of computers and production of instructional materials including desktop publishing, PowerPoint presentations, multimedia, and Web Pages. Training will be conducted in small groups on three campuses to guide/assist faculty in design, production, implementation and evaluation of computer based instructional materials. This person

will also be responsible for developing a faculty newsletter for to keep them abreast of new teaching techniques, technologies and software.

The lab aide (two 20-hour positions) will keep the faculty lab open as needed for up to 40 hours each week and provide assistance for faculty to use hardware and software; design, produce and test materials; and implement presentations and multimedia in classrooms and labs.

Additional positions may be required in the future for Norco and Moreno Valley.

Distance Learning

1.0 Distance Learning Coordinator — Sharon McConnell (increase from 0.4) 2.0 Classified Hourly (increase from 0.5)

Note: This position will coordinate existing courses delivered on tape to local cable companies; review available resources to expand the offerings via cable; prepare a plan for use of interactive video to link RCCD campuses and 4Cnet campuses; support development and implementation of online courses and explore the distance learning options for certificate programs taught at RCCD.

Additional positions may be required in the future for Norco and Moreno Valley.

Instructional Media Center

1.0 Coordinator and Media Specialist (Henry Bravo)

1.0 Media Clerk (Becky Soto) 1.0 AV Tech (Michael Prosser) 1.0 Evening Service (Harry Petty)

1.0 Media Specialist — Norco (0.5 Huy Ngyen + 0.5 **new)**

1.0 Media Specialist — Moreno Valley (Gustavo Segura) Student assistants

Some functions of the IMC may be reassigned to the Library and to Distance Learning. However, the increase in high-tech classrooms and services may require a similar level of staffing for the IMC.

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Chapter 4

Reflections – December 2015

Donald G. Perrin Ph.D.
Dean of Learning Technologies 1997-2000

The essential parts of the five year plan were implemented in the first 18 months. A number of details not written into the plan important for its success are added here.

My previous ten years were spent in the Silicon Valley developing the Alquist Center for Innovative Learning at San Jose State University. This gave me excellent preparation to work with faculty and administration, state-of-the art hardware and software, and faculty developing college level media and materials in many subjects. I worked with the latest PC and Mac computers, peripherals and software. I adopted switched 10/100Mbps networks two years before they were adopted for San Jose State University. My lab had a server and the latest peripherals from Silicon Valley companies, including the first read/write CDROMs. I extended my network and internet connections to studio classrooms for ITFS television. I was equipped to prepare the Riverside Community College District for the new millennium.

RCC already had architectural plans for a large computer lab on each of its three campuses. They had also made an initial purchase of model 8088 PC computers that were essentially obsolete. I was able to initiate purchases for (then) high standard Pentium PCs, printers, servers and switched networks. The computer center had set up dual networks for security to separate academic and business functions. I advocated one network since they could be separated electronically. All of vendor bids recommended one composite network.

Computer equipment and software have an average life of about five years, so I bargained with the administration for an annual replacement budget equal to 20% of the inventory, with new equipment going to areas where it was most needed. We contracted with Microsoft for $42 per computer per year for ***all*** Microsoft software with updates to new versions as they became available. Since almost every computer needed an operating system and Microsoft Office, this represented a very significant cost saving for over 2000 computers used for academic and administrative purposes. The option to lease computers (Appendix Q) was rejected because future budget cuts could eliminate a large numbers of computers and make it impossible to teach some subjects.

Many of the teaching departments requested their own computer labs, equipment and software. A local state university had gone this route with devastating results. It consumed valuable space and departmental budgets. Departments could not afford to keep the labs open except for classes. The result was that these labs were closed and not available for student use most of the time.

As Dean of Learning Technologies, I recognized that RCC needed special purpose labs for subjects such as music, desktop publishing, nursing and Graphic Information Systems. Initially I rejected the Music Department's proposal because it did not include recent innovations, such as playback for musical compositions for orchestra. Desktop publishing required Macintosh computers, but I encouraged them to add a few PCs since some students would be required to use them in the field. Nursing had its own space and very specific requirements for hardware and software. It was a day program. I was able to negotiate for Graphic Information Systems (GIS) to use it in the evenings to train students to use ESRI GIS software.

Other teaching departments were encouraged to group with related disciplines if they needed a specialized lab. Two such proposals were funded. The large and well-staffed general purpose labs, one on each campus, met all other requirements. In some instances instructors were in the lab at certain hours to provide additional help for their students.

Riverside Community College is grateful for the assistance of the Office of the Chancellor, various funding agencies, and numerous colleges and universities that provided additional resources and ideas. A few of these are included here, but they are too numerous to mention and reproduce as part of this document. (Appendix K, Appendix R, Appendix S.)

In the first few years, very few students had their own computers or access to them at home. As a result the general purpose labs were heavily used. Over time, many students got their own digital devices and the labs were used mostly by students who preferred to do their homework on campus, those who did not own or have access to laptop computers or tablets, and those who needed assistance in learning and using software to do their assignments and reports.

Since most of the five-year goals were accomplished by 1999 and the new Library-Learning Resource Center on the City Campus would not be built till 2001, I taught classes for *Computer and Information Systems* to test the viability of the new computer classrooms and instructional materials, such as the Shelly-Cashman manuals. In the year 2000, I retired and returned to the Silicon Valley to join the Ohana Foundation, a startup company for educational media that later moved to Hawaii.

. . . . . .

Fifteen years later (2015) the RCCD web page states its mission is:

> dedicated to the success of our students and the development of the communities we serve. To advance this mission, our colleges and learning centers provide educational and student services to meet the needs and expectations of their unique communities of learners.

The college is focused on career and academic education. In 2015, the three campuses served a total of more than 38,000 (mostly part-time) students, and graduated about 5,000 students with degrees and certificates. For more detailed statistics, go to: http://rccd.edu/rccPresidentSearch/Documents/RCCD%202014%20Quick%20Look.pdf

Success is reflected in the rapid growth of the Riverside community and the low 6.6% unemployment rate in the region. For current information on the city of Riverside view this video: www.riversideoed.com. For further information about this paper contact dperrin@itdl.org

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APPENDIX A

Mission of the California Community Colleges

By law the California Community Colleges shall admit any California resident and may admit anyone who is over 18 years of age and who is capable of profiting from the instruction offered. The Colleges may also admit any nonresident, possessing a high school diploma or the equivalent thereof.

Primary missions of the Colleges are to:

- Offer academic and vocational education at the lower division level for both younger and older students, including those persons returning to school.
- Advance California's economic growth and global competitiveness through education, training, and services that contribute to continuous work force improvement.
- Provide remedial instruction for those in need of it and in conjunction with the school districts, instruction in English as a second language, adult noncredit instruction, and support services that help students succeed at the postsecondary level.
- Offer Community Services according to local needs.
- Conduct institutional research concerning student learning and retention as is needed to facilitate their educational missions.

The Board of Governor's shall provide leadership and direction in the continuing development of the California Community Colleges as an integral and effective element in the structure of public higher education in the state.

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APPENDIX B

Riverside Community College District Mission Statement

The Riverside Community College District is an accessible comprehensive community college committed to providing an affordable post-secondary education, including student services and community services, to a diverse student body. The District provides transfer programs paralleling the first two years of university offerings, pre-professional, career preparation, occupational and technical programs leading to the associate of arts degree, the associate of science degree, and variety of certificates.

In the tradition of general education, the liberal arts and sciences and the occupational and technical programs and courses prepare students for intellectual and cultural awareness, critical and independent thought, and self-reliance. Consistent with its responsibility to assist those who can benefit from post-secondary education, the District provides pre-college, tutorial, and supplemental instruction for underprepared students. The District works in partnership with other educational institutions, business, industry, and community groups to enhance the quality of life and the internal harmony of the communities it serves. The District serves Western Riverside County from three interrelated campuses in the cities of Riverside, Norco and Corona, and Moreno Valley.

Approved by the Riverside Community College District Board of Trustees: June 21, 1994

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APPENDIX C

Riverside Community College District Goals

1995-2005

Improve student retention and success by strengthening certificate, degree, and transfer programs and by establishing new programs and course sequences that lead students to opportunities for transfer education and career preparation.

Ensure that the resources of the college support an effective learning process and assure accountability by measuring and reporting on institutional effectiveness.

Utilize advances in information technologies to improve the effectiveness of instruction, services, and administration.

Improve the district's capability for economic development and community services by strengthening partnerships with other educational institutions, business, labor, and government to enhance "seamless" educational opportunity and continuity for students.

Tailor programs and services to meet the needs of the students and communities served by the three-campus district.

Increase the district's college going rate by reaching out to underrepresented and underserved populations and designing programs, services, and approaches relevant to the diverse segments of the community.

Approved by the Riverside Community College Board of Trustees: October 17, 1995

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APPENDIX D

May 12, 1997

INVITATION TO BID

PC WORKSTATIONS, SERVERS, NETWORK, AND PRINTERS

Riverside Community College District is inviting sealed proposals from California Multiple Award Schedule (CMAS) vendors for acquisition and installation of 242 personal computers with installation, six file servers with Novell software, twelve laser printers, two 130 port 10-BaseT switched networks to be integrated with the backbone of the existing campus network, six Uninterruptable power supplies, four CD consoles, each with at least 21 8X CD-ROM Drives, twelve Flatbed Scanners, two network utility workstations for management troubleshooting. All equipment MUST be Novell and Windows NT certified. Specifications for the equipment are contained in this document.

The District requests the bidder provide two (2) copies of the bid response, and one (1) signed original of the bid bond, hold harmless agreement, and noncollusion affidavit in a sealed package addressed and delivered to:

Purchasing Office, North Hall (3617
Saunders Street) Riverside
Community College District
4800 Magnolia Avenue
Riverside, CA 92506-1299

Envelopes must be clearly marked "Bid for PC Systems — General Purpose Student Labs" and received in the Purchasing Office not later than **2:00 p.m., Friday, June 6, 1997.** Bids received after this time will not be considered.

It is planned to present the results of the bid to the Board of Trustees at its regular scheduled meeting on Tuesday, June 17, 1997. The Board of Trustees reserves the right to reject any or all bids, and to waive any informalities in the bidding.

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RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

PURPOSE OF THE BID:

The Riverside Community College District will receive bids for computer workstations from CMAS qualified vendors. Bid prices shall include parts and software as specified installed and correctly configured. In order to provide continuity and standardization within the District, award will be made by lot. Failure to bid all of the items as specified will result in rejection of the bid. Evaluation of responsible bidders will be based on, but not limited to, such factors as ability to deliver products in a timely manner, ability to provide technical assistance, appropriateness of materials offered, timely replacement of defective parts, and price.

Vendors may bid on one or more of lots (#1) thru (#7). Each lot should be bid and quoted separately. Integrated proposals may be submitted in addition to the separate bids.

One lab will be located in the Science and Technology building on the Norco Campus, 2001 Third Street, Norco, CA 91760. The second lab will be located in the Science and Technology building on the Moreno Valley Campus, 16130 Lasselle Street, Moreno Valley, CA 92551-2045. Delivery and installation will take place at both locations.

Lot (#1) - COMPUTER WORKSTATION WITH HARD DRIVE AND MONITOR

Quantity - two-hundred (200) personal computers as listed below:

266 MHz Intel Pentium II Processor w/ MMX Technology

Internal 512K 1.2 Secondary Write-Back Cache

64Mb EDO RAM expandable to 256Mb

6.4 GB 11 ms Ultra ATA Hard Drive

12X Toshiba XM-5702B CD-ROM Drive

Mid-tower case

IOMega Internal Zip Drive w/ 3 Zip Disks

3.5" 1.44MB Floppy Diskette Drive

64-bit Graphics with 4MB

3COM 10/100 TP Ethernet Adapter — must be full duplex capable at 100 Mbps

3Com Remote Program Load (RPL) Chip installed on network card

17" Color Monitor— 1280x1024 non-interlaced 25 dot pitch

Multi-Media Kit - Sound Card (Soundblaster Compatible),

Altec-AC5-41 Speakers w/ Earphones

104-key Windows Keyboard

MS IntelliMouse and Mouse Pad

***Full versions** of* Windows '95 and MS Office 97Professional *installed on the hard disk*

Installation of workstations - . Please quote separately for unpacking, set-up and testing of workstations, and waste removal. (The District will provide tables and electrical outlets.)

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

Lot (#1) - COMPUTER WORKSTATIONS (CONTINUED)

Quantity — one (1): temporary server

Intel Pentium 266MHz w/MMX Technology

64MB RAM 512KB cache

17" Color Display

PCI local-bus graphics accelerator

4GB SCSI disk drive with controller

3.5" 1.44MB diskette drive

12X CD-ROM drive

3 PCI TP Ethernet adapters

1 ISA TP Ethernet adapter

MS mouse with mouse pad

Windows 95 with MS Office 97 Professional Edition on CD

Lot (#2) FILE SERVERS

Quantity: six (6) file servers, Compaq Proliant or equivalent, as specified below:

P6-200 Mhz. Pentium MicroProcessor

128Mb RAM, 512K L2 Cache

3.5" 1.44 Mb floppy disk drive

Smart 2P Array Controller

4X CD-ROM

101 Key keyboard

Fast-wide SCSI-2 Controller (PCI)

4 Netelligent 10/100 TX PCI UTP Controller

1 SmartStart and IntraNetware 50 User

3 4.3 Gb Pluggable HDD

1 4/16 Turbo DAT Tape backup

1 15" Monitor

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

Lot (#3) LASER PRINTERS

Quantity: 12 laser printers, Hewlett-Packard 5SI/MX or equivalent, as specified below.

24 page-per-minute

600 dot-per-inch

duplex (double-sided)

multiple paper trays -

two (2) 500 sheets trays for sizes to 11 X 17,
one (1) 2000 sheet input tray on rollers.

12Mb RAM memory

Ethernet interface

Lot (#4) 10Mbps SWITCHED NETWORK

Quantity — two (2) 130-station 10-BaseT switched networks and interface equipment, as specified below:

Two (2) Cabletron 6000 or equivalent

Dual power supply

Modular switch with broadcast storm protection, port mirroring, virtual routing, virtual networking, and embedded remote monitoring (RMON) using the standard Simple Network Management Protocol (SNMP).

Connectivity for 100BaseT duplex input from server and one-hundred-and-thirty (130) 10- Mbps Switched Ethernet ports.

Distributed switch processing with throughput exceeding 2,000,000 packets a second with bandwidth exceeding 3.2 Gbps.

Quantity — four (4): DSU's

Access to high-speed T-1, fractional T-1, and Frame Relay services.

Supports AMI or B8Zs line coding.

Configured through dip switches or terminal.

Converts V.35, RS449, EIA 530 compatible DTW signals to T-1 network compatible signals.

DTE data rate is software selectable, from 56KB/s to 1.536MB/s

Provides mechanism for in-band controlled fractional loopbacks.

Motorola FT-100 or equivalent

Quantity — one (1) Router Cisco 2501 or equivalent

2 serial (high-speed) and 1 Ethernet (10BaseT) connections.
8MB Flash and 4MB DRAM.

Desktop feature set (10S Release 11.2)

19" Rackmount kit

Quantity — two (2) V.35 Male cables

Cisco order number CAB-V35MT

Quantity — one (1) Hub (

Cabletron SmartSwitch 2200 or equivalent

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

Lot (#5) Uninterruptable Power Supplies

Quantity: - six (6) APC Matrix 3000 UPS System

Lot (#6) CD-Console

Quantity: Two (2) CD server with 40 (expandable to 63) CD-ROM Drives

Modular design, CPU Driven

Direct network connection

Must run multiple drives simultaneously

Standard 19" rack mount

Redundant and hot swappable power supplies and fans and CD-ROM drives

Lot (#7) 600 DPI Scanners

Quantity: Twelve (12) 600 dpi single pass flatbed scanners 24-bit color graphics

Bundled with full versions of OmniPage and PhotoShop software

QUANTITIES:

The District has immediate requirements for certain items contained in this bid. However, the quantities requested are estimates only and in no way guarantee the purchase of those quantities. The purpose is to establish firm pricing for expected future purchases. Therefore the bidder should assume that additional purchases made would likely consist of multiple smaller quantities over the time period specified.

The District requires that all pricing contained in this bid remain in effect through September 1, 1997. This agreement may be extended for additional one-year periods by mutual consent of both parties (through September 1, 1999). Bidders must agree that pricing for each item will be firm and that purchases in excess of the bid request will be honored through the commitment period.

PRICE CHANGES:

In the event that, during the contract period, the bidder reduces said prices to any of its other customers for the same or similar products, then the prices herein will be changes to reflect the reduced prices effective as of the date lower prices shall be offered to other customers. In no event shall prices be increased during the term of this contract or any extension of this contract.

In addition, within 24 hours of any price decrease the District shall be notified in writing of such changes and any pending orders shall reflect the newer price.

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

INTRODUCTION OF UPGRADES OR NEW TECHNOLOGY:

In the event that an item within the bid is discontinued or replaced by an upgraded item that performs the same task, it shall be deemed an acceptable replacement if it meets or exceed original specifications and is provided at the same or lesser price than the original item.

Where an innovation significantly changes hardware and performance, the bid price can be adjusted upward by mutual agreement so long as the amount is either the CMAS price or the same percentage discount that applies to this contract, whichever is lower.

DELIVERY:

All items shall be bid F.O.B. destination. **Note the delivery dates below for the initial order.** Any bidder who cannot pledge this delivery arrangement must make clear this specification within their bid.

DELIVERY DATE:

For the initial order, delivery is required by July 21, 1997 — 120 workstations or half of each lot for to the Moreno Valley Campus at 16130 Lasselle Street, Moreno Valley, CA 92551 and 120 workstations or half of each lot to the Norco Campus at 2001 Third Street, Norco, CA 71760. If delivery is not made within 14 days of the required date, the Vendor will be required to unpack, install and test all computers at no cost to the District. If delivery is not made within 28 days of the required date this contract may be cancelled and equipment returned at the vendor's expense.

COMPATIBILITY:

Since components listed in this bid will be added to existing systems, it is required that all items be 100% compatible with those listed. Nothing stated herein is intended to be restrictive against a particular brand offered. However, equipment that is not completely compatible with existing systems may be rejected on that basis. Compatibility shall include, but not be limited to:

Operation of software currently issued in the district.

- Mechanical compatibility and configuration adaptability. Ease of repair and availability of compatible parts. Network compatibility (Ethernet, Novell, Windows NT — up to 100 Mbps).
- Compatibility may extend to other systems and networks not mentioned.

The capability of connecting computer workstations to the District mainframe, intranet, internet, and local area networks requires that computer workstations bid must be able to connect to all of the above. The future connectivity of all District academic and administrative computers is essential. Compatibility and performance tests may be conducted to confirm the workstation capabilities. District personnel at District facilities must verify the performance test. The District will use industry-published reports to verify performance and compatibility. The District reserves the right to determine compatibility on all products.

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

HARDWARE ACCEPTABILITY:

Only hardware that is available for general sale or lease, in current production, and which has been used by education institutions in satisfactory operation, will be considered acceptable. The District reserves the right to determine which bid is consistent with the best interests of the District.

MANUFACTURER'S REPRESENTATIVE.

Dealers who submit an offer as a manufacturer's representative must supplement the offer with a letter from the manufacturer certifying that

1. the vendor is a *bone fide* dealer for the specific equipment presented, that
2. the vendor is authorized to submit an offer on such equipment, and that
3. guarantees that, should the dealer fail to satisfactorily fulfill any obligations established as a result of the award, the manufacturer will assume such obligations or provide for their competent assumption by one or more *bone fide* dealers for the balance of the award period.

TECHNICAL SUPPORT:

All bids submitted for computer workstations shall include lifetime technical support via a toll-free technical support phone number at no additional cost. To fully meet District needs, the technical support number must be staffed by live on-site technicians and provided on a 24-hour 7-days-a-week basis. These technicians must be qualified to offer immediate technical assistance and empowered to issue replacement parts and return authorizations. (Voice-mail, clerical staff, generic recordings, and message taking are not considered acceptable forms of phone support). Successful bidders must demonstrate the ability to provide this type of support. Failure to meet this specification or to provide the technical support phone number within the bid may result in rejection of the bid.

RATINGS AND RELIABILITY:

Computer workstations submitted for bid will be verified against major computer trade publication's rating and testing reports for reliability, performance, networkability, expandability, technical support, and repair service. Computers that fail to meet this specification may be rejected on this basis. The District reserves the right to make final determinations regarding ratings and reliability.

SPECIFICATION SHEETS:

Specification sheets for computer workstations being bid, other than those listed within the bid schedule, must be included with the bid. Specification sheets must be complete and demonstrate clearly the product's ability to meet District specification requirements. The responsibility to provide these sheets rests solely with the bidder. The District reserves the right to make final determination regarding conciseness and completeness of specification sheets provided. Failure to meet this condition may result in rejection of the bid.

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

ENVIRONMENT:

No separate, special, or newly constructed facilities may be required for these products. The bidder must specify if any special floor-space or layout configurations will be necessary for the system. The bidder must specify if any particular heating, cooling, or electrical power configurations will be necessary.

DELIVERY OF SAMPLES:

Samples of equipment and peripherals may be required for evaluation. Samples will be delivered to the District and returned to the bidder at the bidder's expense. Bidders are hereby notified to have samples of items ready for prompt evaluation if required within five calendar days of bid opening. Samples that cannot be provided in that time frame will not be considered for award.

MANUALS, LICENSES, AND COPIES OF SOFTWARE:

Bidder shall provide all operation and/or service manuals normally provided with each item included in this bid at no additional cost to the District. Bidder shall provide license numbers and CD-ROM versions of all installed software including Windows 95, MS Office Professional for 97, utilities and drivers required for the specified equipment and peripherals, along with diagnostic and maintenance utilities normally provided for the specified hardware and software.

WARRANTY:

The District requires and bidders agree that as part of the purchase price, all products purchased under the terms of this bid shall be covered by a replacement parts warranty for a minimum period of three (3) years. Each bidder acknowledges the obligation for this kind of warranty and any bidder who cannot pledge this warranty should make clear their exception to this specification in their bid.

ADDITIONAL FEES:

Any and all additional fees not covered in the pricing of the equipment and software must be indicated by the bidder.

RIGHT TO REJECT BIDS:

The District reserves the right to reject any or all bids, to waive any discrepancy or technicality, and to split the awards in any manner deemed most advantageous to the district.

ATTACHMENTS AND SPECIFICATIONS:

Please include all options (if any) as either an attachment to the bid response or as separate bids. You must include copies of technical specifications for all equipment bid. If the District cannot determine the specifications for the listed equipment, the bid will be rejected.

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

SPECIFICATIONS AND INSTRUCTIONS

PATENTS, ETC.:

The vendor shall hold the Riverside Community College District, its officers, agents, and employees, harmless from liability of any nature or kind on account of use of any copyrighted or non copyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in this bid. The hold harmless agreement must be signed and included in the bid package.

REFERENCES:

Each vendor must submit at least three (3) references from similar institutions using similar equipment. It is preferred that they be educational institutions in Southern California. These references **must** include the institution's name, address, current phone number, and contact. References will be checked before any bid is awarded. The District reserves the right to reject a bid if the references fail to provide a positive response to requests for information or if the reference provides a less than satisfactory evaluation of the vendor.

FINANCIAL STATEMENTS/FINANCIAL STABILITY:

A brief financial statement indicating financial viability must be included. The District is requiring that the vendor be financially solvent and have a reasonable chance of being in business for several years.

Upon request, the bidder must submit its public annual report to demonstrate the financial stability of the vendor to the District. The district reserves the right to define and determine financial stability.

OTHER AGENCY CONSIDERATION:

Other Unified School Districts, the County Superintendent of Schools, and Community College Districts within the County of Riverside may secure the identical items at the same price and upon the same terms and conditions pursuant to Section 20118 of the Public Contract Code. This District waives its right to have such other District draw its warrant in favor of the District as provided in said Code Section.

INFORMATION REGARDING BID PROCEDURES AND SPECIFICATIONS:

Bid procedure questions should be addressed to:
Maria Rausch, Purchasing Specialist

(909) 222-8861
or email mrausch@rccd.cc.ca.us

Equipment specification questions should be addressed to:
Dr. Donald G. Perrin, Dean of Learning Technologies
(909) 222-8835
or email dperrin@rccd.cc.ca.us.

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS
HARDWARE / SOFTWARE / TECHNICAL SUPPORT REQUIREMENTS

FORMS, SPECIFICATIONS AND INSTRUCTIONS

VENDOR ACKNOWLEDGEMENT

The authorized agent of the vendor who signs this bid must also initial below in the appropriate space their response to these requirements. Failure to do so may result in rejection of bid. This page is to be included in the sealed bid response.

ITEM	Will Comply	Will Not Comply
California Multiple Awards Schedule (CMAS) Authorized Vendor		
To provide continuity within the District and to assist in more easily securing the computer workstations, servers, and other equipment within an encased security device, the successfully bid equipment must be consistent with the size, type, and style of equipment cases that are provided.		
To assist in properly identifying systems, each unit should clearly indicate processor speed in the front of the CPU.		
To assist in properly identifying systems, each unit must be individually serialized.		
The specified software and/or CD programs included with each workstation must be installed prior to shipping.		
All software and/or CD-programs included with each workstation must include original disks and manuals.		
Upon request, successful bidder shall provide price quotes for replacement parts, add-ons, upgrades, memory, etc. on a 24-hour turn-around basis.		
Technical phone support must be staffed by live on-site technicians who are qualified to discuss and resolve network connectivity, hardware/software configurations, and hardware failure. In the event of hardware failure, technicians must be empowered to immediately issue replacement parts or return authorizations. Voice-mail, clerical staff, generic recordings, and message taking are not considered acceptable forms of technical phone support.		
To provide for district personnel who work beyond standard hours, the above technical support phone line must be available and staffed by live qualified technicians on a 24-hour, 7-days-aweek basis.		

Public Contract Code section 7106 states: "Any public works contract of a public entity shall include an affidavit, in the following form:"

RIVERSIDE COMMUNITY COLLEGE DISTRICT

NONCOLLUSION AFFIDAVIT

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

State of California)

) ss.

County of _____)

_____, being first duly sworn, deposes and says that he or she is

_____ of_____the party making the foregoing bid

that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

_____

Authorized Signature of Bidder

RIVERSIDE COMMUNITY COLLEGE DISTRICT

HOLD HARMLESS AGREEMENT

The Contractor agrees to and does hereby indemnify and hold harmless the District, its officers, agents, and employees from every claim or demand made, and every liability, loss, damages, or expense, or any nature whatsoever, which may be incurred by reason of:

Liability for damages for (1) death or bodily injury to persons, (2) injury to, loss or theft of property, or (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the Contractor or any person, firm or corporation employed by the Contractor upon or in connection with the work called for in this Agreement, except for liability resulting from the sole negligence or willful misconduct of the District, its officers, employees, agents or independent contractors who are directly employed by the District; and

Any injury to or death of persons or damage to property caused by any act, neglect, default or omission of the Contractor, or any person, firm, or corporation employed by the Contractor, either directly or by independent contract, including all damages due to loss or theft, sustained by any person, firm or corporation, including the District, arising out of, or in any way connected with the work covered by this agreement, whether said injury or damage occurs either on or off school district property, if the liability arose from the negligence or willful misconduct of anyone employed by the Contractor, either directly or by independent contract.

The Contractor, at his own expense, cost, and risk, shall defend any and all actions, suits, or other proceedings that may be brought or instituted against the District, its officers, agents or employees, on any such claim, demand or liability, and shall pay or satisfy any judgment that may be rendered against the District, its officers, agents or employees in any action, suit or other proceedings as a result thereof.

_____

Authorized Signature of Bidder

_____

Date

RIVERSIDE COMMUNITY COLLEGE DISTRICT

BID FOR PC SYSTEMS - GENERAL PURPOSE STUDENT LABS

BID FORM

The authorized signature of the vendor's representative certifies that all information submitted as part of this bid response to be true and correct and that the terms of the bid documents are agreed to herein.

COMPANY NAME:	**AUTHORIZED SIGNATURE:**
ADDRESS:	**PRINTED NAME:**
CITY, STATE, ZIP:	**TITLE:**
PHONE NUMBER:	**DATE SIGNED:**
FAX NUMBER:	**SALES REPRESENTATIVE:**

	QTY	UNIT PRICE	EXTENSION	TAXES (RATE: %)	TOTAL
#1 - pc workstations	240				
#2 - file server & netware	6				
#3 - laser printer	12				
#4 - 10/100mbps switched network	2				
#5 - uninterruptable power supply	6				
#6 - cd-console	4				
#7 - 600dpi scanner	12				
#8 - utility workstations	2				

Please indicate if there are to be shipping charges added to the above costs.
Please indicate brand names and model numbers of all items bid.

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APPENDIX E

1997-1998

Priorities for Equipment Budget

1. **General Purpose Student Labs** **$1,000,000**

   Computers and software
   Networks
   Servers
   Printers
   Internet Service

Rationale: *Students and learning are the focus of the Community College System. The large General Purpose lab on each campus will be staffed with assistants and technicians. They will be kept open for at least 60 hours each week and can be extended to 24 hour X 7 day labs in the future. These labs will maximize utilization of both technology and personnel.*

If all items cannot be funded initially at the 100% level, consider the possible reduction in the number of servers and printers and installation of Internet service to the minimum number of computers necessary to support course requirements.

2. **Department labs** **$400,000**

Computers and software

   Networks
   Servers
   Printers
   Internet Service

Rationale: *Department labs serve specialized needs. They are justified where specialized software and courseware is used and specialized assistance is required. Departments must provide lab aides so the number of open hours will be limited by budget. Technician support will have lesser priority because the only available technician may be the person supporting the General Purpose lab.*

If items cannot be funded at the 100% level, reduction should be tailored to specific needs. For instance, Internet may have lesser priority than the number of computers. If a lab can be kept open for more hours using volunteers or interns, fewer computers will be needed.

3. **Faculty Labs** **$50,000**

Rationale: *Faculty labs on each campus will provide a place for training and faculty production. Assistance will be available from a lab aide for several hours each day. Computers will be properly maintained and have software, clip art, and resources to support development of print, graphic, audio, video, and multimedia lessons. Equipment will include scanners, high volume B&W printer, color printer for overhead projectuals, CD-ROM maker, digital camera, and conversion/editing equipment for digital audio and video.*

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1997-98

4. **Faculty Office Computers** $50,000

Rationale: *Faculty need tools to develop lessons and lesson materials. A basic computer should be provided for word processing, email, and Internet access. Power users (those developing graphics and multimedia) need state of the art hardware. Options such as helping faculty to buy their own computers, lease, or upgrading obsolete computers with new motherboard, memory and hard disk should be explored to maximize the number of faculty served. In subsequent years faculty who accepted minimal computers will have priority for new computers.*

5. **Smart Classrooms** $80,000

Rationale: *Smart classrooms may have permanently* installed *demonstration facilities such as cable television and videocassette player, audiotape and CD, and/or computer with LCD digital projector. Instructor time is saved and maintenance is reduced by scheduling classes into appropriately equipped classrooms.*

6. **Library** $60,000

Rationale: The library provides training in accessing information resources and the Internet. The library is extensively used by faculty and student for research and study. Technology resources include computer databases, instructional CDROMs, information services, and the Internet.

7. **Instructor-Led Labs** $50,000

Rationale: *Scheduled classes in the labs should be discouraged because the time used for teaching and demonstration may exceed 25% of the class time. Demonstration facilities (computer and LCD projector) are expensive and would receive higher utilization in a smart classroom. Student computers are not fully utilized and, during class times, are inaccessible to other students.*

8. **Distance Learning** $50,000

Rationale: Distance learning is competing for the same technology dollars as computers. Except for videotape classes, there is no defined role for distance learning at RCCD. Video and multimedia production facilities are geared to training students and interactive video equipment needs to upgraded. Emphasis in the 1997-98 year will be to conduct a market survey and to develop a comprehensive plan for distance education in conjunction with RCCD faculty.

9. **Instructional Media Center** $100,000

Rationale: Classroom television receivers, overhead projectors, and components for smart classrooms.

Total cost $1 840 000

1997-98

Priorities for Technology Personnel

1. Academic Computing:

1.0 Manager for Computers and Networks — Mark Oliver
1.0 Technician — City Campus — new position
1.0 Technician — Moreno Valley Campus — new position
1.0 Technician — Norco Campus — new position
4.0 Lab Aides / Student Assistants

Note: This will not provide sufficient technical support for more than the general purpose labs, nor will it provide adequate support for the installation and testing of systems to be installed before and during the Fall Semester of 1997. The academic network will continue to be dependent on David Bell for system level support and direct support to special purpose labs and faculty.

2. Faculty Development:

1.0 Instructor
1.0 Lab Aide / Student Assistant

Note: The instructor will train faculty in the use of computers and production of instructional materials including desktop publishing, PowerPoint presentations, multimedia, and Web Pages. Training will be conducted in small groups on three campuses to guide/assist faculty in design, production, implementation and evaluation of computer based instructional materials. This person will also be responsible for developing a faculty newsletter for to keep them abreast of new teaching techniques, technologies and software.

The lab aide (two 20-hour positions) will keep the faculty lab open as needed for up to 40 hours each week and provide assistance for faculty to use hardware and software; design, produce and test materials; and implement presentations and multimedia in classrooms and labs.

3. Distance Learning

0.6 Distance Learning Coordinator — Sharon McConnell
0.5 Student assistant

Note: This position will coordinate existing courses delivered on tape to local cable companies; review available resources to expand the offerings via cable; prepare a plan for use of interactive video to link RCCD campuses and 4Cnet campuses; and explore the distance learning options for certificate programs taught at RCCD.

4. **Audiovisual Production / Classroom Support / Technical Support**

1.0 Coordinator and Media Specialist (Henry Bravo)
1.0 Media Clerk (Becky Soto)
1.0 AV Tech (Michael Prosser)
1.0 AV Tech (Amando Castro)
1.0 AV Tech — Evening Service (Harry Petty)
1.0 Media Specialist — Norco (0.5 Huy Ngyen + 0.5 *new)*
1.0 Media Specialist — Moreno Valley (Gustavo Segura)

1997-98

Proposed Operating Budgets (less salaries & equipment)

Academic Computing	
Office supplies, travel, etc.	$ 6,000
Consultant services	$25,000
Software, site licenses, services, etc(new)	$25,000
Faculty Development (new)	
Computer supplies — toner, paper, inks, transparency materials, software, authoring programs, services	$10,000
Distance Learning	
Supplies and services, programs and royalties	$15,000
Instructional Media Center	
AV Lab Services & Production	$66,000
Total	**$147,000**

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APPENDIX F

LEARNING IN THE FUTURE

Donald G. Perrin Ph.D.
Dean of Learning Technologies
July 31, 1997

It is 883 days to the beginning of the new millennium. We will look backward to the nineties as a period of economic uncertainty followed by sweeping changes. We will look with pride at our revitalized campuses and the role we as educators have played in building a prosperous community. Now come with me to the year 2001. We are standing in front of the new library building at the entrance to the City Campus. To the left is a multi-tiered parking structure. Students are streaming onto the campus. We move with them as they file into classrooms, laboratories, the library, and the technology building. . .

The new technology building was once a library. It is beautifully remodeled, with television studio-classrooms on the first floor. Television classes via cable and microwave reach unserved segments of the community, link campuses for classes with small enrollments, and share the most popular instructors and courses. A farm of satellite antennas on the roof sends classes across the hemisphere and receives classes to expand our curriculum offerings. (A statewide curriculum project funded in 1997 set quality standards for telecourses that opened the door for sharing with Community Colleges courses nationwide.)

In another part of the technology building we see faculty on computer workstations developing multimedia courses for Internet II and the World Wide Web. There are servers connected to networks that radiate through each RCC campus, then to schools and businesses, community organizations and homes. Wide Area Networks connect RCC campuses with the statewide network, 4Cnet, and with Internet II.

The second floor of the technology building is a large 24-hour computer lab with all-new equipment. This is the last of the projected inventory from the 1997 Technology Plan. At one end there are three classrooms for instructor-led classes. When not used by classes, these are opened to extend the capacity of the lab. Lab-aides and instructors move throughout the lab quietly assisting students. Others instructors work from their offices sharing computer screens and keyboards as they communicate with students on-campus and at remote sites.

The basement houses servers and technical support. The *Media Center* is integrated with *Academic Computing.* The familiar equipment carts have disappeared and well-equipped *Smart Classrooms* facilitate teaching with audiovisual media, television and computers. Faculty who need them have computers in their offices, others prefer to work in the well-equipped faculty labs where they receive production and training assistance.

The new library is a model for the twenty first century. It has electronic information systems, a computer commons, teleconferencing and rooms for multimedia and television. The library embodies state-of-the-art information and learning technologies. Even the small group study rooms have computer and television access.

RCCD now provides unparalleled service to the Riverside community. *Passport to Learning* has developed enthusiasm for education in parents as well as students. College programs attract a growing and diverse community of learners from all walks of life who seek job skills and education programs. Live courses can be accessed both on- and off-campus. Others are available on an anywhere-anytime basis. Learning technologies customize teaching and learning programs for individual needs and learning styles. Partnerships with business and industry provide students with internships, work experience, and an easy transition to their chosen careers.

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How can such remarkable change occur in just a few years? It requires a common vision, a common commitment, and a community effort. We as a Community College, under Dr. Rotella's leadership, can shape this vision. It requires a plan. It requires resources. It requires commitment. It requires collaborative effort. We can do it!

Today I will outline a preliminary plan for technology for your consideration. It is a straw-man for faculty and staff and administrators and students to discuss, to explore, to shape, and from it to build the College plan. It will be a collaborative plan that reflects the needs of students and community, faculty and curriculum, staff and administration. We need a mechanism to facilitate dialog - a task force or working group of some kind to gather information and shape the final plan.

Communication technologies have become as fundamental to the educational process as electric light, water and plumbing. Technology was a luxury that was barely affordable under the chalk-and-talk college budgets of past. Now there is a radical change. Starting in 1997, substantial funding is available for planning and constructing infrastructure and networks, procuring hardware and software, and training faculty. Public opinion and government are focused on equipping schools and colleges for the twenty-first century.

Let us now examine the issues we, as a College, must consider as we start down the yellow brick road to the future.

Preliminary Technology Plan

July 31, 1997

Two kinds of technology are needed to support teaching and learning *information technology* and *instructional technology*.

Information technology provides access to a wide variety of resources — text and data, multimedia and video. It includes systems for delivering information ranging from traditional libraries, textbooks, and videos to interactive multimedia, teleconferencing, electronic libraries, computer networks and the Internet.

Instructional technology is concerned with teaching and learning. It provides assessment, counseling and advising; a database of student characteristics, learning styles, goals, and accomplishments; curriculum structures and alternatives; courses, courseware, and interactive learning environments that include multimedia, the Internet with integral tools for diagnosis, prescription, benchmarking, and evaluation. Technology expands *access* to learning resources on-campus and off-campus. It makes college courses and programs available to populations that were previously unserved.

In 1997-98 the RCCD has secondary effects funds, capital funds and grant opportunities for technology. Activity is focused on training and equipping faculty; installing smart classrooms, computer laboratories, and networks; reassessing needs and revitalizing curricula; and providing technical support and continuity for technology based learning.

Purpose of the Preliminary Plan

This preliminary plan is intended to:

1. Focus major issues for consideration by the administration, faculty, staff, students, and the community at large.
2. Provide policy guidance, a design model, an implementation plan, and a budget plan.
3. Anticipate teaching and learning needs of faculty and students in a wide variety of disciplines.
4. Determine cost and cost-benefits of current and emerging technologies.
5. Explore options that can result in substantial long-term cost savings.

Effective implementation of new communication technologies will ensure that RCCD graduates are viable and competitive in the global marketplace and enhance economic growth of the Greater Riverside community.

The technology plan has five major components:

1. Computers and networks
2. Software — applications and courseware
3. Interactive television
4. Teaching and learning systems
5. Instructor training and instructional support

Technology funding is available for *computers, networks, software, interactive television, and the supporting telecommunications infrastructure.* The role of faculty and administration is to integrate technology to improve teaching and learning. The role of the Dean of Learning Technologies is to guide faculty and administration and provide the necessary support for successful implementation.

In the Fall of 1997, state-of-the-art technology will be available on all RCCD campuses supported by training opportunities for faculty, support technicians and lab aides.

Computers and networks

RCCD is upgrading computer labs and networks. The following steps are already in progress:

1. District standards are being setup for computers, networks, servers, and printers.
2. Computer labs are being upgraded.
3. Token ring networks are being replaced by Ethernet.
4. General-purpose labs have been setup at Norco and Moreno Valley.
5. Funds are available to facilitate adoption of technology.
6. A bid process is facilitating major purchases of computers for Fall 97.

Standards

Several steps have been taken to ensure reliable equipment operation and prompt service when needed. These include:

1. Standardize on one type, make and model of computer.
2. Buy the most current model.
3. Have the manufacturer install and configure hardware and software.
4. Have the manufacturer unpack and test equipment on-site.
5. Replace token ring networks with Ethernet.
6. Use Switched Ethernet so that multimedia does not overload networks.
7. Use Asynchronous Transmission Mode (ATM) for network backbone.
8. Standardize networks, servers, printers, and lab procedures.

Establish policies and procedures for faculty training, lab support, and procurement, maintenance and replacement of equipment and software.

1. Standardize on one type, make and model of computer. This simplifies purchase, service, operation, and ultimately, replacement. It minimizes the number of makes and models for technical support and permits identical configuration.
2. Buy the most current model. The average useful life of a computer is five years. Buying last-years model reduces useful life to four years. It also takes away some of the functionality and power of the newer machines. For 20% less it is not a good deal because hardware cost is only part of the equation. The cost for installation and setup, maintenance, networking, software, printers, furniture, etc. may triple this cost. So the actual saving was 7%!

3. Have the manufacturer install and configure hardware and software. This requires planning and ensures a common configuration. Opening a new computer to install hardware doesn't make sense since it violates the integrity of the configuration determined by the manufacturer. Technician time is expensive. Technical support should be lean and mean yet responsive when needed.
4. Have the manufacturer unpack and test equipment on-site. Hundreds of new computers are being installed for the Fall of '97. The vendor can accelerate on-site installation since RCC technical staff are already over-committed
5. Replace token ring networks with Ethernet. Token-ring networks are unreliable and difficult to maintain. This upgrade is a real plus!
6. Use Switched Ethernet so that multimedia does not overload networks. Two or three multimedia programs can overload a *shared* network. Switched Ethernet provides every user with a ten-megabit-per-second pipe.
7. Use Asynchronous Transmission Mode (ATM) for the network backbone. The backbone must support all of the traffic on the network, so its collective bandwidth must be substantially greater than bandwidth to the desktop.
8. Standardize networks, servers, printers, and lab procedures. There will be one network to serve both administrative and academic services on three campuses. It will be optimized to ensure a uniformly high *Quality of Service.*
9. Establish policies and procedures for faculty training, lab support, procurement, maintenance and replacement of equipment and software. Faculty training will be provided by one new position shared between three campuses. One lab technician will be added to each campus whose primary function is to support the general-purpose lab. Academic computing will have its own technical support team. It will collaborate closely with the administrative computer support team.

To keep the equipment inventory current, it is necessary to replace 20% of the computers each year. For an inventory of 1,000 computers, that requires purchase of 200 new computers each year at $4,000 each, a total of $800,000 each year. (Lease adds a finance charge and amortizes cost over four years, adding about 30% to the price (See Appendix Q — Comparison of Purchase and Leasing Cost). Also, an inventory of 1,000 computers is not sufficient to support 16,000 Full Time Equivalent Students.)

Computer inventory by campus

For planning purposes, June 1 '97 is used as a baseline. The Fall '97 projection is based on the proposed expenditure of secondary effects and capital funds. The original goal was to have these computers, servers, printers, and networks in place for the beginning of the Fall Semester. Moreno Valley delayed part of its purchase in favor of installation prior to the second 10-week session. Internet connections will be made initially to one student lab on each campus. Management procedures for student use of the Internet are yet to be set up.

City campus

The city campus has many obsolete computers and, except for large labs and some faculty offices, no networks. (The administrative net is near complete in that most staff and administrators who need it have network access.) With no construction funds or secondary effects dollars, technology funds are the only resource available to the City Campus at this time. Unless a new site can be identified, the most likely candidates for a general-purpose lab are the Information Systems and Technology Lab (IS&T) and the Writing Lab. None of the 76 Pentium

computers in the writing lab have hard disk drives. Also, 44 now obsolete 486SX's in the IS&T lab do not have hard-disk drives.

Recommendation #1: *Establish a task force be to determine the requirement for a general-purpose lab on the City Campus and identify a suitable site.*

Academic Computer Inventory — City Campus:

Lab Type	CPU Type	June 1	Sept 1	Nov 1	Server	Internet
Business Lab (BE 100)	286 486s x P6-266	25 15	25 15	 40	1	
Art	P5-120	1	1	1	0	1
Chemistry	8088- 486 P5-60 P6-266	12	12	12 12	1	0
English / Writing	P5-120	76	76	76	2	0
Graphics	Mac	40	40	40	1	0
Info Systems & Technology	486sx- P6-200 P6-266	44 36	44 40 24	 40 68	3	60
Library / Media	P5-133 P6-266	10	10	10 11	1	10
Math	Mac	24	24	24	0	0
Natural Science	286 — 386 p6-266	5	5	 6	0	3
Nursing	386 P5-120 P6-266	6	6	6 6	0	0
TOTAL		294	318	352	9	74

Norco campus

Norco moved many of its older Macintosh computers to the language laboratory. Its inventory is principally Pentium computers, and with purchases from Secondary Effects and Technology funds, numbers are close to adequate for the present courses and students. Secondary Effects dollars have also enabled replacement of the token-ring networks and upgrade of the campus backbone.

Introduction of the Internet will greatly accelerate lab use. Also, the new general-purpose labs will attract participation from disciplines and courses that do not currently use computer facilities.

Norco Campus:

Lab Type	CPU Type	June 1	Sept 1	Nov 1	Server	Internet
General Purpose	P6-266		60	120	3	60*
Art	Mac 610	5	5	5	0	0
Computer Classroom	P6-266	0	40	40		
English/Writing	Mac 486 P6-180	4 12 40	4 40	4 40	1	0
Engineering	P-100 P6-200	20 52	20 52	20 52	2	20
Library / Media	486- P5-100 P6-266	4	4	4 11	0	15
Foreign Language	Mac LC	12	12	12	0	0
Social Science	486 P6-266	1	1	1 1	0	0
TOTAL		150	238	310	7	95

Moreno Valley campus

As with Norco, Moreno Valley is also benefiting from Secondary Effects and technology funds for purchase of computers and networks. It will similarly attract higher utilization through addition of the Internet and through commitment to a large general-purpose lab.

Moreno Valley Campus:

Lab Type	CPU	June 1	Sept 1	Nov 1	Server	Internet
General Purpose	P6-266	0	0**	120	2	60
Computer Classroom	P5-120 P5-200			68		
English	286- P5- 120	36 36	72	72	1	0
1ST	P5-120 P5-200	32 35	32 35		1	0
Library	P		10	10		
Math	P5-120	35	35	35	1	0
TOTAL		174	184	305	5	60

** Installation is delayed to open before second 10 week session.

Computer Inventory by Type

The standard computer for RCC is a Pentium computer of 100Mhz or above. All new purchases will be for 266 Mhz Pentium II computers. Computers dating back to 1983 (8088) are still in use along with 286, 386, 486 and some older Macintosh computers. The following table shows numbers for each as of June 1 and projected numbers for November 1. The data shows replacement of a large number of obsolete computers and an increase in inventory from 618 to 967 computers. City Campus has a slightly larger inventory, but the ratio to FTES is much lower.

Campus & Date	Macintosh	8088-486	Pentium	Total
City Campus				
June '97	64	107	123	**294**
November '97	64	18	270	**352**
Norco				
June '97	21	17	112	**150**
November '97	21	5	284	**310**
Moreno Valley				
June '97	0	38	138	**174**
November '97	0	0	305	**305**

Computer Inventory and FTES

Based on district totals, on June 1 there were approximately 600 computers to support 16,000 full-time equivalent students — a ratio of one computer for every 26 FTES. If labs are open for an average of 50 hours/week, that is equivalent to 2 hours of lab time per FTES or less than 24 minutes per course per week. November 1 predicted totals improve the ratio to one computer for 17 students, 3 hours per FTES, or 36 minutes per course per week. It is clear that even an inventory of 1,000 computers district-wide will not be sufficient.

Recommendation #2: *Maximize availability of computers on each campus by adopting the following measures:*

Assign priority to General-purpose computer labs over departmental labs.

Open labs for the longest number of hours consistent with use.

Adopt alternative methods of supervision/support so students can do lab work in the workplace or at home.

The table that follows lists ways in which utilization of limited computer resources can be expanded. Suggestions in the right-hand column lower or contain costs. Judicious application of the above principles can double or even triple access for on-campus students. Additional cost reduction can be accomplished through planning and management of recurring costs and through cost-avoidance.

INCREASING UTILIZATION OF COMPUTER LABS AND INFRASTRUCTURE

Inefficient use of facilities	Suggested alternative
Instructor led classes that are primarily lecture and demonstration.	**Teach in smart classroom,** then assign students to work in open computer lab where assistance is available.
Scheduled labs — e.g. 3 hours morning, three hours afternoon, three hours evening, **4** or 5 days.	**Create multipurpose labs operating 16-24 hours daily.** Instructors and/or lab assistants should be available as required.
Dedicated laboratory for one discipline. (Partially filled laboratories result in further loss of efficiency.)	**Create multipurpose labs.** If open labs are not suitable, combine labs for related programs wherever possible.
Labs closed because funds are not available for supervision.	**Consolidate small laboratories into larger units and combine support staff.** This will increase equipment utilization and maintain or reduce supervision cost.
Unsupervised laboratories.	**Add television surveillance** to all labs for added security. Supervised labs may be unsupervised for short periods. **Note:** Assistance should always be available to students when needed.
Requirement for all computer activity to be conducted in the assigned laboratory.	**Use open labs and remote access to expand lab capacity.** If students can use computers at home or in the workplace, this reduces space, equipment and maintenance requirements on campus. Connection via the internet and / or cable TV are less expensive than providing lab facilities on campus. Note: **Distance Learning** should be explored for expanding class capacity, reaching unserved students, and providing anywhere-anytime learning and just-in-time learning.
Overcrowded labs with inadequate air conditioning.	Personal comfort adds to lab efficiency for instructors and students. Also, overheated equipment is much more prone to failure.

Consolidating laboratories and extending lab hours will enable fuller utilization of facilities, equipment, software, and networking. Added cost for personnel and maintenance is trivial compared to savings from higher utilization of facilities, equipment, network infrastructure, and software.

Inventory Distribution Based on FTES

Norco and Moreno Valley have more than twice as many computers per FTES as the City Campus. The City Campus will not benefit from Construction and Secondary Effects funding for at least four years, so a compensatory mechanism is needed to build ITS inventory more rapidly. This could be achieved in part by giving the City Campus higher priority for other sources of technology funding.

Recommendation #3. *The City Campus should have higher priority for technology funds to strengthen its inventory.*

SOFTWARE — APPLICATIONS AND COURSEWARE

Software presents its own problems. Computers come preloaded with software such as Windows 95 and Office 97. Textbook publishers may supply software as an inducement to buy their text. Most software is not free! Multiple copies or licenses for a range of programs and courses can escalate costs. Software that is upgraded frequently results in a continuing expense.

Initial purchase is more expensive than upgrades. Licenses are less expensive than multiple copies of software and manuals. Discount coupons may come with new equipment and the savings can be substantial.

Recommendation #4: *The Technology office should keep an inventory of hardware and software, licenses and discount coupons. It should coordinate software requests to avoid unnecessary purchases and to ensure the best price. Where free software is acquired, the terms and conditions of use must be in writing.*

Good management will save money. Ultimately the cost of software must be related to enrollments and course priorities.

Technical problems should be anticipated by testing in advance. New versions of software may not work on older computers, or may be costly in technician time to configure. New versions may require more memory and faster processors. They may overwrite older versions. Some software will disable other applications, overwrite drivers, programs and registry. Removal of programs to free-up hard disk space may also be problematic. These unknowns escalate operating costs for personnel, software, and ultimately — hardware.

Recommendation #5: *A set of policies and procedures should be developed to coordinate, testing, loading and removal of software. It should address problems of incompatibility of programs, loading multiple versions of the same program, the need for technicians to load and remove programs from the servers and workstations, and the need for mirror images to reload software from the server.*

MULTIMEDIA COURSEWARE FOR TEACHING AND LEARNING

Interactive multimedia uses personal computers and specially designed courseware to facilitate teaching and learning. Instructional design, hypermedia, interaction, and evaluation guide the student toward successful achievement of the instructional objectives.

Information is presented via text, graphics, animations, sound and video. Students respond by typing; selecting, arranging, or dragging text and graphic elements using a mouse (click and drag), speaking into a microphone, or inputting data using keyboard, graphic tablet, midi keyboards, electronic sensors, and telecommunication devices. The computer analyzes each response, applies diagnostic-prescriptive algorithms, manages the sequence of learning, and records relevant learning events. Decision trees and elements of artificial intelligence are used to customize instruction for the needs of each learner.

Put simply, multimedia combines a variety of media to develop a dialog between a virtual teacher and the learner. Students learn at their own pace in a pattern consistent with their previous knowledge, learning style, personal interests, and schedule.

Multimedia for Learning at RCCD: Multimedia courseware can be purchased on CD-ROM; accessed through the World Wide Web, Community College Consortia, and publishers; produced by teams of RCC instructors; or produced by individual instructors in conjunction with their students. Production requires training to use hypermedia authoring-software such as Authorware, Hyperstudio, or Toolbook. It requires a lot of time, access to a variety of graphic, audio, and video resources, and a powerful PC.

Most production operations can be performed on multimedia PCs. At least one PC workstation should have a scanner to digitize text and graphics, a digitizer card for sound and video, a large storage disk, and a CD-ROM maker.

With the introduction of large general-purpose computer laboratories on each campus, faculty should be encouraged to experiment with multimedia in their courses. They can begin with off-the-shelf materials, and develop course segments of their own. Courses in the design and production of multimedia are available from local institutions of higher education and on the Web. State and Federal project funds are available to support development of curriculum materials in multimedia format.

Recommendation #6: *Faculty should receive training and assistance to use computer applications and courseware, and also to develop their own teaching materials including multimedia, web pages, and other interactive uses of computers.*

INTERACTIVE TELEVISION

Television is available in a variety options for education, training and teleconferencing:

1. Broadcast and cable television are open access technologies with one-way video and two-way audio. Telephone is used for return audio. Broadcast range is about 50 miles; cable access is determined by the franchise of the cable company. RCCD uses broadcast courses from KVCR and KCET, and distributes courses via local cable companies - *Charter Communications, Cross Country Wireless,* and TCI.
2. C-Band and Ku-Band satellite and digital satellite can be used for state, regional or nationwide distribution. 1-800 phone is used for return audio. RCCD has a classroom on each campus that can receive satellite broadcasts. Program origination is contracted to an outside vendor.
3. Instructional television Fixed Service (ITFS) is used for closed-circuit broadcast and requires a special down converter. Telephone is used for return audio. ITFS requires line-of sight from transmitter to any number of receive-sites in a fifty-mile radius. RCCD distributes classes to schools and homes via *Cross Country Wireless Cable* using the UC Riverside ITFS frequencies.
4. Interactive two-way television and video conferencing use ISDN telephone lines for point-to-point connection. A *bridge* is needed to connect multiple sites (multi-point). Telecommunication charges are substantially higher than telephone cost. RCCD has one set of equipment for interactive two-way television on each campus. Services must be requested in advance from the Instructional Media Center (IMC).
5. Videotape lessons can be checked out by instructors for classroom use. Students can view tapes in the IMC. They can also be obtained on loan, rented or purchased. For television courses, feedback is provided by on-campus sessions and/or by email, chat sessions, forums, and interactive multimedia on the Internet.
6. Internet and Intranet versions of two-way television use software such as CU-See Me to overlay a small video image on a computer screen. This process is called desktop video. It is inexpensive but the images are small, poor in quality, and on busy networks the system is unreliable.
7. 1-6 above can be combined. For example: counseling and advising via interactive video; learning from satellite broadcast lessons with telephone feedback; individual assistance and tutorials via email and the Internet.

All seven options are available to RCCD. 1-4 require specially equipped studio-classrooms or teleconference rooms to originate and receive television lessons. For optimum results, video technologies require instructor training, preparation time and technical support. Video lessons can be recorded for rebroadcast, review, study, and distribution on videotape. Additional information on television is included in Appendix D.

Recommendation #7: *Prepare a plan for effective television outreach. There is a need for a mission statement, policies and procedures, and resources for planning, marketing, scheduling, production, transmission, and evaluation. It should be related to on-campus instruction and distance learning. It should provide training for instructors who teach via television for those who teach in conjunction with television. Classroom(s) and conference room(s) should be remodeled to serve as studio-classrooms that optimize video and audio quality. Television classes should have priority on the use of these rooms.*

Television is not a replacement for traditional teaching, yet it has its own special values for solving logistical and access problems for students.

Recommendation #8: *Use television to expand low-enrollment courses and share courses in high demand. Make courses accessible to the community at homes, high schools, colleges, businesses, industries, government, and community facilities. Enrich the curriculum by importing courses from other colleges and universities.*

CLASSROOM TELECOMMUNICATION SYSTEMS

Every classroom and laboratory should have direct access to television, telephone and computer networks. RCCD campuses should be connected to each other, the school district, surrounding communities, and the Internet. Technologies are available to address these needs using the fiber backbone on each campus for computer, television and voice communications.

A video network is needed for central distribution of teleconferences, television classes, and videotapes to any RCCD classroom, laboratory, library, and to remote sites for distance learning. The entire media collection should be available during library hours; frequently used videos would be available 24-hours 7 days on players designed for multiple-videocassettes, CD-ROM servers, and/or video-on-demand servers. A dial-up system would provide automated access as well as personal assistance. The telephone keypad or computer keyboard can be used to dial up and control video media.

Recommendation #9: *Use the computer network to distribute video and telephone communications between campuses. Determine the pros and cons of such a combined network in terms of cost and Quality of Service.*

DISTANCE LEARNING

Distance learning is a way to reach unserved segments of the population. It serves those who are geographically remote from the campus, those with schedules not compatible with class times, those physically unable to attend for a variety of reasons, and non-traditional learners whose learning styles are not compatible with traditional methods of teaching.

The Open University in Great Britain has demonstrated how higher education can be made open as to people, open as to places, open as to ideas, and open as to methods. Today it has 150,000 students in degree programs and its reputation ranks among the leaders in higher education worldwide.

Two technologies play a dominant role: television for group teaching, and the computer for individualized learning.

Broadcast television translates the classroom paradigm of group teaching into multiple classrooms, industries, and homes. It is a *synchronous* method of learning that links people together according to a fixed schedule. The focus is on teaching and the teacher. It has the advantage of low cost distribution and is accessible to all that have a television. The "drop in" audience may be much larger than those enrolled for degree or certificate credit and should be considered as a community service as well as a promotional device for college programs.

Individualized learning is asynchronous. It can occur anywhere and at any time. It accommodates different learner preferences, schedules, and pace of learning. It can be interrupted and resumed at will. It opens educational opportunities for persons who travel, have families, or otherwise cannot participate according to a predetermined schedule. Videotapes can be used for asynchronous learning, but the new knowledge media — computers and telecommunications — are powerful instruments for interactive learning. It is notable that ten of eleven distance learning institutions with enrollments over 100,000 focus on individual learning, not on group teaching (the exception is the Chinese TV University system).

The British Open University attributes its success to four key elements:

1. Very high quality multi-media learning materials produced by multi-skilled academic teams. Study materials must be excellent and varied to make the campus in the home or workplace a congenial experience.
2. Dedicated personal academic support. Each Open University student has his own tutor for each course, one of Open University's 7,000 adjunct faculty. They comment on and mark the student's assignments, hold group meetings, and give support by phone, email, and computer conference.
3. Slick logistics. Each individual student must receive the right materials and information at the right time. With over 150,000 students around the world, that requires attention to detail.
4. A strong research base. When thousands of students use the material for each course and millions of people view each TV program, the content must be academically up-to-date. Thanks to economies of scale, the Open University has resources to move the academic paradigms steadily forward.

RCCDs approach to distance learning will initiate the opportunity for courses that are developed and shared on a statewide basis. A pilot project will be funded in September for Statewide Delivery of Distance Education. It is designed to . . . solve waiting list problems . . . select and revise and/or produce distance education courses for statewide delivery. Requires technology and volume lease-purchase agreements. RCCD should compete for this pilot project. It should also anticipate using system supplied and approved courses.

Recommendation #10: *Develop an effective distance learning program to serve the needs of the Greater Riverside community.*

Developments already underway include courses taught in local schools and telecourses available on local cable channels. It is important to note that RCCD already assigns instructors to distance learning students in a similar manner to the Open University. As the computer and telecommunications infrastructure is installed, courses can also be made available on the World Wide Web. This will be a large enterprise in the future are requires a comprehensive plan.

DATA A

COMPARISON OF PURCHASE AND RENTAL COST

# Computers	Cost	20% Replace	1-yr lease	2-yr lease	3-yr lease	4-yr lease
100	400,000	80,000	437,280	243,840	175,680	146,400
200	800,000	160,000	874,560	487,680	351,360	292,800
300	1,200,000	240,000	1,311,840	731,520	527,040	439,200
400	1,600,000	320,000	1,749,120	975,360	702,720	585,600
500	2,000,000	400,000	2,186,400	1,219,200	878,400	732,000
600	2,400,000	480,000	2,623,680	1,463,040	1,054,080	878,400
700	2,800,000	560,000	3,060,960	1,706,880	1,229,760	1,024,800
800	3,200,000	640,000	3,498,240	1,950,720	1,405,440	1,171,200
900	3,600,000	720,000	3,935,520	2,194,560	1,581,120	1,317,600
1000	4,000,000	800,000	4,372,800		2,438,400	1,756,800
1100	4,400,000	880,000	4,810,080	2,682,240	1,932,480	1,610,400
1200	4,800,000	960,000	5,247,360	2,926,080	2,108,160	1,756,800
1300	5,200,000	1,040,000	5,684,640	3,169,920	2,283,840	1,903,200
1400	5,600,000	1,120,000	6,121,920	3,413,760	2,459,520	2,049,600
1500	6,000,000	1,200,000	6,559,200	3,657,600	2,635,200	2,196,000
1600	6,400,000	1,280,000	6,996,480	3,901,440	2,810,880	2,342,400
1700	6,800,000	1,360,000	7,433,760	4,145,280	2,986,560	2,488,800
1800	7,200,000	1,440,000	7,871,040	4,389,120	3,162,240	2,635,200
1900	7,600,000	1,520,000	8,308,320	4,632,960	3,337,920	2,781,600
2000	8,000,000	1,600,000	8,745,600	4,876,800	3,513,600	2,928,000

DATA B

BUYING PRACTICES FOR

COMPUTERS, NETWORKS, SERVERS, PRINTERS, AND SOFTWARE

Buying Practices for Computers: Best-buy of the current-year model computer ensures a five-year useful life. Buying last-year's model represents a four-year useful life and some loss of functionality. When the cost of research, procurement, installation, configuration of operating systems and software, and maintenance are added to the purchase price, the current-year model offers both cost and functional advantages. Functional advantage means better performance and the ability to upgrade to newer versions of software.

Compatibility: In the past, the software industry emphasized backward compatibility — that is — software should run on earlier versions of the CPU and operating system. Market research shows that sales of new software are principally for new computer systems. For this reason, many software manufacturers have abandoned backward compatibility in order to provide the new buyer with software that fully utilizes the capabilities of the new computer.

Changed file formats are also a nuisance. For example, *Word* for Office 97 uses a different file format to Office 95. Thus, files must be saved in Office 95 format under a different name to be readable by computers using the older format.

Installation and Maintenance: The manufacturer should install and configure software and peripheral equipment to the extent possible. This minimizes technician time for setup and ensures correct and identical configuration. Unpacking and on-site installation and testing should be conducted by the manufacturer wherever possible to conserve technician time. A maintenance contract with 24 x 7 support is required.

Replacement: If the useful life of a computer is 5 years, 20 percent of the computer inventory should be replaced each year. Based on an average cost of $4,000 per computer, annual replacement cost would be 1000 x 4,000 x 20% or $800,000 per year.

Lease Option: Most leasing plans are finance plans where you pay interest for the loan of the money. Most lease arrangements provide for buyout at the end of the lease. Lease is very costly if you update equipment every one or two years. The longest lease is normally four years, with a buyout cost of either 10% or $1. The cheapest rental costs 30% more than purchase over a four-year period.

Recommendation #4: *Buy top-of-the-line computers — proven brands of the current model — with applications loaded and configured ready for use. This will maximize Quality of Service and years of service and minimize technician time for setup and troubleshooting.*

Buying Practices for Servers, Printers, and other Peripheral Equipment: A server may support from 30 to 100 computers, while one printer can be shared by up to 16 computers. This number can be doubled for high-speed (25 pages/minute) computers. The specific numbers should be based on the applications involved. Useful life for printers and servers is 7 — 10 years.

Maintenance: Preventive maintenance is important. A replacement schedule should be setup to provide for wear and tear and changes in the technology before the equipment becomes unreliable or unusable.

As with computers, standardization and assured quality are fundamental for high reliability and efficient maintenance. Compaq and Hewlett Packard manufacture most servers used by RCCD. Hewlett Packard manufactures almost all printers in use at RCCD. Key items of peripheral

equipment not discussed here are the modem pool to connect off-campus users and CD-ROM servers to provide central access to CD-ROM information and program development resources.

Buying Practices for Networks: The useful life of a network is ten years for where advanced technology (switched Ethernet, fast Ethernet, ATM) is selected. Older technology may be useable for low demand applications such as email and word processing. It is important to correctly assess the network traffic as illustrated by the following examples:

- When 3-Com gave $1,000,000 to network San Jose City Schools, it planned to install shared 10-Base T networks, the standard for word processing and most business applications. 3-Com discovered that educational users make extensive use of graphics and multimedia (sound, graphics, and motion). These overtaxed the network capacity and caused it to be unreliable. Two changes were made. 10-Base T **Shared** Ethernet was replaced with **100-**Base T **Switched** Ethernet. This increased the capacity and reliability of the system for multimedia. The change required the initial grant to be increased to $5,000,000.
- Token-ring networks at RCCD no longer meet our functional requirements and are being phased out in favor of switched Ethernet. This means purchase of new hubs to meet the new standards for speed and reliability. The minimum standard for new classroom and lab installations at RCCD is 100-Base **T** Switched Ethernet (also called Fast Ethernet).

The network should provide connectivity to every classroom and faculty office, with a 10% margin for future expansion. Assuming a baseline number of 1500 ports for all three campuses at a cost of $500 per port, the baseline investment in network hubs and interface cards will be 1,500 x 500 = $750,000. If optimum is four times this number, the investment in networking will be $3,000,000.

Even with 3-Corn's PACE technology to give priority to picture and sound data, the bandwidth of a 100-Base T network limits the number of multimedia users that can be serviced simultaneously without impairment to sound and picture. A better, though more costly solution, would be ATM.

Asynchronous Transmission Mode (ATM) should not to be confused with the Automatic Teller system used by banks. ATM has much greater bandwidth than 100-Base T and its transmission protocol retains the continuity of video, sound, and multimedia.

Both telecommunication and networking systems are now migrating to ATM, initially for the backbone, and then for critical connections where high quality video and multimedia are required. Ultimately, ATM will enable voice, video, and data to be supplied via a single network instead of maintaining three separate infrastructures - phone-lines, television cable, and Ethernet.

At the time of writing, an ATM network costs almost twice as much as 100-Base T. By starting with an ATM backbone for the Intra-Net (internal campus networks), future computer and network purchases can be directed to ATM for priority users.

Purchasing regulations can undo the best research and planning, sometimes with disastrous results. For this reason, close collaboration is desirable between policy makers, purchasing agents, and users.

Replacement cost: Replacement should can be prorated 20% of the value of the computer inventory, 15% of the value of the printers and servers, and 10% of the value of network equipment such as hubs and routers. Additional sums may be needed to take advantage of innovations and significant changes in technology that cannot be predicted in long-term planning.

Buying Telecommunication Services: Initially the connection between campuses and connection to the Internet will be via multiple T1-lines leased from the Telephone Company or other communications provider. A dedicated T1-line currently costs about $1,500 per month

depending on location. To connect though two telephone companies, as from Riverside to Moreno Valley doubles the cost. Several T1-lines will be needed on each campus to handle the different services — Administrative network, Academic Network, 4Cnet, direct Internet connection, and interactive videoconferencing.

4Cnet is provided by an Act of the State Legislature. It is an expansion of the CSUNet, which is not recognized for reliable service. As 4Cnet is expanded from 25 universities to include 106 community colleges, technical problems and interruption to service should be anticipated. For this reason, 4CNet should be used as a backup or supplemental resource and not as the primary Internet connection.

There are cost reductions for multiple T1-lines and there may be further cost reduction as a result of the Snow amendment to the Telecommunications Act of 1996. Some cost may also be absorbed by budget augmentation for new communication technologies from the Chancellor's Office. Even with reduced rates, telecommunication (transmission) costs are high and need to be contained. An alternative plan presented later uses State and Federal resources to buy infrastructure to reduce and contain future costs.

There are four ways to connect the three RCCD campuses.

1. The first and most obvious method is to contract these services from the Telephone Company. The anticipated cost is $2,500 per month per campus for three T1-lines for each campus.
2. A second method is to have *telcos* and other communication providers bid for this service. This method is currently used and results in some cost savings.
3. A third option is to establish partnerships with other users such as the Riverside Unified School District and the City of Riverside in order to share facilities, use existing infrastructures where they exist (the City has fiber optic networks for its power grid), and to collaborate on a common communications infrastructure to achieve economy of scale.
4. A fourth option is for RCCD to build its own system using microwave technology. Galen Tustison, an international communications consultant, should be contracted to conduct a feasibility and cost study for a microwave system to connect computer networks, telephones (voice and fax), two-way video, and central videotape distribution for all three campuses. This would provide a dedicated 45 Mbps ATM service with ample capacity for present and future needs.

Based on the rental cost of multiple T1 lines - 3 x $2,500 = $7,500 / month for three campuses, the microwave system would pay for itself in two to three years. An ATM microwave system has 32 times the capacity of a T1-line. Currently the telephone company would charge of-the-order-of $20,000 per month for each campus for a dedicated ATM connection.

Not included in this section is the cost of connection to the Internet and the cost of Internet addresses for faculty and students. However, it is clear that at $3,000 per computer, and allowing $500 toward server, $500 toward printer, $500 for network hubs and cards, $500 for electrical and network wiring, $500 for furniture and supplemental air conditioning, and $500 for software and software licenses, the cost per installed workstation is not less than $6,000.

DATA C

Telecourses and Teleconferencing at RCC

RCCD receives satellite teleconferences and courses on tape. It distributes television lessons by supplying videocassettes to local cable companies. At this time RCCD cannot originate live broadcast or satellite programs. The RCC campus is a head-end for Cross County (Wireless) Cable. Moreno Valley is negotiating a head-end for TCI Cable. In the future, it will be possible to originate live and recorded programs via local cable from each campus.

RCCD has interactive video (teleconferencing) equipment on each campus. Interactive video requires ISDN telephone lines and a multi-point connection where more than two sites are to be connected. Picture quality is improved when multiple ISDN lines are used. Each campus has purchased three ISDN lines (384K) under the Education First program from Pac Bell. An internal multi-point bridge can connect up to four sites using a single ISDN line (128K). External bridging can be rented for connection at higher data rates. All participating campuses must use the same data rate. ***RCCD equipment was recently upgraded to meet the current standard for the community college system and the California State University.***

Interactive video connections for RCCD campuses can be accessed from one of the following classrooms on each campus:

Riverside City Campus (patched by RCC IMC):

AD 122 (Board Room), Administrative Conference Room, BE 10, LB 102, LS 108, Quad 134, Quad 144, (Hall of Fame is yet to be installed).

Moreno Valley Campus (Patched by IMC Office in Hum 220): Hum 120, Hum 129, Hum 209

Norco Campus (patched locally):

ATec 114, Hum 111, Student Services 101, (Little Theatre is yet to be installed)

Under the Pac Bell *Education First* initiative, three ISDN lines are provided to each campus at a flat rate of $75 per campus per month for the local area ($2,700 year unlimited use for the three campuses). This makes it possible for RCCD to connect to any educational organization in the Greater Riverside area including: California State University, San Bernadino; University of California, Riverside; Riverside Unified School District; California School for the Deaf; and similarly equipped classrooms and conference rooms in adult education centers, government and community agencies.

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APPENDIX G

SENATE PRESENTATION

Every College President is asking, "How long can we wait for computer labs and the Internet and still be competitive?"

Students are asking, "Where can I use a computer?" "Can I access the Internet?" "Will I need computer skills to get a job?"

Faculty at RCC are concerned because student labs are inadequate and many faculty do not have access. Many departments are trying to build computer labs. Campus administrators are asking, "How much will this cost?" These are serious issues. We must confront them as a college community to find the best answers and implement them in a timely way.

Academic Senate Technology Goals:

1. Open computer labs on each campus to provide students in all disciplines access to computer technology in order to complete academic assignment and projects.
2. Acquisition and implementation of adequate and current technology for support of student access to word processing, computers, lab equipment, current software, in-class computer demonstration equipment, and student access to the Internet.

This presentation is divided into five steps:

Step one is Building the Inventory.

Step two describes Our Community Partners.

Step three shows How Population Growth Affects the Equation.

Step four addresses Faculty Training.

Step five relates to Ways to Accelerate Progress.

How many computers do we have? How many computers do we need? How much will it cost? How long will it take to reach the desired level of computers and support?

How many computers do we have?

Table 1 shows the present inventory levels on each campus and relates it to the expected number of Full Time Equivalent Students.

Table 1: Computer Inventory Levels and Ratios for RCCD.

Campus	Obsolete	Macintosh	Obsolete 8088-686	Pentium	Total < 5 years old	FTES	Ratio
City Campus	14	60	**107**	180	220	11000	1:50
Moreno Valley			38	242	242	2600	1:11
Norco	21		17	280	280	3000	1:11
Total	35	60	163	700	740	16,600	1:23

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Norco and Moreno Valley benefited from construction and secondary effects funding. Moreno Valley includes 60 computers currently being purchased for the large general-purpose lab. City Campus expects to have construction and secondary effects funds for the new library building scheduled for 2001. In the interim there will be some technology and one-time capital funds.

How many computers do we need?

Course needs vary. The simplest guide is to compare RCCD with other institutions. Table 2 provides current statistics

Table 2
Computer:FTES Ratios for Selected Schools and Colleges

Institution	Number of Computers	FTES	Ratio
Ngee Ann Polytechnic-Singapore	4,500	12,000	1:2.7
California State University, San Bernadino	4,000	12,000	1:3
Goal for State of California K-12			1:4
Redlands East Valley High School	400	2,000	1:5
RCC Norco	280	3000	1:11
Moreno Valley	240	2600	1:11
State of California K-12 — current ratio			1:14
RCC City Campus	220	11,000	1:50

The goal for RCCD should be no less than the 1:4 proposed for the State of California K-12. This would require 4,150 computers compared to the present inventory of 750, a difference of 3,400 computers.

How much will it cost?
And how long will it take to reach the desired level of computers and support?

At a purchase price of $3,000 each, computers alone represent a cost of $10.3 million. Networks, printers, servers, and software will double this cost. In some instances new construction, renovation, or rewiring will be part of the equation. Add to this the cost of technicians and lab aides.

For planning purposes, a five-year goal fits with the life expectancy of computers. If the desired inventory can be achieved in five years, continued purchase at that level year-by-year will maintain the inventory of current computers. Networks and servers have a longer life expectancy.

The bottom line is that approximately $25 is needed to achieve the 1:4 ratio. If this is a five-year goal, it will cost $5 million each year. Starting in year six, 20% of the inventory will need to be replaced. In other words, there will be a continuing cost of $5 million each year.

Ways must be devised to augment funding or to significantly increase the use of computer resources. If State budgets are not sufficient, external funds and partnerships are needed. Effective utilization of computer resources is crucial — large labs reduce supervision cost and extended lab hours give greater value for each equipment dollar. If policies can be changed to allow students to do more of their work at home or at their placers of work, this further reduces the load on computer labs.

2. Community partners - student access at home and at work

As inventory and courses increase, students will request the opportunity to do lab work on their computers at work and at home. For some, remote access may be easier and more convenient. From an instructional management point of view, support can be provided at a distance via telephone and wide area networks.

Telephone provides voice, fax, bulletin boards, email, chat rooms, computer forums, computer conferences, and other Internet services. Most businesses will have high-speed access to the Internet through ISDN or T1 lines used to connect their internal networks or LANs to the Internet.

Software is available that will allow instructor and student to share and control the desktop, keyboard and mouse at a distance - even if the receiving party does not have the software on his or her computer (Timbuktu, Proshare, etc.). Video options are also available (Connectrix, Proshare, CU-SeeMe, Netscape, Explorer, etc.).

In order to do laboratory at work and at home, a policy changes will be needed regarding "line-ofsight" between instructor and student. Two measures are possible: One is to provide equivalent online services using the technologies listed above. If the student requires an online connection to a campus server, time and progress can be measured by polling the student's computer and making a log of requests for assistance. A preferred means would be to change the metrics from time-based to outcome based learning. What the student has learned and his or her ability to apply the new knowledge and skills are more important measurements than seat time.

3. How growth affects the equation;

Growth of up to 50% may occur in the next five years. The data presented is based on level enrollments and the level of support, including augmentations of capital, technology, and one-time allocations provided in the 1997-98 academic year. Expanded technology budgets and additional one-time allocations will be needed to handle annual growth. If the State does not provide these resources, partnerships and "for profit" programs will be needed to keep RCCD viable in meeting its mission to the Riverside community.

4. How faculty training affects the equation;

Faculty training needs to be synchronized with the development of computer labs. If training lags, computer resources cannot be used effectively; if construction lags, courses may need to be cancelled and/or students cannot be properly supported to do their assignments.

The quality and level of training is also a factor. High quality training experiences will provide a model for instructors. The breadth and depth of the training experience provides more options for the instructor and more opportunities for creative use of interactive multimedia in teaching and learning.

5. Ways to accelerate progress.

A number of factors impede progress. These include:

1) **Short and long term planning**

   a. Plans need to be prepared well in advance to ensure that space, infrastructure, personnel and budget are sufficient and available in a timely manner for construction, training, operation, maintenance, and replacement.

2) **Space**

   a. If space is already impacted, creative solutions are required to meet the short-term need. More effective solutions result from long-term planning involving new construction and/or renovation — a process that requires several years to plan, fund, and implement. Small labs cost more to supervise on a per-student basis than large labs. Teaching labs (instructor-led classes) are less efficient than open labs. If possible, the majority of laboratories should be focused in a single building adjacent to each other. The most efficient configuration is a large open lab surrounded by specialized labs and teaching labs. The specialized labs and

teaching labs can be kept open when not assigned to classes to maximize student access.

3) I**nfrastructure:** Electrical power, networks, air conditioning, furniture.
    a. One problem of converting existing spaces is the provision of services such as power, air conditioning, network access. Also the space may substantially limit the furniture and layout options for the lab.
4) **Personnel support**: technicians, lab aides, trained instructors
    a. Spaces have to be supervised; students have to be supported; equipment, networks and software have to be maintained; lab aides and instructors need to be trained
5) **Budget**
    a. Capital budget is required construction, wiring, air conditioning, carpeting, furniture, computers, printers, network hubs and switches, and other computer peripheral equipment.
    b. Operating budget is needed for a lab manager, technicians, lab aides, contracted services, and spare and replacement equipment and parts.
    c. Replacement equipment budget is needed to replace equipment that is obsolete or no longer economical to repair. Typical life is five years for a computer, eight years for a printer, and ten to years for networks. These times may be substantially less if inappropriate equipment is purchased. For example, all instructional networks need switched hubs rather than shared hubs — shared hubs will not handle the multimedia, Internet and video traffic for multiple users.

Can the five-year goal be accelerated?

In addition to dollars, space and faculty training affect the rate of implementation. City Campus has no adequate space for its large general-purpose laboratory. The new library and technology building are five years away. Portables are not large enough and will not handle the heat from the new generation of computers. Pre-engineered warehouse buildings (as used by Costco and Home Depot) are a logical alternative if funding could be obtained. Norco and Moreno Valley are closer to the goal and could reach the 1:4 ratio in less than 5 years.

Faculty training will require instructors, well-equipped faculty laboratories, and lab aides. Courseware has to be selected or developed. Production support is needed. And curriculum committees must have time to act. Five years is not a long time for these things to happen. In the interim there will be shortages, tensions, and a great need for faculty, staff, administration, students, and the community to pull together to ensure that graduates for RCCD have the best possible training in computers and the internet to ensure that they are fully competitive in the workplace.

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APPENDIX H

MEMORANDUM

Date: April 6, 1998

To: John Pietro, President of RCCD. Faculty Senate
Senators, CCD Faculty SCTE

To:: **Computer Technology and Equity Committee (CTE)**

Mark Carpenter, Adjunct Instructor, Behavioral Sciences
Steven Day, Assistant Professor, Mathematics
Joseph G. Eckstein, Assistant Professor, Geography
Anita Kinser, Instructor, Nursing
Janice Kollitz, Ph.D., Associate Professor, English
Donald Perrin, Ph.D., Dean, Learning Technologies
David Waxman, Ed.D., Associate Professor, Physical Education

Re: Report on Committee Activity and Review of RCCD Technology Plan

Dear Faculty Senators, RCCD,

The CTE committee submits the attached report for your review. The findings of this report are based on the results of a faculty survey, meetings with Donald Perrin (Dean of Learning Technologies), interviews with the Director of the Writing Center, and the committee members own interpretation of the state of RCC's technology. The final report, which committee members approved, was Dr. Mehegan's analysis of their comments. The committee unanimously approved, with minor revisions, the 'working' computer technology plan submitted by Dr. Donald Perrin. Although some committee members believe that the components of the plan that discuss *Distance Learning and Teaching* needs much more participation by members of the RCCD faculty. We compliment Dr. Perrin for developing a workable plan to move RCCD into the technical future.

The CTE committee report addresses the following issues:

Development of technology plans by individual departments.

Equity in the distribution of technology resources.

Insure that adjunct faculty have the same needed teaching resources as tenure-track faculty.

Training of the faculty in the use of modern technology.

Plan for the College to help the faculty in the purchasing of personal computers

Student needs for access to computers, Internet, WWW, and E-mail.

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Computer Technology and Equity Committee Report

1. **Equity in tcollege-wide distribution of computers for faculty use:**

Under the current economic conditions of RCCD the entire faculty could not receive new or upgraded computer systems. Thus, as the district attempts to distribute new computers and upgrade the older systems, an equitable process must be in place that allows everyone to have the opportunity to get the necessary equipment. Currently, the system seems to reward the "squeaky wheel."

Recommendations: The faculty will funnel computer requests to their department technology committees and then the departmental request will be forwarded to the Dean of Learning Technologies. This plan requires that departments write both short-term and long-term technology plans that include the needs of the faculty to teach and the designs necessary to modernize classrooms. These committees, and plans, should represent entire departments. We should make the formats for these plans available to all the faculty. The appropriate administrative office should distribute the time lines for making equipment request.

2. **Identification of department/classroom technology needs and the identification of classroom/lab space needs for students:**

Not all departments are clearly articulating their departments future technology needs for classroom instructions.

Recommendations: Technology plans written by every department should demonstrate not only the reason for the technology, and how the technology will be used, but also specify what additional classroom space is needed to satisfy the requests. Those department technology plans that impact space should also be directed to the appropriate administrative office.

College needs to develop a system of determining how to prioritize open computer labs, subject specific labs, etc. Departmental technology plans should help the college identify those subjects that could share resources. The plans should also give the college a means to estimate the number of workstations in open labs.

3. **Faculty training:**

Many faculty need enhancement of both their computer skills and introductions to the new technology. One of the most effective methods of training faculty would be to put computers into the hands of every faculty.

Recommendation: RCCD should develop an interest free loan system for faculty to purchase new computer systems for at-home use. The college would purchase approved systems for faculty and the faculty would be obligated to reimburse the college for the cost of the systems. This purchasing program has been used at other community colleges and with some businesses.

Recommendation: RCCD has a very large population of adjunct faculty that lack home computers and have minimal access to computers at RCCD. To develop their courses these faculty need access to computers. The college needs

to find mechanisms of giving these faculty members 24 hr/weekday and weekend access to on-campus computers. The college also should explore the mechanisms they use to dispose of "obsolete" computer systems - some of these systems might provide the adjunct faculty useful systems for at-home word processing, spread sheets, etc.

Recommendation: RCCD needs to simplify the administrative problems and technical problems that faculty encounter with being hooked to Email/Internet in their offices or work areas and at home.

Recommendation: RCCD needs to develop workshops that focus on the usage of computers in specific classroom/teaching settings, such as Internet usage for the Social Sciences, spreadsheets for classroom calculations, developing CD's for multimedia presentations, etc.

4. Campus-wide software site licenses:

Currently faculty are not clear on the method to acquire software from the campus.

Recommendation: Every department should be informed through a campus clearing house (Dean, Learning Technology) as to the software available from the campus. Campus should suggest standards for spreadsheet and word processing that departments should use for college business, such as curriculum, budget etc.

5. Infusing technology into curriculum:

Recommendation: All three campuses need 24 hr technological faculty work area with scanners, CD production systems, digitizer, quality color printers, copy machines, and computers for faculty to develop course materials. Campus needs digital cameras and digital projectors.

Recommendation: Many, if not most, classrooms need Internet access with portable computers and digital video projectors. Some rooms will need even more technology as specified within departmental technology plans.

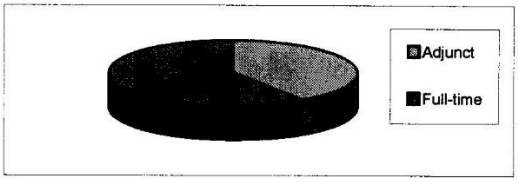
6. Student needs

Classes need student access to word processing programs, spread sheet programs, Internet, and E-mail for class assignments, tutorial programs, student research, etc.

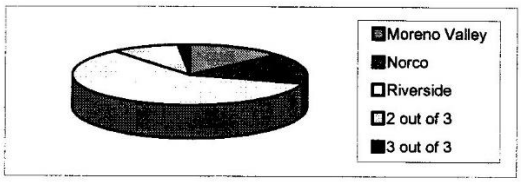
Recommendation: If the campus is truly preparing RCC students for the 21' Century we must develop E-mail and Internet access for our students.

FACULTY SURVEY OF COMPUTER USE

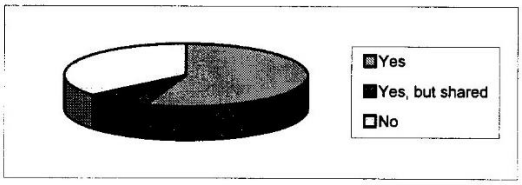
1	**What is your status?**	
A.	Adjunct	91
B.	Full-time	133



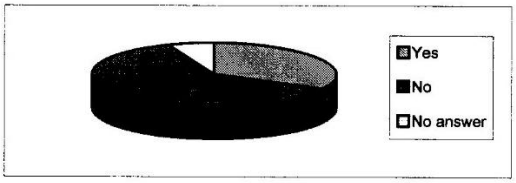
2	**What is your primary campus?**	
A.	Moreno Valley	30
B.	Norco	36
C.	Riverside	133
D.	2 out of 3	21
E.	3 out of 3	4



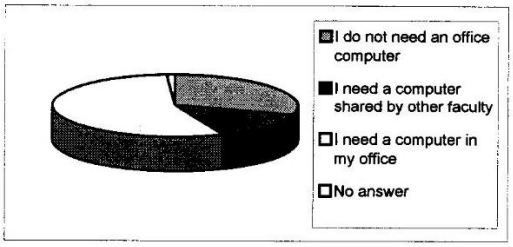
3	**Do you have an office?**	
A.	Yes	124
B.	Yes, but shared	19
C.	No	81



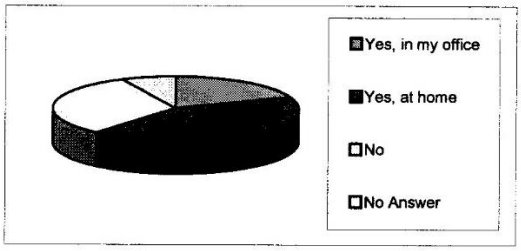
4	**Do you have an RCC computer in your office?**	
A.	Yes	73
B.	No	137
	No answer	14



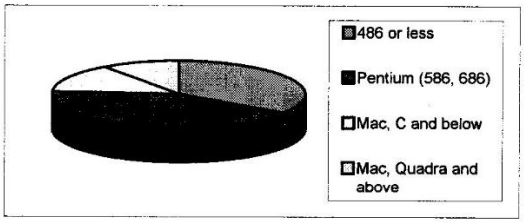
5	**What are your computer needs?**	
A.	I do not need an office computer	61
B.	I need a computer shared by other faculty	28
C.	I need a computer in my office	113
	No answer	2



6	**Do you have the Internet and Email?**	
A.	Yes, in my office	43
B.	Yes, at home	94
C.	No	71
	No Answer	16



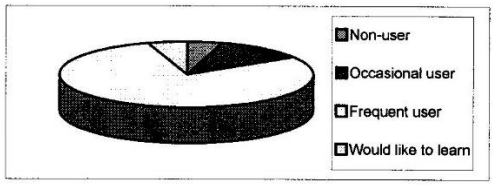
7	What is the current RCC computer system you are presently using?	
A.	486 or less	49
B.	Pentium (586, 686)	58
C.	Mac, C and below	20
D.	Mac, Quadra and above	14



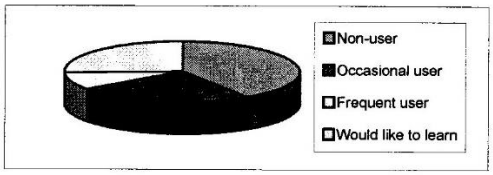
Note: 73 faculty claim to have an RCC computer in their offices (Q4). 141 Faculty answered question 7 describing the RCC computer they use. The difference might reflect those that use shared/department

Software Use

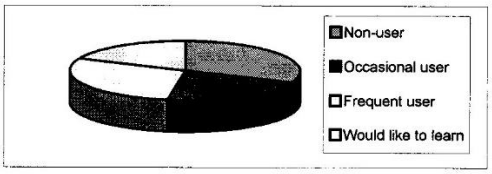
8	Word Processing (Word, Word Perfect)	
A.	Non-user	10
B.	Occasional user	25
C.	Frequent user	175
D.	Would like to learn	11



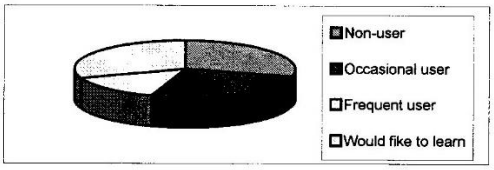
9	Database (dBASE, Access)	
A.	Non-user	90
B.	Occasional user	53
C.	Frequent user	21
D.	Would like to learn	56



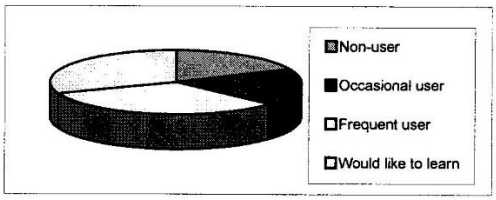
10	Spreadsheet (Excel, Lotus 123)	
A.	Non-user	69
B.	Occasional user	46
C.	Frequent user	63
D.	Would like to learn	41



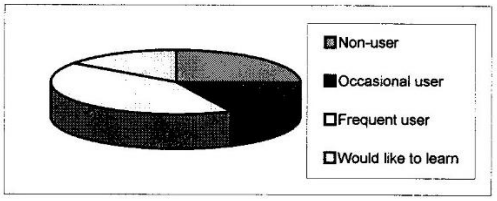
11	Presentation (PowerPoint	
A	Non-user	64
B.	Occasional user	57
C.	Frequent user	32
D.	Would like to learn	67



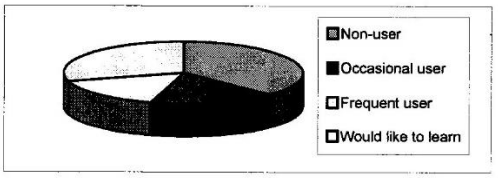
12	Interactive Multimedia (Netscape)	
A	Non-user	40
B.	Occasional user	41
C.	Frequent user	72
D.	Would like to learn	68



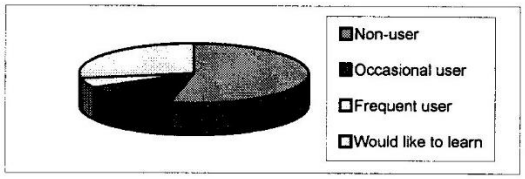
13	Microsoft Office or Equivalent	
A	Non-user	54
B.	Occasional user	38
C.	Frequent user	90
D.	Would like to learn	33



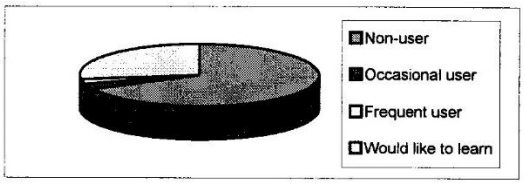
14	Scanning (character reader & graphics)	
A	Non-user	79
B.	Occasional user	37
C.	Frequent user	34
D.	Would like to learn	63



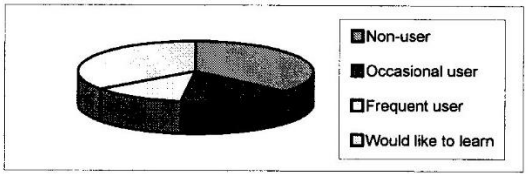
15	Teaching with e-mail	
A	Non-user	113
B.	Occasional user	29
C.	Frequent user	11
D.	Would like to learn	59



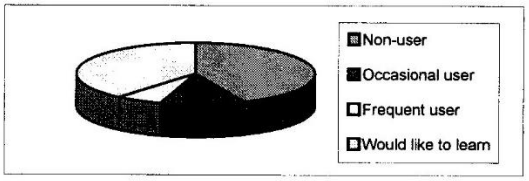
16	Teaching with listservs, chats, forums	
A	Non-user	143
B.	Occasional user	6
C.	Frequent user	5
D.	Would like to learn	58



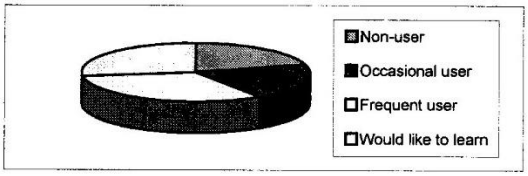
17	Teaching with Multimedia	
A	Non-user	78
B.	Occasional user	33
C.	Frequent user	28
D.	Would like to learn	75



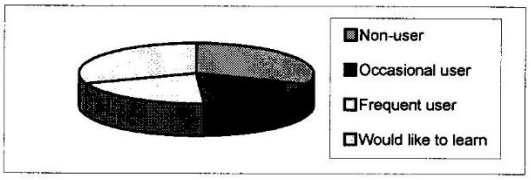
18	Teaching with WorldWideWeb	
A	Non-user	93
B.	Occasional user	24
C.	Frequent user	14
D.	Would like to learn	83



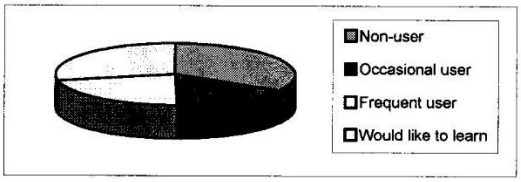
19	Locating resource materials	
A	Non-user	44
B.	Occasional user	43
C.	Frequent user	69
D.	Would like to learn	58



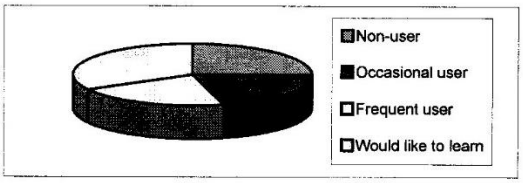
20	Creating graphics.	
A	Non-user	65
B.	Occasional user	39
C.	Frequent user	44
D,	Would like to learn	65



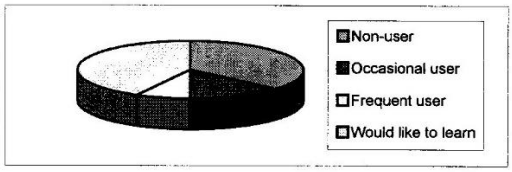
21	Creating publications.	
A	Non-user	71
B.	Occasional user	34
C.	Frequent user	46
D.	Would like to learn	60



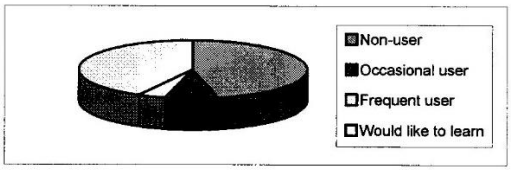
22	Creating presentations.	
A	Non-user	53
B.	Occasional user	44
C.	Frequent user	45
D.	Would like to learn	70



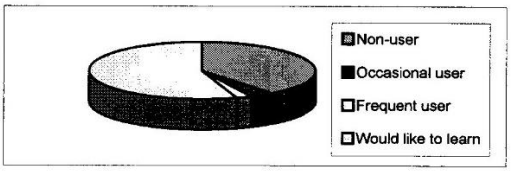
23	Creating multimedia.	
A	Non-user	74
B.	Occasional user	28
C.	Frequent user	16
D.	Would like to learn	86



24	Creating Web pages.	
A	Non-user	99
B.	Occasional user	16
C.	Frequent user	8
D.	Would like to learn	90



25	Creating interactive lessons	
A	Non-user	73
B.	Occasional user	6
C.	Frequent user	4
D.	Would like to learn	102



Faculty Survey of Computer Use - Comments

This survey is of NO value unless the results are published to the respondents.. Obviously, an indicator of a badly written questionnaire.	In house creation of instructional CD's or DVD's would be a major move - the wave of the future.
I would like to find a good program for figuring out student grades. Doing it manually is far too tedious due to the fact that my courses are set up in such a way that points are accumulated on a daily basis in 6 different categories, help!	Please consider making E-mail available to students vis computer lab. Terrific job with survey & follow-up.
In the Huntley Gym band office we have yet to enter the 90's! No E-mail, No Internet. Our printer got rained on because the roof leaks! Help!	It would be good to have different types of inservice. Also, a computer being available to adjunct faculty so they can work or prep while on campus would be helpful.
Software - 1. Scientific Work place 2. WordPerfect I would appreciate all the help you can give. Having secretaries for so long has allowed me to remain computer illiterate.	I have a Power Mac at home on which I do my RCC work. I would love to have a Powerbook so I could do work at work or my own computer in my office
I would use a computer constantly if I had access to one equipped with e-mail. I share ideas with colleagues (here and at other institutions) via e-mail when I have access, and I am enthusiastic about developing e-mail (and other) interactive formats to use with my composition students.	I don't have a computer & without one the possibility that I will learn to use one is remote. I do believe that there are plenty of opportunities to use computers in teaching Art History - starting with putting slide reviews on computer for student use. Also, the Internet should be great for research in art.

FACULTY USE OF COMPUTERS SURVEY

More Comments	
At the point of #3 — no office — survey is immaterial	There are many ways we can update the paralegal program's computer use for a low outlay of funds.
Would like to use computer in classroom for multimedia and /or interactive presentations for medical terminology and medical transcription	Our department would like to develop curricula using probes that interface with computers and use these when they can be purchased. My needs can best be met by an open access computer lab where my students can process and analyze data and run tutorial programs.
I also find parscore very beneficial	Thanks for the survey!
As adjunct it's easier to use my home computer	**MIN—** This is great and long overdue,
Thank you for giving attention to these issues. Don't forget to explore these applications as they relate to distance education. I am currently studying interactive multimedia a UC Irvine. I'm excited and anxious to use what I learn for instructional applications.	I have an older IBM computer at home that is not hooked up to the internet. I am interested in becoming more about computers and how they can be used. I use mine for word processing only.
I do a considerable amount of lecture and exam writing/development on a computer, but need to learn to develop data bases to teach student projects/progression. I would also like to learn how to develop presentations using graphic technology. I really do not know enough to know what I could use or how to apply it.	I would like very much to learn how to use all the resources, teach my students how to research on the internet and learn how to use the resources available in a classroom like 123 — E-mail and access to a computer on a regular basis in a convenient place on campus is essential. (Working on getting internet at home, but would prefer to have it at work)
Computing Services has really been bad in regards to speedy repair and service for math lab Macintosh computers.	I would like to use the computer for presentations/graphics but confess I am ignorant
Don't forget we need a printer to go with the computer (s).	Several in 15-25 sound interesting, but I'm so uninformed that I'm not certain what they are
All computers should be replaced every three to five years. LCD panels, instruc- tors' computers and internet should be in every classroom. More computer labs — including some reserved for instruction — are essential. Norco and Moreno Valley are light years ahead of Riverside. All students should have e-mail, internet	This survey does not account for the computers needs of adjunct faculty. It is also written for computer literate faculty, not those of us who have not had the familiarized with how all these things work.
I have my *own* computer in my office hooked up to RCC email	Please! Get us out of the *Stone Age* and get us computers and worthwhile training

I have 286 computer in my office and it is totally inadequate for my purpose of preparing teaching materials, evaluations, researching and locating resources. My work also involves communicating with researchers in my field here in the USA and abroad. So I need a Pentium with modem, cd rom and internet facilities. I also need a laser printer.	My computer needs have a very low priority. Our communication center does all my word processing. I will volunteer to be one of the last instructors to have a school computer installed in my office. Other instructors can make much better use of the device.
I would love to be able to incorporated internet & e-mail into teaching. We need a lab w/student access to those services.	Would like to learn about all the instructional use of computers (15-25)
A major hurdle for most folk is the lack of time to master the technique/technology needed. Some times more can be done with less (from a student or instructor perspective)	I am a new hire this year. I am the Director of the speed and debate team. I was promised a computer with net access. It has not yet been delivered.
I don't have an computer but the department specialist does. I answered this for me and only me.	I personally appreciate your fine interest in this very important area of computer use. I for one am ready and willing to learn. Your efforts are appreciated.
The English Department gave me one of the ancient MAC computer for the MUSE (college literary magazine) but we still need a copy of ADOBE printshop and photoshop as well as a basic WP program to meet our needs. So far, we've never been able to use the computer. Presently, we're using the MAC computer lab in Tech, but we've been told we won't have that option next semester. We're desperately seeking a MAC that has the capability to meet our needs.	The following is available at local high schools, but not RCC. My students must have access to the internet at RCC. They must be able to research and produce business reports. This includes word processing, editing, graphics and presentation. Students in the International Business courses need access to The National Trade Data Bank.
I have a computer in my office because I'm Dept. Chair. It doesn't have internet or email	We need scanners for faculty use and student use! We need internet access for students badly!
Computer has been in my office since 1988 and it is useless. Would like the www to have students use for research.	I am very interested in learning teaching methods & developing curriculum for/with multimedia & internet classrooms.
I don't have time at school to work on the computer. We have one in the office with two faculty and two work students. I do my work at home on a MAC and can't transfer it! We would like to get the program & computers to use for choreography.	I need a computer in my home — would like information as to kind that fit my needs. To let you know how far behind I am, I purchased the 1s` Apple 2E (Dinosaur) that's as far as I ever got.

Faculty Use of Computers Survey - continued

Currently, I have to get my students who have internet access to utilize graphics, search tools and access textbook home- This is not a success. Only 415/30 students have the hardware to do this. We do not have the resources to offer this in our dept. yet. We keep asking !!!	I answered non-user for 15 & 16. Occasional use — for communicating with students, e.g. answer questions & send files. No Direct teaching, but would like to!
I use my computer at home for word processing & graphics. I make transparencies here only because I do not have the transparencies at home for my use. I use duplication for hand-outs and tests. I would like access to a computer here with word and transparency capabilities.	Students & Faculty need intemet & email access. Classrooms need internet connections. Classrooms need digital projectors. Faculty lab needs high-quality scanners, printers & software packages. As we near the 21st[1] century we need to get into at least the 20th century.
It would be nice to have an RCC computer in my office, but I would rather use my own Mac at home,	Thanks to Dick Tworek for really supporting the needs & ideas of faculty that are anxious & willing to demonstrate computer usage.
Would instruction on PAR score	Re: questions 5 & 6 — answered for my office at other school where I do my primary teaching/research
Part-Time faculty NEED offices.	Could not answer #7 because I use my own 386 PC in my faculty office.
I have taken a UCLA extension course — Online Teaching — and I'm eager to implement an Art Appreciation Art 6 class online. It could use the WEB & email — I have a class plan already! I use the internet on the shared faculty office computer and at home but would like to be able to rely on it for the classroom. There are tons of things for the art classes	The old Mac LCIII I have in my office hardly meets the need I have to prepare materials for my classes in Spanish. I need CD-ROM/Internet to work on existing pro-grams. We are behind other colleges in this area. I have CD-ROM computer in my classroom & we are using contemporary technology but we need the proper tools to do our job developing & evaluating materials
When you ask a question with a possible "NO" answer (like #4), you should not follow it with a question (like #5) that cannot be answered by those who answered "NO". (Another example is #6 & 7)	We have a very old MacIntosh & need to set a new one! We also have a Gateway I share with in office with students, so I don't actually have one in my office.
Do not have the classroom technical support to use PowerPoint, etc in classroom	Before questions 15-15 remind us we can choose "d — Would like to learn"
It is very difficult to determine how to answer some of these questions. No place to indicate doesn't apply.	The more elaborate forms of use multimedia in class, etc — would be great in my field — Arch. & Anth. Are very visual.-oriented. Without technology (have only 486) it isn't possible to even

I do all my work at home on my computer. It would be wonderful to have safe (w/o viruses) computer access at work to complete my work. I tire of hauling my work from home to school on a regular basis	I would appreciate all the help you can give. Having secretaries for so long has allowed me to remain mostly computer illiterate All local health care agencies use computerized records (to varying extents). I would like to create a computer lab simulation for students which would enable them to practice in college lab what they will encounter in the real world.
I definitely need a computer in my office that is capable of accessing the net. I have been told neither my Powerbook nor the older computers in the math dept. are capable of such access. Additionally, the math dept is desperately in need of updated computers and access to other hardware such as an LCD projector	Most of 15-23 I would like to do with my class but don't have the opportunity. I am hoping to have Chem 1A here at Norco in the Fall. So at least my class has access to computers. I cannot use RCC email because Bell (David) decided he won't support Macs even though every other school I know supports them. But if someone will buy me a PC I'll be glad to use it. I would like to let my student's email me. I know that there are some computers available for faculty, but I don't know what is available to me. It would be great to know if I could have e-mail and/or internet access and also how to use it. Also, being a math teacher, the equation editor available through MS office is great, I use it at home. When making tests. Is that available on the faculty computers here? I would like to learn how to create animated text (with special effects) for math classroom presentations. I would also like to learn how to incorporate that into video. (helpful to my sabbatical project)
Departments need laptops or portable PC's plus projectors to be able to use presentation software. One projector to 14 FT faculty and only a "loaner" laptop doesn't encourage faculty learning how to change	1) I think I'm going to get in trouble here, but I think part of the problem is how we utilize and distribute resources. I see people getting equipment who (a) don't use it (b) won't use it (c) don't care to use it (d) weren't consulted on their needs (e) are even strongly against using it. Meanwhile others who have need/desire go without

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APPENDIX I

TECHNOLOGY PLAN FOR THE
RIVERSIDE COMMUNITY COLLEGE DISTRICT

PROLOG

December 10, 1997

It is 750 days to the beginning of the new millennium. In the year 2001 we will look backward to the nineties as a period of economic uncertainty followed by sweeping changes. We will look with pride at our revitalized campuses and the role we as educators have played in building a prosperous community. Come with me to the year 2001. We are standing in front of the new Library-Learning Resources Center at the entrance to the City Campus. To the left is a multi-tiered parking structure. Students are streaming onto the campus. We move with them as they file into classrooms, laboratories, the LRC and the technology building. . .

The technology building was once the library. It is beautifully remodeled, with television studio-classrooms on the first floor. Television classes via cable, microwave and the Internet reach unserved segments of the community, link campuses for classes with small enrollments, and share the most popular instructors and courses. A farm of satellite antennas on the roof sends classes across the hemisphere and receive classes to expand our curriculum offerings.

In another part of the technology building we see faculty on computer workstations developing multimedia courses for Internet II and the World Wide Web. There are servers connected to networks that radiate through each RCC campus, then to schools, businesses, community organizations and homes. Wide Area Networks connect RCC campuses with the statewide network, 4Cnet, and with Internet II.

The second floor of the technology building is a large 24-hour computer lab with all-new equipment. This is the last of the projected inventory from the 1997 Technology Plan. At one end there are three classrooms for instructor-led classes. These open to extend the lab when classes are not in session. Lab-aides and instructors move throughout the lab quietly assisting students. Other instructors work from their offices sharing computer screens and keyboards as they communicate with students on-campus and at remote sites.

The basement of the technology building has file servers, CD-ROM servers, and Video-on-demand servers. It is the hub of academic computing services for the campus and the district. The *Media Center* with its equipment carts and has been replaced by electronic technologies and *Smart Classrooms.* Faculty have computers in their offices and receive production and training assistance in well-equipped faculty labs.

The Library-Learning Resources Center is a model for the twenty first century. It has electronic information systems, a computer commons, teleconferencing and rooms for multimedia and television. The LLRC embodies state-of-the-art information and learning technologies. Even the small group study rooms have computer and television access.

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RCCD is equipped to provide unparalleled service to the Riverside community. *Passport to Learning* now supports all grade levels and continues to generate enthusiasm from parents and students. College programs attract a growing and diverse community of learners from all walks of life who seek job skills and education programs. Live courses can be accessed both on- and off-campus. Others are available on an anywhere-anytime basis. Learning technologies customize teaching and learning programs for individual needs and learning styles. Partnerships with business and industry provide students with internships, work experience, and an easy transition to their chosen careers.

Can such remarkable changes occur in just a few years? Yes, it can. It requires a common vision, a common commitment, and a community effort. We as a Community College, under Dr. Rotella's leadership, can shape this vision. It requires a plan. It requires resources. It requires commitment. It requires collaborative effort. We can do it!

The documents that follow outline a preliminary technology plan for faculty and staff and administrators and students to discuss, explore, and shape into a collaborative plan that reflects the needs and the best thinking of faculty and students, staff and administration, and the greater Riverside community.

Communication technologies have become as fundamental to the educational process as electric light, water and plumbing. Technology was a luxury that was barely affordable under the chalk-and-talk college budgets of past. Now there is a radical change. Starting in 1997, substantial funding became available for planning and constructing infrastructure and networks, procuring hardware and software, and training faculty. Public opinion and government are focused on equipping schools and colleges for the twenty-first century.

The pages that follow are the basics of the technology plan that will lead us down the yellow brick road to the future.

ABSTRACT

The goal of the RCCD Technology Plan is to provide faculty and students with Information Age tools and training to enrich teaching and learning and to improve the employment prospects for graduates. This requires universal access to computers and the Internet, rich learning experiences to support a diversity of learning styles and cultural backgrounds, and responsive support so that the technology is both reliable and transparent to the teaching-learning process.

Phase I of the *Technology Plan* is a *needs assessment* based on data from faculty, students, administrators, the Greater Riverside community, and leading institutions of higher learning in information technology. This plan is ready for widespread coordination. Reactions will be gathered in January and February of 1998 to produce the baseline document. Because of the dynamically changing technology and uncertainty of funding, the plan will be revisited frequently to update the time frame, magnitude, and priorities.

Phase II began concurrently with Phase I. Phase II involves computer training for instructors and students, integrating technology into the curriculum, building additional computer laboratories, and providing support staff and infrastructure. Phase Two will continue through January 2002 when the new Library-Learning Resource Center is scheduled for completion on the City Campus. Phase II includes the initial purchase of computers and networks, providing workstations for instructors, installation of *smart* classrooms, and providing large open labs for students. Specifications were developed for computers, servers, printers, and networks so that Fall classes could be taught using state-of-the art technology and software. Special consideration was given to operating **cost,** maintainability, and future program requirements. Initial purchases involved a bid procedure.

Phase II confronts the need for faculty training, faculty computers, universal access for students to computers and the Internet, and technical support. Personnel and budget needs were identified. Faculty training, technical support personnel and budget were given top priority.

Mark Oliver was assigned for district level coordination and technical support for all academic labs, networks, servers, computers, and printers. Four new positions were identified as the top priorities for hiring in 1997-98 — a faculty trainer (district level) and three Local Area Network and Computer technicians, one for each campus. Technician positions for Norco and Moreno Valley will be recruited in January 1998. Hourly classified funds are supporting lab installation and maintenance in the interim. A space was acquired in the Instructional Media Center for 12 workstations to be used for faculty training and production.

Phase III is a consolidation phase to strengthen support for students and instructors, increase efficiency, and contain costs. This phase began concurrently with Phase I and Phase II planning and will be a continuing process. Computer technology has a high priority in local, state and national education programs. Successful implementation of

the RCC Technology Plan will ensure that RCC graduates can compete successfully in the global marketplace.

In 1997-98 secondary effects, capital and block grant funds are supporting technology. Activity is focused on training and equipping faculty; installing smart classrooms, computer laboratories, and networks; reassessing needs and revitalizing curricula; and providing technical support and continuity for technology based learning. The technology plan is anticipating strong financial support for several years. However, the RCCD plan is designed to minimize operating and maintenance costs to ensure future viability.

The Technology Plan is intended to:

1. Focus major issues for consideration by the administration, faculty, staff, students, and the community at large.
2. Provide policy guidance, a design model, an implementation plan, and a budget plan.
3. Anticipate teaching and learning needs of faculty and students in a wide variety of disciplines.
4. Determine cost and cost-benefits of current and emerging technologies. Explore options that can result in substantial long-term cost savings.
5. Establish budgets, plan of organization, priorities and procedures for technology related instructional support.

TECHNOLOGY PLAN FOR THE
RIVERSIDE COMMUNITY COLLEGE DISTRICT

ASSESSMENT OF NEEDS AND PRIORITIES

1. Overview of Current Technology / Equipment
Districtwide and by Campus

The Instructional Media Center (IMC) provided classroom support with projectors, sound and video playback, public address systems, production of audiovisual materials for instruction, a learning resources center, and technical support for campus events. Until recently, audiovisual was the principal communication technology for instruction in the Riverside Community College District.

Television is used in classroom instruction. The campus has a satellite downlink and an interactive television system that works on digital telephone lines.

Distance learning distributes tape-recorded television lessons via local cable and wireless-cable. The broadcast lessons are complemented by 15 hours of on-campus instruction. Over 1,000 students enroll each semester in approximately 22 courses.

Computer laboratories have been developed to support interactive learning in applied technology, art, engineering, English, computer and information technologies, music, science, social science, and writing. Computers are becoming integral to teaching and learning in almost every area of the curriculum. The marriage of computers with telecommunications has created networks. The Internet, a global network of networks, has caused the computer to take center stage as an emerging educational technology.

1.1 Current Technology and Equipment

This section will deal with technologies under the organizational units that manage them and/or are proposed to manage them in the future.

Instructional Media Center (IMC)

The IMC is responsible for the following functions:

1. Acquire, manage, operate and maintain equipment and systems installed in classrooms and smart-classrooms
2. Check-out equipment and materials for classroom use — projectors, audio/video playback, public address systems, video equipment
3. Record events on videocassette; produce video lessons in collaboration with faculty
4. Produce media — design, produce and duplicate graphics, slides, overheads, videos, and multimedia
5. Schedule, downlink and connect satellite lessons to classrooms and conference rooms; setup and operate two-way interactive video between campuses and with external organizations

Record off-air; edit and/or copy audiocassettes and videocassettes

Operate Learning Resources Center — where students can listen to and watch prerecorded materials

Operate video library - select, acquire, catalog, store, loan, and maintain

Note: Discussion is underway with the Librarian to resolve which parts of functions 4), 6), 7) and 8) will be transferred to the library as part of the proposed Library—Learning Resources Center building in 2001.

The IMC supports classroom instruction with equipment such as television sets and overhead projectors, slide projectors, audiocassette and videocassette players, videodisc players, CD players, public address systems, and other items of equipment as needed. Some equipment is permanently installed in classrooms. The instructor must request equipment and media from the IMC.

With the exception of the newly purchased interactive video system, the equipment inventory is quite old. Many projectors and television sets are more than l5 years old and breakdown of such equipment occurs with increasing frequency. In some instances parts are no longer available to repair the equipment.

The media library is approximately 6,000 videocassettes that include lesson materials previously supplied as 16mm films, slides and filmstrips. Some videos are reserved for students to view in the Learning Resources Center. To receive credit, students must log in at the Learning Resources Center, view the assigned video, and log out.

The IMC produces slides, graphics, audio, video, and multimedia. Other production services include media duplication, editing, sound mixing, and documentation of campus events.

IMC services include operator support for classroom use of media, public address systems for auditoriums and stadiums, satellite television downlink and recording, interactive video for classes and videoconferences, design and installation of *smart* classrooms (classrooms with permanently installed display and Internet equipment) and equipment maintenance.

There are periodic training sessions for faculty in media production. There is also a laboratory to enable faculty to produce their own instructional materials using audiovisual and computer-based materials.

Distance Learning

Distance learning is a way to reach unserved segments of the population. It serves those who are geographically remote from the campus, those with schedules not compatible with class times, those physically unable to attend for a variety of reasons, and non-traditional learners whose learning styles are not compatible with traditional methods of teaching.

Two technologies play a dominant role: television for group teaching, and the computer for individualized learning.

Broadcast television translates the classroom paradigm of group teaching into multiple classrooms, industries, and homes. Live television classes are a synchronous method of teaching and learning that link people together according to a fixed schedule. The focus is on teaching and the teacher. It has the advantage of low cost distribution and is accessible on broadcast or cable television. The "drop in" audience may be much larger than those enrolled for degree or certificate credit and should be considered as a community service and a promotional device for college programs.

Individualized learning is usually asynchronous. It can occur anywhere and at any time. It accommodates different learner preferences, schedules, and pace of learning. It can be interrupted and resumed at will. It opens educational opportunities for persons who travel, have families, or otherwise cannot participate according to a predetermined schedule.

Videotapes can be used for asynchronous learning, but the new knowledge media — computers and telecommunications — are powerful instruments for interactive learning. It is notable that ten of eleven distance learning institutions with enrollments over 100,000 focus on individual learning, not on group teaching (the exception is the Chinese Television University system).

Telecourses and Teleconferencing at RCC

RCCD receives satellite teleconferences and courses on tape and distributes television lessons by supplying videocassettes to local cable companies. At this time RCCD cannot originate live broadcast or satellite programs. The RCC campus is a head-end for Cross County (Wireless) Cable. Moreno Valley is negotiating a head-end for TCI Cable. In the future, it will be possible to originate live and recorded programs via local cable from each campus.

RCCD has interactive video (teleconferencing) equipment on each campus. Interactive video requires ISDN telephone lines and a multi-point connection where more than two sites are to be connected. Picture quality is improved when multiple ISDN lines are used. Each campus has purchased three ISDN lines (384K) under the Education First program from Pac Bell. An internal multi-point bridge can connect up to four sites using a single ISDN line (128K). External bridging can be rented for connection at higher data rates. All participating campuses must use the same data rate. *RCCD equipment was recently upgraded to meet the current standard for the community college system and the California State University.*

Interactive video connections for RCCD campuses can be accessed from one of the following classrooms on each campus:

Riverside City Campus (patched by RCC IMC):

AD 122 (Board Room), Administrative Conference Room, **BE** 10, LB 102, LS 108, Quad 134, Quad 144, (Hall of Fame is yet to be installed).

Moreno Valley Campus (Patched by IMC Office in Hum 220): Hum 120, Hum 129, Hum 209

Norco Campus (patched locally): ATec 114, Hum 111, Student Services 101, (Little Theatre is yet to be installed)

Computing this statistic separately for each campus gives a different picture. The computer to FTES ratio at Moreno Valley and Norco is of the order of 1:11 while on the City Campus it is about 1:50.

If labs are open for an average of 60 hours/week, that equates to an average of 14 minutes per course per week for students on the City Campus and one hour and ten minutes per course per week at Moreno Valley and Norco.

Under the Pac Bell *Education First* initiative, three ISDN lines are provided to each campus at a flat rate of $75 per campus per month for the local area ($2,700 year unlimited use for the three campuses). It is possible for RCCD to connect to any educational organization in the Greater Riverside area including: California State University, San Bernadino; University of California, Riverside; Riverside Unified School District; California School for the Deaf; and similarly equipped classrooms and conference rooms in adult education centers, government and community agencies throughout the United States.

Computer Labs and Networks

In 1996 the RCCD Academic Senate set up two goals for computer technology:

- Open computer labs on each campus to provide students in all disciplines access to computer technology in order to complete academic assignment and projects.
- Acquisition and implementation of adequate and current technology for support of student access to word processing, computers, lab equipment, current software, in-class computer demonstration equipment, and student access to the Internet.

In March of 1997 a Dean of Learning Technologies was recruited to develop a technology plan and manage the development of instructional computing.

Computer labs are attached to teaching departments except for large general-purpose labs recently installed at Moreno Valley and Norco. The facilities at Moreno Valley and Norco are relatively new, and new labs were constructed and new computers procured in 1997 as a result of secondary effects funding. On the City Campus the only shared lab is on the first floor of the Business Education building. The City Campus has a computer inventory dating back to 1983 (8088) along with 286, 386, 486 and some older Macintosh computers.

Table I
Computers and Computer to FTES Ratios

Campus	Obsolete Macintosh	Macintosh	Obsolete 8088-486	Pentium	Total < 5 years old	Est. 1997-98 FTES	Ratio
City Campus	14	60	107	180	220	11000	1:50
Moreno Valley			38	242	242	2600	1:11
Norco	21		17	280	280	3000	1:11
Total	35	60	163	700	740	16,600	1:23

Table 1 shows the number of computers for instructional use by Campus as of October 1997. After eliminating the obsolete computers in the shaded columns, there are 740 computers to support 16,000 Full-Time Equivalent Students (FTES) — a ratio of one computer for every 23 FTES.

1.2. Anticipated or Already Scheduled Additions

Instructional Media Center. The greatest immediate change in IMC function is installation of new television monitors and digital video projectors in classrooms, and possible addition of computers or computer connections to some of these devices to make *smart classrooms.* To provide flexibility, digital video projectors will also be available on carts for checkout or supplied with an operator. This will be standard on all three campuses, although the level of video and computer support is much higher at Moreno Valley and Norco.

Part of the IMC space on the City Campus will be the site of the proposed Faculty computer training and production lab described later in this section. Equivalent spaces will be identified at Moreno Valley and Norco. At Moreno Valley the IMC will house the head end for cable television. Similar spaces will be identified for cable head-ends at City Campus and Norco. It is expected that graphic and video production capabilities of the IMCs will increasingly be used to support development of World Wide Web pages for campus instruction.

One-time capital funds have been released for instructional technology needs. About 90% will be used for computer related purchases and 10% for television related equipment and classrooms.

Faculty computer training and production lab. Instructor training is a prerequisite to effective use of the new student computer labs. All three campuses will promote use of student and faculty labs starting with computer literacy and basic skills with word processing, spreadsheets, and databases.

Specifically, the Faculty computer training and production lab will train faculty to:

- Use computers, computer applications, networks and the Internet.
- Design, produce, implement and evaluate computer developed printed materials, instructional presentations, and interactive teaching and learning media.
- Acquire or develop, implement and evaluate lessons segments, lessons and courses that involve text and graphics, presentation graphics, color overhead projectuals, desktop publishing, 3-dimensional graphics, digital audio and video, animations, interactive multimedia, CD-ROMs, Web pages
- Teach advanced workshops and assist individual faculty to design, produce, implement and evaluate lessons and courses.
- Test, demonstrate, implement and evaluate new and emerging learning technologies

Advanced workshops will be conducted on scanning, optical character reading, creating graphics, digital photography, digital image processing, digital audio and digital video editing and conversion, PowerPoint presentations, creating interactive multimedia, creating CD-ROMs, authoring multimedia programs using Authorware, Netscape and Explorer, and authoring techniques for the World Wide Web.

The faculty lab on the city campus will Have 12 networked Pentium II computer stations with Internet access, a WWW server, flatbed scanner, slide/negative scanner, color printer, high speed B&W production printer, and an extensive variety of applications software and authoring programs. This model will be replicated with smaller numbers of computers at Norco and Moreno Valley.

Distance Learning. Distance learning will facilitate off-campus learning using print, computers, audiotapes and videotapes and CD-ROM, and instructional telecommunications.

Instructional telecommunications includes:

Broadcast courses and programs -

commercial, public and educational broadcast courses

live and videotaped (videocassette) courses

satellite and digital satellite courses and and teleconferences

Instructional Television Fixed Service and wireless cable

cable television

videos on CD-ROM

two-way interactive video

Interactive Internet courses and programs

Email, bulletin boards, listservs, chat rooms, computer forums and conferences

MOOs, MUDs, and three-dimensional graphic Worlds

Internet information resources and electronic libraries

World Wide Web and interactive multimedia

Distance learning will be a major area of future growth for the RCCD. It substitutes telecommunications and virtual classrooms for brick and mortar costs. It is the only practical way for many people to attend College because of their complex lifestyles, time barriers, and geographic barriers.

The British Open University is the largest Distance Learning organization in the world. It attributes its success to four key elements:

1. **High quality multi-media learning materials** produced by multi-skilled academic teams. Study materials are excellent and varied to make the campus in the home or workplace a congenial experience.
2. **Dedicated personal academic support**. Each Open University student has his own tutor for each course, one of Open University's 7,000 adjunct faculty. They comment on and mark the student's assignments, hold group meetings, and give support by phone, email, and computer conference.
3. **Effective logistics**. Each individual student receives the right materials and information at the right time. With over 150,000 students around the world, that requires attention to detail.
4. **A strong research base**. When thousands of students use the material for each course and millions of people view each TV program, the content must be academically up-to-date and presented clearly. Thanks to economies of scale, the Open University has resources to move the academic paradigms steadily forward.

RCCDs approach to distance learning will increase courses taught live on television and strengthen interaction and support by telephone, email, chat room and forums on the Internet.

RCCD will initiate distance learning that can be shared on a statewide basis. The CCC will shortly fund a pilot project for Statewide Delivery of Distance Education that is designed to select, purchase or site-license, revise and/or produce distance education courses for statewide delivery.

Television courses. Developments already underway include courses taught K-College and telecourses available on local broadcast and cable channels. It is important to note that RCCD assigns instructors to distance learning students, but not with the level of mentoring offered by the British Open University.

Computer and Internet Courses. As computer and telecommunications infrastructure is installed, RCCD will make courses available on the World Wide Web. This will be a large enterprise in the future are requires a comprehensive plan, staff, production areas, and production oriented hardware, software and authoring programs. It is projected that secondary effects after construction of the new library will convert the second floor of the existing library building for distance learning classrooms, teleconferencing, and production of World Wide Web pages for instruction.

Computer Labs and Networks

For the foreseeable future, the major focus of activity will be installation of computer labs and development of computer based courses. It is important that every graduate of RCCD be computer literate and skilled in the use of the Internet to maximize his or her job opportunities. This will be an expensive venture. However, it can be successfully accomplished through careful planning, good teamwork and community / industry collaboration.

How many computers are needed?

There are several ways to determine the required number of computers. One is to total the number of computer laboratory hours needed to support each course. This method is subject to error because many more classes will use computers when they are available.

Another approach is benchmark against similar organizations that use computers to offer comparable courses and programs. This produced some interesting statistics shown in Table 2.

For planning purposes, a goal is 1:4 as proposed for the RCCD, the ratio proposed for the State of California K-12. This would require 4,150 computers compared to the present inventory of 740, a difference of 3,410 computers. The majority of these are needed on the City Campus because of its higher FTES.

Table 2
Computer:FTES Ratios for Selected Schools and Colleges

Institution	Number of Computers	FTES	Ratio
Ngee Ann Polytechnic-Singapore	4,500	12,000	1:2.7
California State University, San Bernadino	4,000	12,000	1:3
Goal for State of California K-12			1:4
Redlands East Valley High School	400	2,000	1:5
RCC Norco	280	3000	1:11
RCC Moreno Valley	240	2600	1:11
State of California K-12 — current ratio			1:14
RCC City Campus	220	11,000	1:50

Doing more with less

Computers are a scare resource and will continue to be so. It will take five years to build the inventory assuming that sufficient dollars are available. Since the goal is five years in the future at best, it is imperative to explore ways to maximize use of the existing inventory. It mandates shared access for faculty for the time being in a faculty lab or shared office environment. The exception will be power users who can justify a state-of-the-art computer for personal use, or who will accept an older computer because their primary need is word processing and Internet access.

Scarcity mandates against departmental labs open a few hours a week and teaching labs where the primary use is demonstration and discussion. Priority will be given to large open labs with extended hours each day and on weekends, shared labs for disciplines such as the physical sciences with specific requirements, and consolidation of small labs to extend lab hours and minimize supervision cost.

A further multiplier would be Internet access to programs used in campus labs to enable students to do lab assignments at home or in the workplace. This will require changes in policies and procedures. For example, performance measures should replace seat time as a way to measure learning. Mentoring and the equivalent of line-of-sight supervision can be provided online using email, bulletin boards, chat rooms, forums, and programs that enable instructor and student to share the same screen and control it from his or her local keyboard and mouse.

Economy can also be achieved through specialization. If present trends continue, Norco and Moreno Valley will be high tech campuses that require a large numbers of computers compared to their FTES. Norco will specialize in engineering, computer science, computer-assisted design, graphics and multimedia. Moreno Valley will specialize in high-tech medical sciences. If the mission of the City Campus is to support more traditional types of courses, it may need fewer computers. The gap analysis between needs and available resources (space, infrastructure and budget) suggest that it is impractical to achieve the 1:4 ratio on the City Campus prior to construction of the proposed LLRC in 2001. For this reason, it is proposed that a more realistic short-term goal for RCC City Campus would be "50% in five years."

First Steps

In 1997, RCCD is upgrading infrastructure for computer labs and networks as follows:

1. Token ring networks at Norco and Moreno Valley instructional labs and library were replaced by Ethernet in as part of Secondary Effects
   — *completed.*
2. A large (120 station) General-Purpose lab was setup at Norco (Secondary effects)
   — *completed*
3. A large (120 station) General-Purpose lab was setup at Moreno Valley
   — *near complete)* Secondary effects)
4. District standards were setup for computers, networks, servers, and printers. Pentium II computers using Windows 95 or Windows **NT** will be purchased until replaced by a newer technology
   — *completed*
5. District Standards were setup for networks. 3Com switched networks with ATM backbone were selected
   — *installation in process*
6. A bid was initiated in Summer 1997 to purchase computers and related equipment
   — *completed.*
7. A *band aid* action added 30 state-of-the-art computers on City Campus at the beginning of the Fall Semester so that Office 97 could be taught on all three campuses. An additional 30 computers were added in October
   — *completed.*
8. Departments on City Campus and the Senate Technology and Equity Committee are meeting with the Dean of Learning Technologies to establish needs that can be satisfied within this year's budget and initial priorities for next year's budget
   — *ongoing.*
9. Grant applications were generated for multimedia, distance learning, and faculty computers
   — *completed.*

How much will it cost? And how long will it take to reach the desired level of computers and support?

At a purchase price of $3,000 each, computers alone represent a cost of $10.3 million. Networks, printers, servers, and software will double this cost. In some instances new construction, renovation, or rewiring will be needed. Consider also the cost of technicians and lab aides.

For planning purposes, a five-year goal fits with the life expectancy of computers. If the desired inventory can be achieved in five years, continued purchase at that level year-by-year will maintain the inventory of current computers. Networks and servers have a longer life expectancy.

The bottom line is that approximately $25 is needed to achieve the 1:4 ratio. If this is a five-year goal, it will cost $5 million each year. Starting in year six, 20% of the inventory will need to be replaced. In other words, there will be a continuing cost of $5 million each year.

Ways must be devised to augment funding or to significantly increase the use of computer resources. If State budgets are not sufficient, external funds and partnerships are needed. Effective utilization of computer resources is crucial large labs reduce supervision cost and extended lab hours give greater value for each equipment dollar. If policies can be changed to allow students to do more of their work at home or at their placers of work, this further reduces the load on computer labs.

Operating cost

Operating cost is a composite of equipment and software amortization; maintenance cost including parts and contracted services; personnel cost including technicians, lab managers, lab aides, help desk, instructors, and security personnel; electrical power and telecommunication cost; contracted services such as Internet Service Provider and the telephone company; and supplies such as toner and printer paper.

So long as computer labs are a necessary expense for the College, the question is how to contain or avoid costs on the one hand, and how to maximize cost-benefits and results on the other.

Based on the level of utilization from hour to hour, the greatest cost benefit can be achieved by having large open labs (to spread supervision cost over a larger number of users and to reduce the number of faculty needed in the lab at any given time) and keeping labs open for an extended number of hours each day.

Computer Inventory and FTES

Based on district totals, there were approximately 600 computers to support 16,000 full-time equivalent students on June 1 — a ratio of one computer for every 26 FTES. Predicted totals for December 1 improve the ratio to one computer for 17 students, 3 hours per FTES, or 36 minutes per course per week.

To maximize use of the available computer pool, it is recommend that the following measures be adopted:

1. Assign priority to General-purpose computer labs over departmental labs.
2. Open labs for the longest number of hours consistent with use.
3. Adopt alternative methods of supervision/support so students can do lab work in the workplace or at home.

The table on the following page lists ways in which utilization of limited computer resources can be expanded. Suggestions in the right-hand column lower or contain costs. Judicious application of the above principles can double or even triple access for on-campus students. Additional cost reduction can be accomplished through planning and management of recurring costs and through cost-avoidance.

INCREASING UTILIZATION OF COMPUTER LABS AND INFRASTRUCTURE

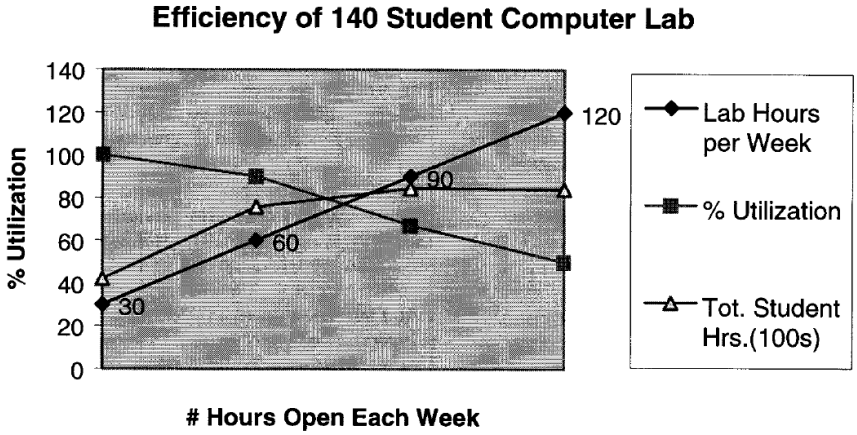
Inefficient use of facilities	Suggested Alternative
Instructor led classes that are primarily lecture and demonstration.	**Teach in smart classroom,** then assign students to work in open computer lab where assistance is available.
Scheduled labs — e.g. 3 hours morning, three hours afternoon, three hours evening, 4 or 5 days.	**Create multipurpose labs operating 16-24 hours daily.** Instructors and/or lab assistants should be available as required.
Dedicated laboratory for one discipline. (Partially filled laboratories result in further loss of efficiency.)	**Create multipurpose labs.** If open labs are not suitable, combine labs for related programs wherever possible.
Labs closed because funds are not available for supervision.	**Consolidate small laboratories into larger units and combine support staff.** This will increase equipment utilization and maintain or reduce supervision cost.
Unsupervised laboratories.	**Add television surveillance** to all labs for added security. Supervised labs may be unsupervised for short periods. **Note:** Assistance should always be available to students when needed.
Requirement for all computer activity to be conducted in the assigned laboratory.	Use **open labs and remote access to expand lab capacity.** If students can use computers at home or in the workplace, this reduces space, equipment and maintenance requirements on campus. Connection via the internet and / or cable TV are less expensive than providing lab facilities on campus. Note: **Distance Learning** should be explored for expanding class capacity, reaching unserved students, and providing anywhere-anytime learning and just-in-time learning.
Overcrowded labs with inadequate air conditioning.	Personal comfort adds to lab efficiency for instructors and students. Also, overheated equipment is much more prone to failure.

Consolidating laboratories and extending lab hours enable fuller utilization of facilities, equipment, software, and networking. Added cost for personnel and maintenance is trivial compared to savings from higher utilization of facilities, equipment, network infrastructure, and software.

Amortizing Equipment Cost. Consider the following hypothetical examples. The installed cost of each computer, including servers and networks, is $6,000. A lab is kept open for 30 hours per week for 50 weeks and the life of the equipment is four years, the amortized cost of equipment is $1 per computer per hour if the lab is utilized 100%. If the lab is open 90 hours per week and utilization is 67%, cost averages 50c per hour.

If the lab is open 120 hours a week and utilization averages 50%, the cost is 50c per hour. There may come a point of decreasing returns. For example, in a 140 station lab open 30, 60, 90, and

120 hours the total hours of student use is 4,200, 7,560, 8,400, and 8,400 respectively. In other words, there is no increase in the number of student hours of use when utilization is increased from 90 hours to 120 hours in this hypothetical situation. Actual lab data should be used to determine optimum hours of service.



Personnel cost. Large labs are less expensive to supervise and maintain. Assuming the people needed to support a 140-station lab are: one classified full-time, one classified hourly, and 0.5 technician and .25 janitor, cost with benefits is less than $70 per hour or 50 cents per station per hour. If the same level of support is needed for a 70-station lab, then the large lab is twice as efficient. In practice this tends to be a logarithmic scale, particularly when multiple labs and large numbers of students are involved. Lab support and lab size should be optimized to meet the educational need and the desired quality of service.

Other Operating Cost. This includes electrical power for computers, printers, peripherals and room lights, telecommunication services, and Internet Service for a total of $1.00 per station per hour.

Ways must be devised to augment funding or to significantly increase the use of computer resources. External funds and partnerships will be needed to augment State budgets. Effective utilization of computer resources is crucial — large labs reduce supervision cost and extended lab hours give greater value for each equipment dollar. Policies need to be changed to allow students to use computers at home or in the workplace to reduce the load on computer labs.

Administrative Network

Key administrative offices and approximately 15% of faculty offices are connected with Shared Ethernet to the mainframe, Intranet and Internet services for administrators, faculty and staff. The network connects all three campuses via T1 telephone lines.

Data Security

Administrative and instructional computers are connected to the network as separate Virtual Local Area Networks (VLANs). The VLAN allows the physical sharing of the network infrastructure yet provides absolute protection against students accessing administrative data or the administrative VLAN.

Networks and Operating Systems

10Mbps Switched Ethernet is the standard selected for workstations on the RCCD Instructional Network. The backbone connecting computer labs, faculty offices, and classrooms will use ATM, 100Mbps Ethernet, or 10 Mbps Ethernet depending on data requirements and

location with respect to the backbone. All computer stations are wired with Category 5 wire to support data rates up to 100 Mbps. The campus backbone is fiber optic cables with multiple pairs of fiber including unused (dark) fibers for future system expansion.

Student labs constructed or refurbished in the second half of 1997 have switched Ethernet. All student labs will eventually have switched Ethernet to permit network intensive activities involving graphics, sound, video, multimedia, and transfer of files and overlays.

New and upgraded student labs are concurrently installing 300 Mhz Pentium II computers, Compaq Proliant file servers, and Hewlett Packard 5SiMX printers. Software includes the Windows 95 operating system, Office 97, and either Novelle Netware or NT Workstation for the network operating system. Manufacturers, model and versions will be periodically changed and updated to ensure a high quality learning environment.

Older labs on the City Campus will be upgraded, as budget is available. Student stations in some labs installed prior to 1997 have no hard disks and run from the file server. Some computers still use the DOS operating system and Windows 3.11 as the user interface. Instructional labs that are not refurbished with new equipment will be upgraded to PCs with hard disks and extended RAM memory.

Computer Communications and the Internet

Computers communicate with other computer via Local Area Networks (LANs). LANs communicate with other networks across a wide area via Wide Area Networks (WANs). WANs connect LANs through telephone lines, fiber, cable, microwave or satellite based on availability and cost. The Internet is a global network of networks.

Routing of Internet data is transparent to the user. Multiple telephone and telecommunication companies are dynamically linked wire, cable, fiber, microwave and satellite to make a connection. Telecommunication company-computers select the preferred path, and for practical reasons this anonymous linkage is called a "cloud." Control is shared dynamically between multiple telephone companies and Internet Service Providers (ISPs) so that no single organization controls the flow of information.

Access to the Internet

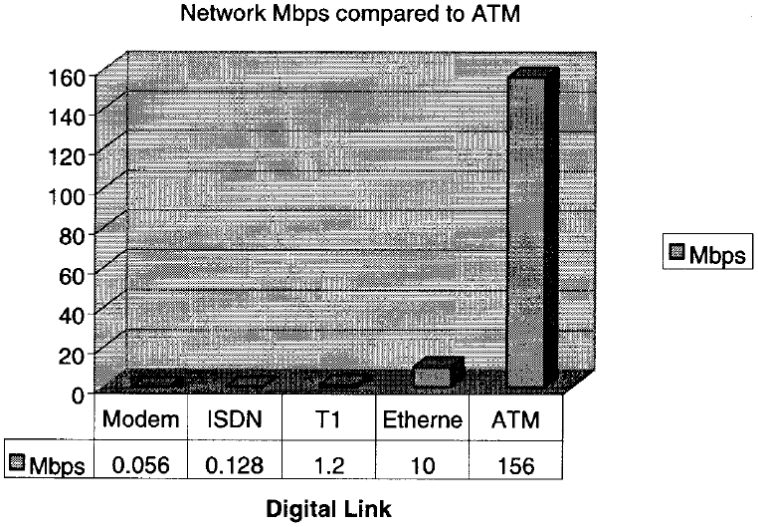
Communications via the Internet have become as important as computing itself. It provides almost instantaneous access to information resources of every conceivable kind in more than 100 countries. It supports email, electronic libraries, chat rooms, computer forums, multimedia, electronic libraries, electronic publishers, the World Wide Web, and distance learning in a variety of interactive formats. It is used by tens of millions of students worldwide and by business, industry, government, military; international, regional and community organizations; and by public and private foundations and research organizations.

Quality of Internet Access

For electronic libraries and text-based systems, shared networks can support a large number of users. As traffic increases, the system slows down. Substantial delays may occur, or even failure to make a connection. The bandwidth of the Internet connection must be sized to the volume and nature of use. Home users have telephone modems up to 56 Kilobits per second (56 KBPS) or ISDN digital telephone lines up to 128Kbps. Institutional connections require one or more T1 lines with a capacity of 1,200 Kbps, usually described as 1.2 Megabits per second (1.2Mbps). Eight T1 lines are equivalent to 10Mbps Ethernet. Digital satellite is offering delivery up to 200Kbps for home use, and may provide an economic means of supporting some college

operations. Large information technology users such as the Library of Congress and Microsoft Corporation use ATM lines with a capacity of 156Mbps or 624Mbps.

In the College environment, it is anticipated that hundreds of users may be accessing the Internet at the same time. Just as 10Mbps Ethernet can be overloaded by data intensive tasks such as downloading files and graphics and interactive viewing of multimedia, one T1 line, which has one eighth of the capacity of Ethernet, will not provide an adequate quality of service. At the discounted education rate of $800 per month for a dedicated T1 line, cost rather than *Quality of Service* may be a determining factor



District Net

Connection between campuses within the District requires T1 lines for the administrative network, the instructional network, 4CNet and the Internet. To have sufficient capacity will require the purchase of several T1 lines for each campus. Assuming four T1 lines per campus, this would cost of the order of $120,000 per year. Expansion for better Internet service could double this amount by the year 2,000 and continue to expand.

Several alternatives were explored.

1. **Leasing dark fiber**. This would require connection through multiple vendors that would include telephone companies from whom we procure these services at a highly discounted rate. No significant benefit could be expected from this approach.
2. **Partnerships**. Many cable companies are installing fiber to provide broadband services. The possibility of partnerships where RCCD and other educational providers provide programming in return for district fiber and Internet connections should be explored.
3. **Bury RCCD fiber between campuses**. This is impractical because of legal (right of way) problems and high construction cost.
4. **Use ITFS frequencies**. Unfortunately RCCD does not have any ITFS and no more frequencies will be available in this area. Pac Bell (the new owner of Cross Country Cable) has secured available bandwidth on the University of California Riverside ITFS frequencies.
5. **Connect via microwave**. Northern Arizona University (NAU) uses this for its statewide network. The system links multiple two-way television programs, campus telephone, and

Internet between sixteen campuses. Microwave requires line-of-sight connections between transmitters and receivers. One mountain site new Flagstaff AZ can see all Northern Arizona campuses. The system was constructed primarily with grant money is very cost affordable.

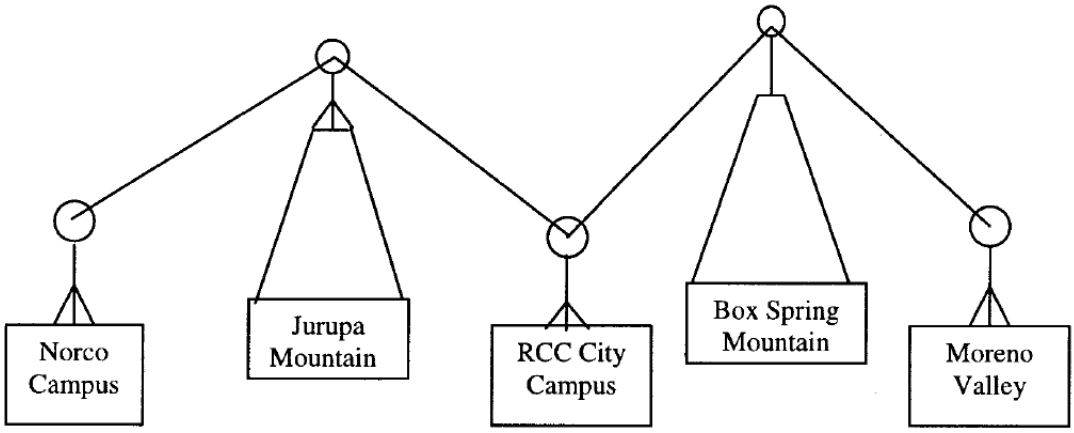
Options 2) and 5) should be explored in depth. Option 2) is the preferred option if a suitable partnership can be developed. Option 5) is a fallback option that would require a million dollar investment to be amortized over 20 years.

Consultant Study

A preliminary consultant study showed that direct connection between the three RCCD campuses is not possible due to geographic barriers. City Campus and Moreno Valley have a clear view of microwave towers on Box Spring Mountain; another mountain site such as Jurapa Mountain or Radio Hill may be required to connect the Norco campus. A more comprehensive study is needed to determine actual costs and the most cost-effective option.

For the cost of T1-level services for the next four years, RCCD can construct a microwave link with extended capacity for future growth. An operational fully redundant DS3 (56 Mbps) link between all three campuses would cost of the order of $600.000. This would have the capacity of 28 T1-lines connecting each campus. ATM would triple this capacity for an additional $400,000. (A non- redundant ATM system would reduce cost to $600,000. However, in the event of technical problems there may be interruption of service.)

Proposed RCCD ATM Microwave System



Connectivity on each campus is an integral connectivity network plan. Some parts of the infrastructure for Moreno Valley and Norco were supplied as part of secondary effects funding. 3Com Engineers have designed a system with an ATM backbone *on* each campus to support instructional and administrative computing, video, and campus telephone and fax. A fiber or microwave system is needed to provide the connection *between* campuses

Instructional Software and Courseware

Software presents its own problems. Until October of 1997, computers were purchased with preloaded with software such as Windows 95 and Office 97. The bundled software is expensive to update, and starting in November 1997, site licenses have been adopted as the preferred means of purchasing and updating software. In some instances the publishers of textbooks supply software when the college adopts their text. This raises some questions of ownership if the text is discontinued by the publisher or by the college.

Some programs are very expensive; some are needed in large numbers. It is clear that maintaining an inventory of current software for a large number of computers will be a costly enterprise for which there is presently no provision in the budget. Initial purchase is more expensive than upgrades. Licenses are less expensive than multiple copies of software and manuals. Substantial saving can also result from discount coupons that come with new equipment.

The *Learning Technologies* is keeping an inventory of hardware and software, licenses and discount coupons. It will coordinate software requests to avoid unnecessary purchases and to ensure the best price. Where free software is acquired, the terms and conditions of use must be in writing. Good management will save money. Ultimately the cost of software needs to be related to enrollments and course priorities.

Technical problems should be anticipated when new software is installed for the first time. New versions of software may not work on older computers, or may be costly in technician time to configure. Some new software may require more memory and faster processors. They may overwrite older versions, destroy programs and configuration, disable other applications, and overwrite drivers, programs and registry. Removal of programs to free-up hard disk space may also be problematic. These unknowns escalate operating costs for personnel, software, and ultimately — hardware.

A set of policies and procedures is required to coordinate, test, load and remove software. Technicians should perform this task to identify problems and incompatibility. New software for reloading computers is being investigated so that problems that affect a large number of computers can be quickly rectified.

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APPENDIX J

Faculty Computer Training and Production Lab

City Campus — Martin Luther King Library 106

OPEN HOUSE

You are invited to attend the Teaching/Learning Center Open House in Martin Luther King Library 106 on xx March 1998 between 2:00 p.m. and 4:00 p.m.. Dr. Rotella will officially open the lab at 3:00 p.m.

The Teaching/Learning Center (TLC) was established to assist faculty and staff to use computers for instruction. It provides state-of-the-art equipment and software with personal assistance in the form of group training, individual tutoring, consultation and production support. It houses a library of exemplary courseware that faculty can evaluate, try with their classes, or use as models for designing their own lessons.

The lab has 12 Pentium 200 computers with large 17-inch screens. These are connected to black & white and color printers. Additional computer stations have scanners to convert art and photographs into computer graphics, convert printed pages into text files, convert slides and negatives, and convert videocassettes into computer video. Computers are connected via a local area network to each other, to a file server, to the campus net, and to the Internet.

The lab is equipped to prepare lesson materials — handouts, grant proposals, graphics, color overhead projectuals, PowerPoint presentations, interactive multimedia, and World Wide Web pages. Software is pre-installed for word processing and desktop publishing, creating spreadsheets and databases, scanning pictures and text, generating graphics and PowerPoint presentations; producing color overhead transparencies, and for building interactive multimedia and world-wide-web pages. All computers are equipped with 100 Megabyte ZIP drives to enable faculty to store and transport lessons to use on RCC computers in labs and classrooms.

Training programs are hands-on. Persons with little or no computer experience are encouraged to attend one of the sessions on *My First Computer.* Alternatively, schedule an appointment for personal tutoring. Faculty and staff can attend workshops and work in the lab any time it is open. The only condition is that you must be faculty, adjunct faculty, staff or administrator at RCC. *Students should be referred the designated lab for their class or to the general-purpose computer laboratory in Business Education 108.*

Beginning March 1998, the lab on City Campus will be open Monday thru Thursday from 10:00 a.m. to 4:00 p.m. and other times by appointment. Walk-in assistance is available, but appointments are recommended for individual tutoring and assistance in using complex hardware and software.

Workshops Proposed for 1998

Workshops are recommended to learn basics. Guided assistance is recommended for the next steps in developing your own projects. The next pages list workshops proposed for Spring, Summer and Fall of 1998. This will be set up as tracks so that beginning and experienced users can be served. Actual times will be determined as a result of a short telephone questionnaire.

Most sessions will be repeated throughout the week to accommodate a variety of faculty and staff schedules. Friday and weekend classes will be scheduled if there is sufficient demand.

Your specific needs and feedback would be greatly appreciated, whether by telephone/ voice mail at 222-8835 (for Don Perrin) or by email — dperrin@rccd.cc.ca.us (*no longer active)*

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Teaching/Learning Center

Labs are Mon – Thur **2:00 – 3:30 pm** **Spring 1998**

My First Computer.

This session is designed for persons with little or no computer experience. You will learn how to turn on the computer and use the mouse to select programs, do simple keyboarding and word processing, print your text, save the file, and close down the computer. At the end of this session you will have enough familiarity with a computer that you can come back and work out how to do these things *on your own!*

Simple Word Processing using Word (in Office 97).

This is strictly for beginners. You will learn how to: enter text in paragraphs; center and justify text; bold, italicize, and change the size of fonts; spell check; cut, copy and paste text to rearrange a document, paste in a graphic; print-preview; page setup for portrait and landscape pages, and use the Print Options menu. At the end of this session you should be able to do a professional looking handout, letter, or proposal.

Simple Presentations using PowerPoint (in Office 97).

This program is simple to use and very powerful. You can generate -professional looking slides presentations using templates to create titles, bullets, tables, and graphics. You will display your products using equipment now available in RCC classrooms. At the end of this session you should be able to do an effective slide presentation presenting *your* ideas through text and graphics.

Simple Spreadsheets using Excel (in Office 97).

This program offers timesaving features for all levels of users. Spreadsheets make it easy to display and manipulate numerical data. Learn how to set up headings, enter data, add rows and columns, create and copy formulas, sort data, display data as graphs, and use the automatic recalculating functions of the spreadsheet to play ***What If?*** At the end of this session you should be able to use spreadsheets to communicate alternative options/ strategies using numbers and graphs.

Simple Graphics.

This program is an introduction to the Draw functions in Microsoft Office. Create simple shapes with shading and color to enhance your layout or highlight areas of special interest. Create simple graphics with Draw and Paint tools. Use Frames to layout text and graphics on a page. Add color to text. Use text as art (WordArt). Insert Clip Art and Photographs in a page of text. At the end of this session you should have the skills to make an attractive poster and to use graphics as embellishments to printed materials.

Scanning Text and Images.

This program uses the flatbed scanner to copy materials from books or sheets of paper. Scan text using Optical Character Recognition software (OmniPage) to create a text file. Scan graphics using Acquire Scanner from your favorite Paint program. At the end of this session you will be able to convert printed text into editable files, and images into forms suitable for printed and on-screen presentations.

Microsoft Office for the Classroom.

This session shows how to combine elements from Word, Excel, and PowerPoint learned in previous sessions for handouts and instructional presentations. You will copy and paste graphic and spreadsheet materials into a written report or PowerPoint presentation. At the end of this session you will be able to combine print and graphics from a variety of sources to achieve your communication objective.

POSITION DESCRIPTION

Faculty Lab Manager and Trainer

Design and prepare instructional materials and workshops to teach academic units, faculty and staff how to use computers in instruction and how to design and produce computer based instructional materials. Topics include learning and using computer applications, design and production of print publications (graphics and desktop publishing), interactive multimedia (hypermedia, animation, digital audio and video, interface design, authoring programs), and web pages (interactivity, interface design, html template design, linking; integration of text, databases, graphics, animation, audio, video, and custom features; debugging, publishing, managing, and maintaining web sites).

Assist faculty in the production of instructional materials using computers. Manage operations of Teaching/Learning Center computer laboratory. Keep records and prepare reports. Perform other duties as assigned.

Minimum qualifications and experience:

Bachelor Degree and at least two years of experience in design of computer based materials for instruction.

Experience in instructing, tutoring and assisting adults in a university environment. Experience in designing, authoring, programming, editing, production, and teaching design and production courses using desktop publishing, interactive multimedia, and World Wide Web sites. Extensive skills in using IBM personal computers; audio, video and CDROM recorders; scanners, printers, servers, networks, computer applications, authoring programs, and operating systems.

Excellent communication and coordination skills to facilitate working with faculty, students, administration, vendors, and community / industry partners. Ability to establish and maintain cooperative working relationships within a diverse multicultural environment.

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APPENDIX K

Board of Governors

California Community Colleges
March 9-10, 1998

TITLE 5 REGULATIONS: DISTANCE EDUCATION

11.2

ACTION SCHEDULED
(PUBLIC HEARING ITEM)

Committee on: Educational Policy
Julia Li Wu, Chair

Presentation: Rita Cepeda, Vice Chancellor
Educational Services and Economic Development

Issue

This item presents revisions to the Title 5 regulations on distance education in the areas of "personal contact" requirements, extension of the evaluation period, separate course approval, and the submittal of reports to district board of trustees and the Chancellor's Office.

Background

Revisions to Title 5 regulations on distance education, for the duration of the evaluation period, are being recommended by the Distance Education Technical Advisory Committee (DETAC). In 1994, the Board of Governors revised the Title 5 regulations pertaining to distance education. The regulations implemented an evaluation period for distance education. The DETAC is the consultative advisory committee formed through *Board of Governors Standing Order 409*, which is responsible for the overall evaluation of distance education between 1994 and 1999. Pursuant to current regulations and standing orders, the DETAC is scheduled to make overall recommendations to the Board of Governors on the long-term status of distance education within the California community colleges by December 1999.

The recommended changes are required to effectively evaluate distance education programs throughout the system completely and accurately. The recommendations are supported by a significant number of community college organizations and have been reviewed through the Consultation Process.

One of the recommended changes addresses a substantial and critical issue for the California Community College system, the relationship between the student and faculty, and how effective it is to deliver education at a distance without regular "personal contact." This aspect of the regulations has been the most debated and contested component of the changes during the evaluation period.

A true and accurate evaluation of distance education cannot be conducted under the current regulations.

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The DETAC is promoting the revisions to enable faculty to choose the most effective method to deliver instruction to students at a distance. The proposed removal of the regular personal contact requirement from credit transferable courses will provide the system and committee with the appropriate data to evaluate the effectiveness of a variety of faculty-student contact models for the remainder of the evaluation period.

Other proposed recommendations for changes to the regulations and guidelines address the extension of the evaluation period, separate course approval, and the submittal of reports to district board of trustees and the Chancellor's Office.

The current Title 5 regulation charges the DETAC with reviewing and evaluating distance education programs throughout the system in a pilot period from 1994-95 through 1998-99. The DETAC is to report to the Board of Governors, by December 1999, on the findings and recommend changes to the Title 5 Distance Education regulations. The sections that most affect the review during the evaluation period are

- 55316.5(b), Additional Courses
- 55317(b) and (c), District Reporting
- 55376(a) and (b), Instructor Contact (and related Guidelines)
- 55378, Separate Course Approval

Title 5 regulations currently require that each district offering distance education courses report annually to their board of trustees and submit a copy to the Chancellor's Office on July 1 (Section 55317(b)). The regulations also require that courses offered for transfer require instructor and student to have "regular personal contact" (Section 55376(a) and (b) and related guidelines). Sections 55316.5, Additional Courses, and 55317(c), Ongoing Responsibilities of Districts, are to become inoperative on July 1, 2000, unless a later adopted regulation deletes or extends this date. Recommended changes would extend the date by eighteen months to January 1, 2002. Section 55378, Separate Course Approval, would require review of courses with specific emphasis on regular effective contact between instructor and student.

Three public meetings were convened in November 1997 to allow public comment in support or opposition by individuals; in person, via facsimile, e-mail, or regular postal service. The meetings were held in Oakland, Los Angeles, and Sacramento.

Chancellor's Office staff presented the results of the first reading and public hearing at the Board of Governors' meeting to the Consultation Council on January 22, 1998. The Council supported the regulation language as is. The president of the statewide Academic Senate spoke and indicated that the Academic Senate approved the language as written and further discussion of the language was not necessary. However, the president of the Academic Senate indicated that discussions were taking place to address the issues of the University of California and California State University academic senates regarding transfer and articulation related to the revision of Instructor Contact, Section 55376.

In January 1998, the Board of Governors reviewed the proposed changes. Public testimony, including the Academic Senate, supported the language as presented. Subsequent to that meeting, the statewide Academic Senate reviewed the language and are now recommending technical changes to it. The proposed re-wording by the Academic Senate does not significantly impact the intent of the language received by

the Board of Governors in January 1998. The new language is being noticed for this Board of Governors meeting. The Board of Governors is requested to approve the language and delegate authority to the Chancellor to adopt the regulations at the conclusion of the comment period. This will allow the regulations to take effect by June 1, 1998, in time for summer sessions.

Analysis

Extension of Distance Education Evaluation Period

Sections 55316.5, Additional Courses, and 55317, Ongoing Responsibilities of Districts, are to become inoperative on July 1, 2000, unless a later adopted regulation deletes or extends this date. *Board of Governors Standing Order 409,* Distance Education, requires the DETAC to submit a report to the Board by December 1999.

The DETAC recommends changes to this section and extending this date by eighteen months to June 2002. This will allow the DETAC the necessary time to review collected data and complete a final report and recommendations to the Board.

District Reporting

Ongoing Responsibilities of Districts, Section 55317(b), requires that the district's distance education reports be submitted annually on July 1.

The problems created by the current July 1 date are: (1) collecting the reports in a timely manner; and (2) incomplete reports because of a lack of data available to the district at the time the reports are due to the board of trustees and the Chancellor's Office. Title 5 requires districts to report on all distance education courses. The requested information on students and courses may not be available until classes have ended, which may be in July. This forces the district to either submit the report late, or submit an incomplete report. The first year of reporting, 26 districts submitted reports and of those only 11 were complete enough to extract data. The second year, 35 districts submitted reports and a majority of those were either late or incomplete. To gather accurate and complete data, the DETAC recommends changing the reporting date to August 31.

Instructor Contact

Section 55376(a), Instructor Contact, requires instructors conducting distance education courses for transfer to have "regular personal contact" (face-to-face) with the student. The interpretation of "regular personal contact" has been that the instructor and student have face-to-face meetings.

Comparative Evaluation and Dual Standard

Changing Title 5 regulation Section 55376(a) and (b) would allow for proper evaluation of all California Community Colleges distance education courses during the remaining study period. Currently, 90 percent of all distance education courses in the system are transfer. In the most recent survey count there are approximately 1,077 distance education courses-31 are nontransferable. To continue the practice of "regular personal contact" for transfer courses between the instructor and learner restricts the districts and campuses' ability to offer distance education courses to students across the California, as well as students beyond the state's borders.

This change would eliminate the dual standard for transferable courses. All transfer courses require regular personal contact. Non-transferable courses do not require regular personal contact. As stated above, the majority of courses offered throughout the system are transferable; to provide accurate information in a report we must eliminate the requirement to study both types of courses.

Transfer Issues of CCC Distance Education Courses to the University of California and the California State University

The University of California (UC) and the California State University (CSU) raised the issue regarding the face-to-face requirement for California Community Colleges (CCC) courses. The face-to-face requirement was a part of the regulations in place since 1984. In 1994, when the CCC system was considering expanding distance education courses beyond credit transferable, the two university systems suggested that the elimination of the face-to-face requirement for credit transferable courses would jeopardize the eligibility of CCC courses for transfer.

The UC and CSU systems, however, conduct distance education courses in a different manner than the CCC system. Their respective distance education extension programs do not require any personal contact between the instructor and student.

Dialogue has occurred among the three systems within the Intersegmental Academic Senate Associations. The issues that were at the heart of the concerns of all three systems were those of the quality and rigor of distance education courses offered by the system's colleges. The requirement of regular "personal" contact does not in itself address quality and rigor.

California Virtual University

The California Virtual University's main objective is to create an on-line Internet catalog of all distance education programs, certificates, and degrees via distance education offered by the three segments of higher education in California. The CCC system is at a disadvantage to compete with other segments of public and private higher education that are participating in the California Virtual University.

Changes/Improvements in Technology

There has been an improvement of the technology over the last two years for more effective contact between instructor and learner. In 1993, when the debate on face-to-face took place, the use of the World Wide Web was virtually non-existent in educational institutions. The CCC Telecommunications and Technology Infrastructure Program is now in place throughout the system that includes T1 lines, video conferencing, and satellite systems. This allows districts and campuses to develop, test, and expand the use of educational media technology for the use of instruction.

Separate Course Approval

Section 55378, Separate Course Approval, requires all distance education courses to undergo a separate approval process by each district. Proposed changes to this section direct the review process to focus on the method of effective regular contact between instructor and student. This revision is recommended because of the change to Section 55376(a), Instructor Contact, regarding effective regular contact. Due to that change, this language draws attention to the change at the local review and approval process. The curriculum committee, responsible for the review and approval of distance education courses, would conduct the review to assure that courses were being developed that clearly outlined the effectiveness of the contact between instructor and student.

Recommended Action

The regulations as presented in January were noticed for public comment, because of the work of the ad hoc committee, with agreement by all the parties, changes were made to Section 55376(a) and (b), which requires a new public comment period.

The text of the proposed regulations follows. Because of the expiration of this new public comment period is not until April 23, 1998, the Board is being asked to initially approve the regulations and delegate authority to the Chancellor to adopt the regulations.

That the Board of Governors adopt the following resolution:

Be it resolved that the Board of Governors of the California Community Colleges, acting under the authority of Section 70901(d) of the *Education Code,* delegates authority to the Chancellor of the California Community Colleges to adopt, on behalf of the Board, regulations on Distance Education that have been reviewed and approved by the Board, and that are herein set forth.

The Chancellor shall have the authority to consider written comments regarding these regulations. The Chancellor shall also have the authority to make nonsubstantive technical changes. The Chancellor shall adopt the regulations as endorsed by the Board in this resolution only if, in the Chancellor's opinion, no substantive changes are necessary, he shall bring such revisions back to the Board of Governors for further consideration.

Pursuant to Section 208 of the *Procedures and Standing Orders of the Board of Governors,* these regulations shall become effective 30 days after adoption by the Chancellor unless, within that 30-day period, at least two-thirds of the community college district governing boards vote in open session to disapprove the regulation. Written verification of governing board disapproval action must state the basis for the disapproval and include the text of any related governing board resolution related to the disapproval. Verification of disapproval must be sent to the Board of Governors, postmarked no later than 30 days after the regulations are adopted by the Chancellor.

Staff: LeBaron Woodyard Dean

Instructional Resources and Technology

Cristina Mora-Lopez

Instructional Resources and Technology-Distance Education

Proposed Revisions to Regulations on Distance Education

1. Section 55316.5 of Article 1 of Subchapter 4 of Chapter 6 of Title 5 of the *California Code of Regulations* is amended to read:

55316.5 Additional Courses.

Notwithstanding any other provision of law, after June 1, 1994, the following additional types of courses may be offered pursuant to this Chapter, consistent with guidelines developed by the Chancellor:

(a) Nontransferable courses designed to meet the requirements of Sections 55805.5, 55806, and 55002(a) or (b);

(b) Noncredit courses conducted as distance education independent study. This Section shall become inoperative on Jul[y] 1, 2000, January 1, 2002 unless a later adopted regulation deletes or extends this date.

Note: Authority cited: Sections-66700 and 70901, Education Code.
Reference: Sections 70901, 70902 and 78310, Education Code.

2. Section 55317 of Article 1 of Subchapter 4 of Chapter 6 of Title 5 of the *California Code of Regulations* is amended to read:

55317. Ongoing Responsibilities of Districts.

Any district conducting courses under Section 55316 or 55316.5 shall:

(a) Maintain records and report data through the Chancellor's Office Management Information System on the number of students and faculty participating in new courses or sections of established courses;

(b) Provide to the local governing board no later than July 1, 1995, August 31, 1998, and annually thereafter, a report on all distance education activity;

(c) Provide other information consistent with reporting guidelines which shall be developed by the Chancellor pursuant to Section 409 of the Procedures and Standing Orders of the Board of Governors.

This section shall become inoperative on July 1, 2000, January 1, 2002, unless a later adopted regulation deletes or extends this date.

Note: Authority cited: Sections-66700-and 70901, Education Code. Reference: Sections 70901, 70902 and 78310, Education Code.

3. Section 55376 of Article 2 of Subchapter 4 of Chapter 6 of Title 5 of the *California Code of Regulations* is amended to read:

55376. Instructor Contact.

In addition to the requirements of Section 55002 and any locally-established requirements applicable to all courses, district governing boards shall ensure that

(a) -All approved courses offered as distance education shall include regular personal effective contact between instructor and students, through group or individual meetings, orientation and review sessions, supplemental seminar or study sessions, field trips, library workshops, telephone contact and-correspondence, voice mail, e-mail, or other activities.

(b) All other—approved—courses—0ffered—by distance education courses shall be delivered - consistent with guidelines issued by the Chancellor pursuant to Section 409 of the Procedures and Standing Orders of the Board of Governors.

Note: Authority cited: Section 70901, Education Code.
Reference: Sections 70901-70902, Education Code.

4. Section 55378 of Article 2 of Subchapter 4 of Chapter 6 of Title 5 of the *California Code of Regulations* is amended to read:

55378. Separate Course Approval.

Each proposed or existing course, if delivered by distance education, shall be **separately reviewed and approved, according to the district's certified course approval procedures. Districts are to review courses with a specific emphasis on regular effective contact between instructor and student pursuant to Section 55376.**

Note: Authority cited: Section 70901, Education Code.
Reference: Sections 70901-70902, Education Code.

AB 2431 Distance learning: state policy: California Virtual University
Bill Number: AB 2431 Amended 04/14/98 Bill Text Amended In Assembly April 14, 1998 Amended In Assembly March 25, 1998

INTRODUCED BY Assembly Members Firestone, Lempert, and Cunneen {+ (Coauthors: Assembly Members Baldwin, Kuykendall, and Leach) +}

FEBRUARY 20, 1998

An act to amend Section 66943 of, to add and repeal Article 1.5 (commencing with Section 66942) of Chapter 11.3 of Part 40 of, and to repeal and add Article 1 (commencing with Section 66940) of Chapter 11.3 of Part 40 of, the Education Code, relating to distance learning.

LEGISLATIVE COUNSEL'S DIGEST

AB 2431, as amended, Firestone. Distance learning: state policy: California Virtual University Matching Grant Program. Existing law requires the California Postsecondary Education Commission to develop a state policy on the use of distance learning technology, as defined, in education, to be considered and, if appropriate, adopted by the Legislature. Existing law requires the commission, in developing the policy, to address specified issues and to compile research on the effectiveness and cost effectiveness of distance education at various levels of education. Existing law requires that the policy be developed to recognize the several existing distance learning networks, to enhance their coordination and direction, and to provide statewide incentives to build partnerships that further distance learning, as specified.

Existing law requires the commission, in developing the policy, (1) to propose a strategy to provide the 5 types of educational services of curriculum enhancement, expanded course offerings to rural and inner-city secondary schools, expanded course offerings at rural community colleges and off-campus centers, staff development courses for elementary and secondary teachers, and curriculum enhancement through the increased communication capability of schools, colleges, and universities and (2) to draw upon the experience and findings of the various campuses of the California State University that currently offer courses via distance education.

Existing law also requires the commission, in developing the policy, to identify existing sources of interactive distance learning instructional and staff development programming that can be utilized immediately by schools and colleges and to propose a strategy to utilize existing technologies to deliver instruction over distance, and link together school and college classrooms in rural and inner-city areas in the state. Existing law further requires the commission, in preparing the policy statement, to consult with an advisory committee having prescribed membership.

This bill would repeal these provisions, and instead provide that distance education shall be utilized by the state to achieve educational goals of access, quality, choice, efficiency, and accountability. The bill would require the state to provide that the standards for course and program quality applied to distance learning will be the same rigorous standards as are applied to traditional classroom instruction at higher educational institutions. The bill would require the state to encourage collaboration between the private sector and educational institutions in the use of technology.

This bill would require the California Postsecondary Education Commission to review and evaluate the state's distance learning policy, and make recommendations to the

Legislature and Governor every 3 years, beginning in the year 2000, in consultation with an advisory committee composed of representatives from public elementary and secondary education, the California State University, the California Community Colleges, the University of California, the independent accredited universities and colleges, and private sector providers of distance learning services.

The bill would establish the California Virtual University Matching Grant Program to provide matching grants and technical assistance to California institutions of higher education for the purpose of developing and delivering high-quality distance learning courses, programs, and related applications of technology. The bill would prescribe procedures for the process of applications for these grants, including making the University of California, the California State University, and the California Community Colleges responsible for awarding funds to assist faculty in developing courses, programs, and related applications of technology.

The bill would repeal these provisions as of January 1, 2002.

Under existing law {+ , +} these provisions would not be applicable to the University of California unless made applicable to the university by the Regents of the University of California by appropriate resolution.

Vote: majority.

Appropriation: **no.**

Fiscal committee: **yes.**

State-mandated local program: **no.**

(4) Collaboration among institutions of higher education can reduce costs and increase efficiency in the deployment of information technologies by, for example, offering instructional programs and services, including electronic catalogs of all statewide distance learning courses, programs, and related services. A number of accredited California colleges and universities have chosen to collaborate through the California Virtual University for these purposes.

(5) Advances in distance learning can increase the ability of faculty and academic departments to assess the quality of instruction delivered. These advances have the potential to enhance performance measurement and accountability at campuses and within higher education segments.

(b) The delivery of educational programs and services via the use of information technologies has the potential to serve many California, national, and global constituencies. The state should provide incentives for institutions to expand their utilization of distance learning technologies, rather than prescribing or mandating institutional actions.

(c) The availability of a broad array of distance learning courses, programs and related services may serve the following high-priority needs in California:

(1) Assist in meeting enrollment demand at the undergraduate level and within certain advanced degree programs.

(2) Expand opportunities for intercampus and intersegmental collaboration on classes, courses, and programs.

(3) Increase educational opportunities available to underserved geographic regions of the state.

(4) Reduce time-to-degree by increasing the availability of required and impacted courses.

(5) Enhance work force skills and competency in the adult population.

(6) Expand course offerings in subjects that include, but are not necessarily limited to, English, science, and mathematics, to secondary schools that are unable to provide the college preparatory and enrichment courses that their pupils require and that other schools provide.

(7) Provide staff development courses for elementary and secondary teachers, especially those with provisional or temporary credentials {+ or permits +}

(8) Expand opportunities for students currently limited by geographic location, disability, or campus class schedule.

a The standards for course and program quality applied to distance learning will be as rigorous as the standards currently applied to traditional classroom instruction at higher educational institutions. This includes standards relating to course content, student achievement levels, and the coherence of the curriculum.

b The state shall encourage collaboration between the private sector and the educational institutions in the use of technology, both to enhance the quality of education in the classroom and to expand and enhance the delivery of educational services to homes and worksites

c The California Postsecondary Education Commission shall review and evaluate the state's distance learning policy, and make recommendations to the Legislature and Governor every three years, beginning in 2000. The review and evaluation shall be made, in consultation with an advisory committee composed of representatives from public elementary and secondary education, the California State University, the California Community Colleges, the University of California, the independent accredited universities and colleges, and private sector providers of distance learning services.

SEC. 4. Article 1.5 (commencing with Section 66942) is added to Chapter 11.3 of Part 40 of the Education Code, to read:

Article 1.5. The California Virtual University Matching Grant

Program 66942.

(a) The California Virtual University Matching Grant Program is hereby established to provide matching grants and technical assistance to California institutions of higher education for the purpose of developing and delivering high-quality on-line and other distance learning courses, programs, and related applications of technology.

(b) The University of California, California State University, and the California Community Colleges shall separately and independently be responsible for awarding funds to assist faculty in developing high-quality distance learning courses, programs, and related applications of technology.

(c) Each public higher education segment shall be responsible for establishing criteria and developing a process for making awards. In developing the process, the segments should consider criteria such as the following:

(1) Quality of instruction or service.

(2) Demonstrated or projected demand for the course or program to be developed and offered.

(3) The fit between the course material and the mode of instruction.

(4) Cost effectiveness of the proposed project.

(5) The potential of the course to increase flexibility that can enhance student progress.

(6) Degree to which the proposed project utilizes private or nonstate funding.

(d) Funds provided will be matched from other sources, including in-kind contributions by the higher education segments. The public higher education segments shall develop requirements to achieve this provision.

(e) A report on the programs and activities funded under this section shall be transmitted by each segment to the Governor, to the Legislature, and to the California Postsecondary Education Commission, by September 30 of each year.

Date: Sun, 19 Apr 1998 10:43:06 -0500 (CDT)

From: astrotoy@ix.netcom.com (Larry Toy)

Subject: Moving on Legislation + More Task Force Members 4/19/98 To: ccc-cvu-list@Cerritos.edu

AB2341 (Firestone) from the administration and Joe Rodota of the CVU (modified by us and the other segments) was introduced to provide implementing language and intent for the $1M of Faculty/Staff Grants for each segment. I testified before the legislative consultants on Friday - indicating that we would be coordinating the purposes of the RFA's in all the areas together and using the on-line task forces to help us identify the crucial issues. I also shared some of the conceptual frameworks - but said that we would be developing them further over the next month or so. I got a nice phone call back saying that the testimony was very useful - it appears to have very good support - though CPEC (CA Post Secondary Education Commission) has asked to be included more centrally in the management of the grants which we and the other segments are opposing.

More Task Force Members

Could you please check this list for accuracy?

Task Force Key:

1 Access for Disabled

2 Regional Centers

3 Staff Development

4 Faculty Staff Grants

5 Big Issues

Johanna Bowen, jobowen@cabrillo.cc.ca.us, Cabrillo, Library, 1

Pat Boyle, pboyle@rh.cc.ca.us, Rio Hondo, DSPS, 1,2,4

Charles Carlson, ccarlson@bc.cc.ca.us,Bakersfield,VPInst,2,4

Steven Cato, scato@mail2.yuba.cc.ca.us, Yuba, faculty?, 2,3,4,5

Joy Chase, JOYCHASE@aol.com, Evergreen Valley, faculty, 4

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Carol Zakala, czdhedins@in.netcom.com, Cypress, faculty health sci,2,3,4,5

Thanks again, LT

Date: Sun, 19 Apr 1998 13:32:40 -0500 (CDT)

From: astrotoy@ix.netcom.com (Larry Toy)

Subject: Netg **Staff Development Update T**

o: ccc-cvu-list@Cerritos.edu

As you all know, we chose NETg to provide computer based training software for staff development. Most of the colleges are in process of purchasing the site license. To help install, get implemented, etc. we are holding four regional workshops in mid May - coordinated by the @one project at DeAnza through Ann Koda. She is sending out registration materials for these free workshops. Because of the timing of these, NETg has agreed to extend the first license period to May 31, 1999 - so that anyone signing up before the end of May will have more than one year to use the license - those signing after May 31 will only get use until May 31, 1999. You might want to check at your college where in process is the NEtg offer.

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APPENDIX L

RIVERSIDE COMMUNITY COLLEGE

May 18, 1998

Gene Rogers
Moreno Valley City Manager P.O. Box 88005
Moreno Valley, CA 92552-0805

Dear Mr. Rogers:

As a result of our recent discussions begun with Dr. Jack Randall, Interim

Provost, and subsequently with Dr. Richard Tworek, Provost of the Moreno Valley Campus of Riverside Community College, I have prepared a proposal for a television studio for Educational Access and Public Access. The college will use this for training and production, which will in turn develop a staff of interns to produce both live and recorded programs for Education and Public Access at the College and for the Government Channel of the City of Moreno Valley.

Riverside Community College at Moreno Valley is already a head-end for educational providers in the region that includes RCC Telecourses and programs for the Moreno Valley and Val Verde school systems. The Moreno Valley campus is providing space, equipment, a supervising technician and student operators. TCI Inc. provided the fiber optic connection to its distribution center in Perris. This is a 24-hour service seven days each week where local programming is supplemented by other sources of programming and a bulletin board for local events and college programs.

The RCC Moreno Valley Campus will provide the space and education staff to operate the proposed studio. The cost of construction, equipment, and the continuing cost of a television engineer will be met by TCI Inc. as part of the Cable Franchise Renegotiations. TCI will also provide additional channels for Education and Public Access from the Moreno Valley Head-end. The City of Moreno Valley will join with Riverside Community College, Moreno Valley Campus, in developing the public access and education channels.

The Riverside Community College, Moreno Valley Campus, support the City's goal to have six (6) Access Channels: three (3) for Educational Access, two (2) for Public Access, and one (1) for Government Access as part of the new Franchise Agreement. The Educational Access channels will be designated for use by the Riverside Community College, Moreno Valley Unified School District, and Val Verde Unified School District. Initially the College will manage the three educational channels until such time as the school districts are ready to head-end their own programs.

Moreno Valley Campus • 16130 Lasselle Street, Moreno Valley, California 92551-2045 • (909) 485-6100 • FAX (909) 485-6188
Norco Campus • 2001 Third Street, Norco, California 91760.2600 • (909) 372-7000 • FAX (909) 372-7050
Riverside City Campus • 4800 Magnolia Avenue, Riverside, CA 92506-1299 • (909) 222-8000 • FAX (909) 222-8036

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RCC staff has reviewed the Franchise Agreement between the City of Cupertino, California, and TCI and will like to use this as a guide for our program design. The Cupertino agreement identifies 6 channels for use by that community. Funding for the P-E-G programming comes in part through a grant from ICI. Additional support comes from both the City and the Community College for Public Access and Educational Access programming at the local community college. RCC staff traveled to Cupertino, California to visit the DeAnza Community College Campus to see how Public Access and Educational Access Cable Television are implemented there.

DeAnza Community College has assumed full control in developing these programs. Regarding Public Access: DeAnza requires that interested parties successfully complete Public Access training to understand Public Access and to learn how to use the available video equipment. Then the Community College oversees scheduling and cablecasting of Public Access video programming on the Public Access Channel. Regarding Educational Access: DeAnza uses its channel to cablecast televised classes and any other video and electronic bulletin board programming it deems educational in nature and useful for the community.

Looking to the future, the City of Moreno Valley would like to see Public Access and Educational Access channels operated from the RCC Moreno Valley Campus. RCC Staff members have identified space on the Moreno Valley Campus that can be modified to use as studio space for Educational and Public Access video production. The RCC development team for the studio and supporting programs will be:

- Dr. Richard Tworek, Provost, Dr. Lisa Conyers, Dean of Instruction, and Gustavo Segura, Instructional Media Technician representing the Moreno Valley Campus;
- Bud Tedesco and Sharon McConnell representing RCC telecommunications, television courses and interns; and
- Dr. Donald Perrin, Dean of Learning Technologies representing the Riverside Community College District.

Under the leadership of Dr. Tworek, this group will be responsible for planning, construction, equipment installation and maintenance, training staff and operating the studio for educational, and public access users.

The use of an Educational Access channel has multiple benefits for the community and for the RCC Moreno Valley Campus as demonstrated by establishing a TCI Cablevision head-end on the Moreno Valley Campus of RCC in January 1998.

KRCC Channel 25 enables televised teaching throughout the community of Moreno Valley, and offers opportunities for residents to take advantage of RCC programming. Channel 25 is an excellent path for the College to establish and communicate a strong presence to the community; allowing residents to easily

access information about classes, enrollment procedures, programs and on-campus events. This channel space is helping Riverside Community College establish itself as a focal point of within the community of Moreno Valley.

Educational video programming is already produced on the RCC Riverside Campus, so development of a similar program in Moreno Valley, and the use of Moreno Valley Educational Access channel space will be accomplished by expansion of the existing RCC program in Performing Arts and Media Telecommunications on the Moreno Valley campus.

That will entail:

1) constructing a television studio, control room and edit bays on the Moreno Valley campus;
2) purchasing and maintaining equipment necessary to operate the television studio (this equipment list has been compiled and is attached to this memo);
3) coordinating - and perhaps hiring additional - staff to teach writing, video production, and associated television production classes;
4) scheduling video productions for playback.

The television studio on the Moreno Valley campus will serve as a shared Educational Access/Public Access studio. The City has endorsed the principle that the Community College is the appropriate entity to oversee Public Access channel space in this community. Public Access oversight involves:

1) creating a community-based Public Access Board to oversee the program;
2) developing policy to govern Public Access;
3) developing courses to support Public Access (as a means to train citizens in the proper use of video equipment, plus training in the type of programming that is defined as "Public Access" programming),
4) purchasing, overseeing and maintaining video equipment (cameras and editing equipment) available for use by citizens who qualify to produce Public Access programming;
5) having television studio space available for the production of some Public Access programming;
6) scheduling playback of Public Access programming on a Public Access channel.

RCC Moreno Valley will have full control of both Public Access and Educational Access as outlined above.

RCC requests that you negotiate for channel space and a grant from ICI Cablevision to help fund construction, equipment, and technician support for Public Access Television. We request the collaboration of the city to develop

funding for Public Access, taking full advantage of available grants, and exploring underwriting possibilities.

Riverside Community College believes that, together with the City of Moreno Valley, we can create for the community of Moreno Valley an exciting environment of learning and open public access through the medium of cable television.

Attached is an equipment list and cost analysis produced by the Riverside Community College Telecommunications Department, outlining what is needed to turn the available space identified on the Moreno Valley Campus into a working television studio. Digital technologies are creating rapid changes in video technology so that some of the specified equipment will be replaced with newer technology by the time of purchase. However, the overall prices should remain consistent.

Also attached is Option 2, a backup proposal. This is part of the long-term planning for distance learning classrooms on all RCC campuses. These are designed for live teaching using one-way and two-way television. The three RCC campuses will be connected by broadband communications so that programming could be shared throughout the region. Based on the proposed partnership between RCC, the City of Moreno Valley, and TCI Cablevision, these studio-classrooms could also be shared for public access and town hall meetings.

Our hope is that TCI can fund the production studio based on the level of support provided to DeAnza College. This will be a major asset to the community and TCI Cablevision

Donald G. Perrin Ph.D.
Dean of Learning Technologies
Riverside Community College District

Cc: Salvatore G. Rotella, President
William Andrews, Academic Vice President
Sandra Foster, VP Planning J
James Buysse, VP Administration and Finance
Richard K. Tworek, Provost, Moreno Valley Campus.

A Proposal to TCI Inc. and the City of Moreno Valley

A Television Studio for Education and Public Access

At Riverside Community College, Moreno Valley Campus

This is a proposal requesting funding for a professional television production studio, editing facilities and television engineer to produce live and recorded programs for use on TCI's Education, Public Access and Government channels. This will be a joint venture of the Riverside Community College, Moreno Valley (RCC-MV) with the City of Moreno Valley and TCI Inc.

The RCC development team for the studio and supporting programs will be:

- Dr. Richard Tworek, Provost, Dr. Lisa Conyers, Dean of Instruction, and Gustavo Segura, Instructional Media Technician representing the Moreno Valley Campus;
- Bud Tedesco and Sharon McConnell representing television courses and interns of RCC Performing Arts/Telecommunications;
- Dr. Donald Perrin, Dean of Learning Technologies representing the Riverside Community College District.

Under the leadership of Dr. Tworek, this group will be responsible for planning, construction, equipment installation and maintenance, training staff and operating the studio for educational, government, and public access users. The studio will be installed on the Moreno Valley Campus of the Riverside Community College.

Construction and Installation:

Based on funding from TCI Inc., RCC-MV will:

1) Construct a television studio, control room and edit bays on the Moreno Valley campus;
2) Purchase and maintain equipment necessary to operate the television studio (equipment list is attached);
3) Coordinate staff to teach writing, video production, and associated television production classes;
4) Coordinate use by RCC, the City of Moreno Valley, and Public Access users
5) Schedule video productions for playback on KRCC Channel 25.

Riverside Community College
Moreno Valley Campus

Management:

The Provost of the Moreno Valley Campus will designate the Manager of the television studio for Education and Public Access.

- The manager will coordinate production activities with other RCC campuses, the City of Moreno Valley, TCI Inc, KRCC 25, and groups seeking public access.
- The manager will coordinate teaching, production planning, studio and editing schedules; studio production and post-production, and program scheduling and distribution.
- The manager will schedule, assign and supervise RCC staff and interns responsible for planning, production, editing, technical operation and maintenance of the television studio.

Facilities:

- Facilities will include a studio, control room, editing room, graphics production, office and storage.
- The studio complex will be constructed in existing space in the Humanities building on the Moreno Valley campus.
- Construction cost will include additional electric power and air conditioning to provide a quality studio environment.

Programming:

- RCC-Moreno Valley will produce educational programs and public access programs; head-end TCI Education Channel(s) and Public Access Channel; supplement produced programs with telecourses, cultural and information programs and bulletin board of local events
- RCC-City Campus will provide telecourses, other district-wide programming, interns, and consultant support as needed;
- The City of Moreno Valley will separately provide Government programming including meetings of the City Council, local government committees, information related to City services, and other programming in the public interest;

Personnel:

- RCC-MV will fund the studio manager and graphic artist positions. Interns will be supported by external funds wherever possible.
- TCI Inc will fund the television engineer position. **Budget:**
- TCI Inc will fund construction, equipment and the TV Engineer
- RCC-MV will fund operating budgets
- The City of Moreno Valley will assist in finding additional funding

Riverside Community College
Moreno Valley Campus

TELEVISION STUDIO EQUIPMENT

EDITOR/CONTROLLER:

1	Sony BE-9100 System Includes: EDL Monitor Switcher Control Audio Control	$32,000.00

VIDEO PRODUCTION:

1	Sony Digital Video Switcher System Includes: Chroma Key Sync Generator Video DA's Video Patch Bay	

VIDEO TAPE RECORDERS: $ 155,000.00

4	Sony DVR-20 Digital Tape Recorders	$236,000.00

DIGITAL EFFECTS:

1	Sony DME-5000 Digital Effects Processor Includes: Composite Serial Digital I/O Non-Linear Effects Graphics Board	$77,000.00
1	Toaster / Flyer (Non-Linear Editing)	$15,000.00

MONITOR TEST EQUIPMENT:

1	Digital Wave FormNector Scope Includes: Video Analyzer $28,000.00	

EQUIPMENT CONSOLE:

1	Custom Console & Racks	$11,000.00
4	Cameras: IKEGAMIHL 43	$140,000.00
4	Vinten Studio Pedestals	$32,000.00
6	Microphones: Sony UHF Wireless with Lavaliere	$12,600.00
6	Microphones: ECUR 166 BC	$930.00
400'	Camera Cable	$2,000.00
4	Teleprompters: GTV FDP-9	$13,000.00
1	Studio Monitor: PUM-411	$1,585.00
10	Studio Monitor: PUM-122-12	$10,000.00

Total Cost of Television Studio Equipment:1 **$ 766,115.00**

Riverside Community College
Moreno Valley Campus

LIGHTING FOR TELEVISION STUDIO

(Prices Include Installation)

CONTROL: (See Description below)

1	9200 Mini-Light Palette 90 Control Console	
1	8166 LP90 Focus Remote	
2	25' DMX Control Cables	
3	eReceptacle Stations (3 Gang)	$24.610.00

Detailed Description of CONTROL items:

10	14' Connector Strips	
	With: 9 - 20 AMP Circuits on 36" GP Pigtails	
8	14' Connector Strips	
	With: 8 - 20 AMP Circuits on 36" GP Pigtails	
4	Surface Mounted Wall Boxes	
	With: 2 - 20 AMP Flush Mounted GP Receptacles 1 - 40 AMP Flush Mounted GP Receptacles 1 - 100 AMP Flush Mounted GP Receptacles	

GRID / DRAPES:

8	4' X 4' Suspended Cross Grid for an approximate 30' x 30' (Including all Hardware and Installation)	$7,200.00
1	Double Cyc. Track with Crosspiece and Switchers	
	With: 2 - 30' x 16' Approx. CBS 60% Reflective Gray Drapes 8 - 24' x 16' Approx. Black Velour masking Drapes Sewn Flat	$5,600.00
	2 - 20' Wide Chroma Key Blue Drapes	
	All Studio Lighting will be equipped with Video Lights of Various Sizes	$30,000.00

Total Cost of Lighting Equipment **$ 67,410.00**

Riverside Community College
Moreno Valley Campus

Sound Recording Equipment

Optional at additional cost

1	Digitac Mixing Board /NEVE Trident Full Audio	$8,000.00
1	Microphone Snake and Headphone snake	$1,800.00
3	Power Amps (Halfer, Macintosh, Ashley, Crown)	$3,800.00
1	Headphone Amp / Multi and Stereo	$600.00
15	headphones	$1,500.00
8	Monitor Speakers for Studio Playback	$5,600.00
2	DA 88 Tascam Digital Tape Decks	$12,500.00
12	Microphones for Studio	$8,000.00
12	Microphone Stands	$1,200.00
6	Patch Bay - Auto	$1,200.00
12	FX Racks	$500.00
7	Outboard Gear	$4,000.00
2	Computers	$7,000.00
35	Custom made Decks or Racks for all. Equipment	$8,000.00
1,000'	Cables For Microphones and all Equipment	$4,000.00
2	Drum Booth	$5,000.00
1	Sturder Revox or Ampex 1/2"	$7,000.00
1	Digital Tape Deck - Sony or Tascam	$2,500.00
	Total Cost of Recording Equipment:	$67,410.00

Riverside Community College
Moreno Valley Campus

MISCELLANEOUS EQUIPMENT

Entire studio must be sound proofed with appropriate materials

Cables:

A) Television
B) Audio
C) Power

Bulbs

Clamps

Connectors

Copy Machine

Monitors

Testing Equipment

Additional 3/4" and SVHS Decks will be needed for Head End Playback

Total of Miscellaneous Equipment *(Approximately):* **$9,500.00**

EDITING SUITE

1 Media 100 Editing Systems @ $35,000 **$35,000**

GRAPHICS PRODUCTION

1 Graphics System - computer, software, clip art, server **$45.00**

Riverside Community College
Moreno Valley Campus

Modification of Classrooms - raise ceiling,	
install dividing walls, electrical power & air conditioning	$105,000

TOTAL COSTS

Television Studio Equipment	$751,115.00
Lighting Equipment	$67,410.00
Miscellaneous Equipment	$9,500.00
Editing suite	35,000.00
Graphics production	30,000.00
Construction	$105,000
Total Costs of	
Construction, installation, and Equipment:	**$998,025.00**

TOTAL OF OPTIONAL EQUIPMENT

(At Additional Cost)	
Sound Recording Equipment:	**$82,200.00**

Television Engineer — **to be determined**

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APPENDIX M

INCREASING UTILIZATION OF COMPUTER LABS AND INFRASTRUCTURE

INEFFICIENT USE OF FACILITIES	SUGGESTED ALTERNATIVE
Instructor led classes that are primarily lecture and demonstration.	**Teach in smart classroom,** then assign students to work in open computer lab where assistance is available.
Scheduled labs — e.g. 3 hours morning, three hours afternoon, three hours evening, 4 or 5 days.	**Create multipurpose labs operating 16-24 hours daily.** Instructors and/or lab assistants should be available as required.
Dedicated laboratory for one discipline. (Partially filled laboratories result in further loss of efficiency.)	**Create multipurpose labs.** If open labs are not suitable, combine labs for related programs wherever possible.
Labs closed because funds are not available for supervision.	**Consolidate small laboratories into larger units and combine support staff.** This will increase equipment utilization and maintain or reduce supervision cost.
Unsupervised laboratories.	**Add television surveillance** to all labs for added security. Supervised labs may be unsupervised for short periods. **Note:** Assistance should always be available to students when needed.
Requirement for all computer activity to be conducted in the assigned laboratory.	**Use open labs and remote access to expand lab capacity.** If students can use computers at home or in the workplace, this reduces space, equipment and maintenance requirements on campus. Connection via the internet and / or cable TV are less expensive than providing lab facilities on campus. Note: **Distance Learning** should be explored for expanding class capacity, reaching unserved students, and providing anywhere-anytime learning and just-in-time learning.
Overcrowded labs with inadequate air conditioning.	Personal comfort adds to lab efficiency for instructors and students. Also, overheated equipment is much more prone to failure.

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APPENDIX N

Riverside Community College District
Riverside City Campus ~ Norco Campus ~ Moreno Valley Campus
Educational Master Plan 1997- 2005+

CHAPTER 10

REQUIREMENTS FOR STAFF & FACILITIES
LEARNING TECHNOLOGIES

The following operations will have a small district staff with larger facilities and support staffs on each of the three campuses.

Instructional computing is a new function. It requires laboratories, lab-classrooms, Smart Classrooms; equipment rooms for servers, patch panels, concentrators, and other networking equipment; technician work and repair areas and telecommunications and electrical wiring and closets; faculty training areas; production areas for multimedia, academic web pages, and classes taught on the Internet; and administrative offices, faculty offices, and conference rooms.

There will be a large general-purpose laboratory on each campus complemented by lab classrooms and specialized laboratories as needed. Moreno Valley and Norco recently installed such labs as part of their secondary effects funding. On the City Campus, the first floor of the Business building serves this function on an interim basis. Available space is limited and will remain so until the new Library — Learning Resources Center (LLRC) is constructed in 2001. At that time, the LLRC will have a computer commons, open labs, and learning resources labs. Instructor assisted labs will be housed on the third floor of the present library building supported by the Office of Learning Technologies. Teaching (computer) labs and other specialized laboratories will be housed adjacent to their academic departments.

Distance Learning is an area projected for rapid growth. It uses communication technologies to reach learners who cannot attend on-campus classes at the time they are scheduled, or who for reasons of time and distance do not have access to a college education. Distance learning includes: 1) Internet based programs developed in conjunction with the instructional computing unit; 2) television based programs that broadcast on-campus classes and/or combine classes using two-way interactive video; and 3) import Internet and/or television based classes from other colleges and educational providers.

Distance learning requires studio-classrooms for program origination and teleconferencing, and smart (media) classrooms for reception of live and recorded courses from other organizations. Studio classrooms will be supported by camera control rooms and a master control center for recording, playback, and routing television signals to broadcast transmitters, cable companies, telephone companies, and Internet Service providers. There will be lesson preparation rooms, rehearsal rooms, administrative offices, faculty offices, conference rooms, and storage areas for classroom sets, props, backgrounds, and equipment. All classrooms will have conference telephones and digital video projection displays.

Television and Internet classes will be broadcast from the second floor of the present library building when the new LLRC building is constructed. In the interim, videotaped classes will continue to be produced in the Telecommunications TV studio. One classroom in the Instructional Media Center has been converted for interactive video and teleconferencing.

Instructional Media Center (IMC) will provide production services, media distribution, campus-wide classroom support, technical maintenance, and support for special campus events. The media library, media catalog, and the learning resource center are designated as part of the new LLRC.

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Production services will be expanded to provide digital imaging, graphic, photographic and on-location video support for Internet, multimedia and television courses and presentations, including editing and duplication of video and digital media.

Media distribution will be increasingly electronic and on-demand. Since the media library catalog and collection is projected to become part of the LLRC, electronic distribution will be a joint IMC-LLRC activity. Classrooms, distance learning classes, and library carrels on all three campuses will be supported from the City Campus facility. IMC technicians will be responsible for operation and maintenance of the distribution system in addition to supporting smart classrooms, regular classrooms, and special campus events. The IMC will continue its role of training faculty and students to use audiovisual and television equipment.

The IMC is housed on the first floor of the present library building on the City Campus.

It will require renovation to support new and changed operations including new production areas for digital imaging, digital audio and video production, and digital editing to support on-campus and distance learning. Facilities will include preview and presentation rooms, administrative offices, faculty offices, conference rooms, and storage areas.

Faculty Training and Production Lab is a new function. It is designed to assist faculty to learn to use computers in instruction, preview and select off-the-shelf courseware, and develop lessons and courses in interactive multimedia formats for distribution via CD-ROM and Internet. On the City Campus, this lab will be housed on the first floor of the present library building. It will begin operations in January 1998. Sites are being identified to replicate this function at Norco and Moreno Valley.

OVERALL PERSONNEL REQUIREMENTS

1. Overview of Current Personnel District-wide and by Campus

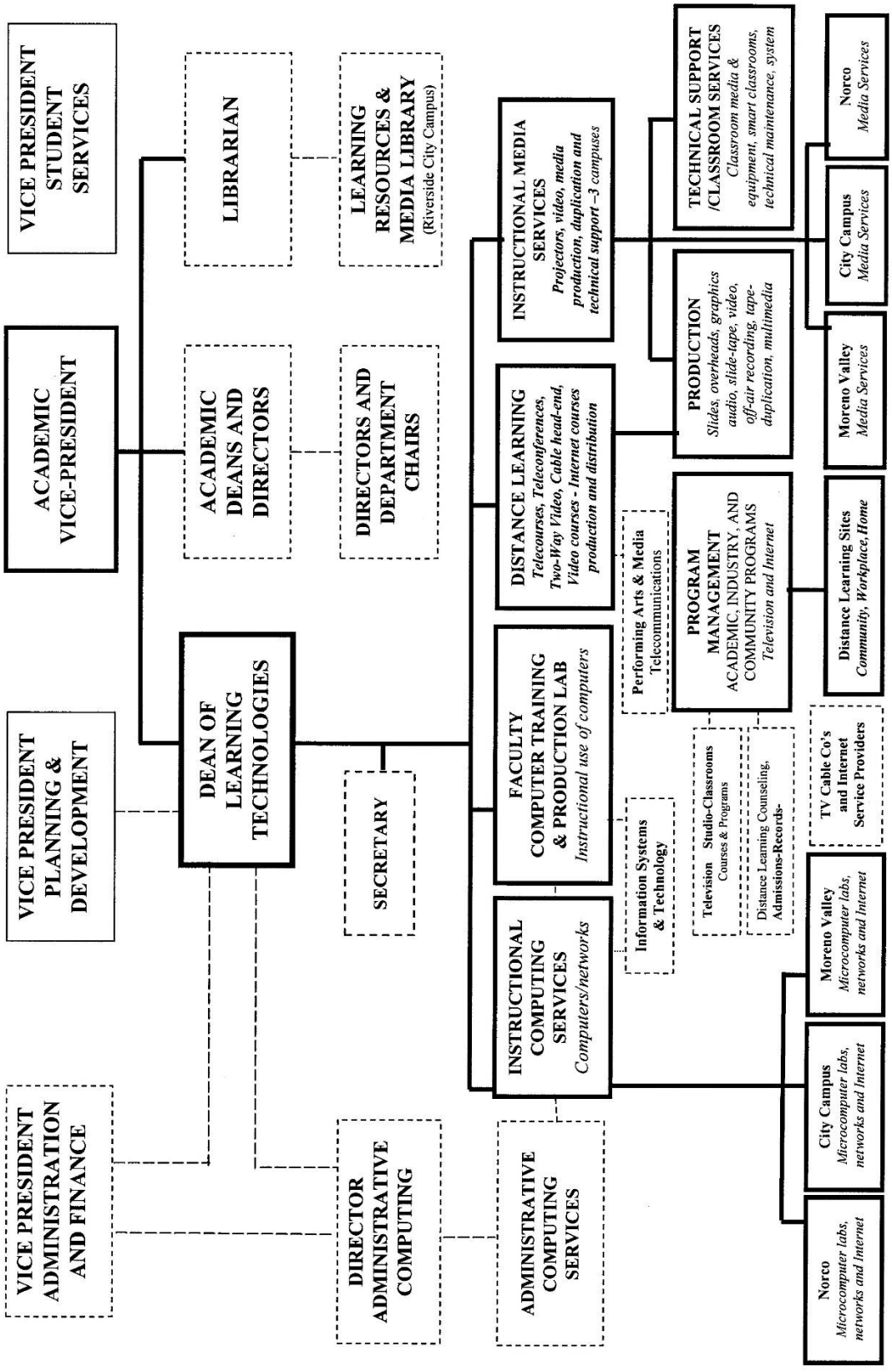
The Learning Technologies division came into existence on March 1, 1997 with the appointment of a Dean of Learning Technologies, Donald G. Perrin Ph.D. He was tasked to develop a technology plan and initiate laboratories and services for the district and its three campuses. A preliminary plan was submitted to the RCCD Management Retreat on July 31, 1997.

A Tentative Plan of Organization has been prepared for the Learning Technologies that includes four operating units — Instructional Computing, Faculty Training and Production Lab, Distance Learning, and a reorganized Instructional Media Center based on plans for the new Library — Learning Resources Center.

In September, the Academic Senate combined its technology related committees to study the report, make recommendations, and facilitate early implementation.

1.1 Current personnel. The Dean is supported by 1.0 Secretary, Emily Deitrich. Distance Learning has 0.4 position staffed by Sharon McConnell. The Instructional Media Center (IMC) has five full time positions — Manager, Henry Bravo; Media Clerk, Beck Soto; Instructional Media Technicians, Armando Castro and Gustavo Sequro; and Instructional Media Assistants, Harry Petty and Michael Prosser. The IMC was designated to report to the Dean in June, 1997. In September 1997, Computer Laboratory Coordinator Mark Oliver was assigned to the Dean of Learning Technologies to initiate a separate unit for instructional computing (as compared to computing support for administrative functions of the District). This is a District Level position responsible for planning, installation and maintenance of servers, networks, and computer laboratories to support instructional programs, install and maintain hardware and software, provide internet support, and manage and train technical support and lab aides for instructional laboratories and instructional units on each campus.

Proposed Plan of Organization for Learning Technologies



1.2. **Anticipated or already scheduled personnel additions.** An instructor position for faculty training and three full-time technicians to support instructional computer labs were requested in the 1997-98 budget. One technician will be assigned to each campus to support instructional labs. All of these positions are awaiting funding.

Instructional Computing. Most areas of instruction will use computers and the Internet. It will be increasingly difficult for students in most disciplines to get jobs without computer literacy and Internet skills. It is therefore a matter of some urgency to provide the necessary computer facilities and courses. Instructional Computing is responsible for development of infrastructure and services.

Faculty Training and Production Lab. This department will provide a nonthreatening environment where faculty and staff can learn to use and experiment with computers for instruction. It will provide the opportunity to hone computer skills and develop computer related instructional materials involving word processing, desktop publishing, databases and spreadsheets, computer graphics, slide presentations, animations, digital audio and video, interactive multimedia, and web pages. The lab will be staffed by one district level instructor, a lab manager, and lab aides. Assistance will be available to faculty at all times during regular business hours. Faculty and faculty groups will be given 24-hour and 7-day access when required.

Distance Learning. At this time, distance learning is based primarily on videotaped lessons from the Community College Consortium, the Annenberg Foundation, Miami-Dade and Dallas Community College District. Each video course is complemented by five three-hour sessions conducted live on campus. The Coordinator sets up class times and instructors in conjunction with teaching departments, provides schedules and class data for the catalog, coordinates duplication and distribution of tapes and broadcast schedules to three local cable operators, and plans future improvement and expansion of distance learning services.

Instructional Media Center. The IMC supports classroom operations on all campuses with projectors, television, audio and video players, easels, public address systems, and other audiovisual equipment as appropriate. The IMC provides production and duplication services for graphics, audio and video. The IMC currently provides technical support for two-way interactive video. The IMC manages a video library and catalog that is scheduled to become part of the new LLRC in 2001 and a learning resources center that is also scheduled to be part of the LLRC.

1.3 **Projected growth.** Personnel levels will be based on priorities of the college and funding. For example, faculty training is top priority to ensure effective use of computer laboratories and networks. A needs assessment will indicate the level support needed. Some personnel requirement will be formula driven. For example, one technician is needed for each 300 networked computers to ensure an acceptable quality of service.

There is a relationship between equipment and personnel funding. An interactive computer model was generated using Excel to determine equipment and support costs for computer labs. The goal was projected to have one computer for every ***four*** Full Time Equivalent Students (FTES) within five years. The 4:1 ratio was chosen because this is the goal of K-12 schools in the State of California. Five years was chosen because

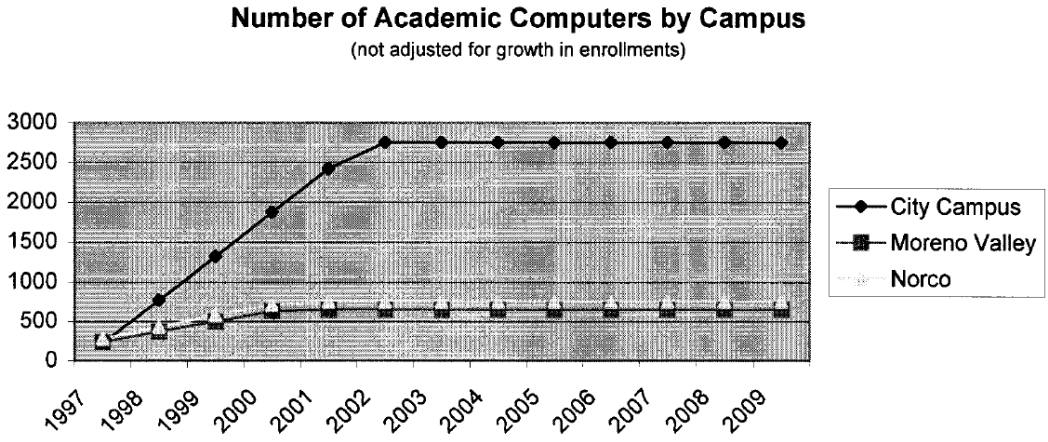
this is the life of a computer before obsolescence. 20% of the computer inventory will need to be replaced each year to ensure acceptable lab operation.

The models presented below do not account for increase in the student population. The first part of the model is to establish the projected inventory. By eliminating computers already obsolete, the first five years for city campus, and three years for Moreno Valley and Norco, are needed to build the inventory base. Beyond this point the annual purchase is equal to the number of computers removed from inventory. Growth can be expected on all campuses, and will result in a proportional increase in the number of computers listed below.

Number of Computers to Achieve a Computer:FTES Ratio of 1:4.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Annual Purchase
City Campus	220	770	1320	1870	2420	2750	2750	2750	2750	2750	2750	2750	2750	550
Moreno Valley	240	370	500	630	650	650	650	650	650	650	650	650	650	130
Norco	280	430	580	710	750	750	750	750	750	750	750	750	750	150
Total Inv.	740	1570	2400	3210	3820	4150	4150	4150	4150	4150	4150	4150	4150	830

RCCD is moving from support of an inventory of 740 instructional computers in 1997 to 4,150 in the year 2002. A graph of the above table illustrates the time and number of computers required to achieve the desired Computer to FTES ratio. Whether available budgets can sustain this rate of growth has yet to be explored.



By the year 2000 the college will be teaching certification courses for troubleshooting and maintenance of computer hardware, software and networks. At this time expansion of the technician pool can be accomplished using interns from the certification program supported by RCCD technicians and instructors.

For lab aides, economies require fewer and larger labs. This necessitates construction of new buildings where classrooms are located on the periphery of a large computer commons. This may not be possible for specialized laboratories that need to be located in close proximity to related teaching classrooms and laboratories.

1.4 Cost of Computer Lab Support Personnel. 1997 Personnel cost at $45,000 for a hardware, software and network technician, and $10,00 per hour for lab aides, is:

2 X $45,000 + 4 X 2000 X $10 = $ 170,000.

In the year 2002, lab personnel cost would be:

14 X $45,000 + 28 X 2000 X $10 = $1,190,000.

Use of interns as proposed above would reduce year 2002 cost to approximately one million dollars. Consolidation of laboratories would further reduce cost.

1.5 Cost of Installed Computers. A cost model was created as part of the growth model using Excel. Fields were connected with formulas so that annual number of computers purchased per campus and computer cost and related cost could be adjusted based on different scenarios. It showed that there were fixed and variable costs that were at least as great as the price of the computer. As a result, reduction in computer price did not reduce overall cost as much as was initially expected.

Cost of Installed Computers

Purchase Price per Pentium computer	**$3,106**	**Total annual cost for Pentiums**	$2,577,980
Specialized computer equipment (Mac, Silicon Graphics, etc) calculated at 5% number of Pentiums purchased and 10% of cost			$257,798
Network & server cost per computer	1000	Total network and servers	$830,000
Electrical wiring	100	Total electrical	$83,000
Software and licenses	500	Total software and licenses	$415,000
Internet Services	150	Total Internet services	$124,500
Faculty Training & Production Lab	350	Total faculty training / production	$319,550
Furniture and installation	250	Total installation cost	$207,500
		Annual total	$4,815,328

As of October 1997, the cost of a Pentium II 300 Mhz computer equipped to RCCD bid specification for instructional computers was $3,105. The installed cost after adding the wiring, servers, network and furniture was $5,455 — $2,350 more. The cost of training technicians, instructors and students should be added to the above cost.

2. Personnel and Staff Development — Riverside City Campus

2.1. October 1997

Instructional Computing	1.0 Technician (not funded)
	3.0 Lab aides (not funded)
Distance Learning	0.0
Faculty Lab	1.5 Lab Aides (not funded)
Instructional Media Center	1.0 Media Clerk
	2.0 Instructional Media Technician
	2.0 Instructional Media Assistants

Five year projection — year 2002:

Instructional Computing	1.0 Lab manager 4.0 Technician 16.0 Interns 12.0 Lab aides
Distance Learning	1.0 Production Manager (Television) 1.0 Television Technician 10.0 Student Camera Operators 1.0 Clerical 1.0 Production Manager (Internet) 2.0 Instructional Designer 10.0 Student Web Page Designers 1.0 Programmer/Technician 1.0 Coordinator of Community programs 1.0 Clerical
Faculty Training / Production Labs	1.0 Lab Manager 5.0 Lab Aides
Instructional Media Center	1.0 Media Clerk 2.0 Graphic artist 2.0 Instructional Media Technician 2.0 Instructional Media Assistants

2.2 Overall summary description:

In 1997, Instructional computing is in crisis mode awaiting funding of technician positions. Equipment is in the process of being installed and tested even as classes are beginning. Hopefully this is a temporary situation.

Labs, equipment, and personnel are very limited on the city campus. With favorable budgets, this condition can be corrected in two to three years. Major effort must be given to getting the fullest possible utilization out of this scarce resource.

Space is a serious problem. Operation and maintenance is greatly simplified where equipment is concentrated in a few large laboratories. Such spaces do not exist on the City Campus. The nearest approximation is the Computer and Information Science labs in the Business Building, and the computer labs operated by the English Department and Writing Center.

A full time position is needed to develop Distance Learning. Funds are needed for networks, Internet connections, and distance learning classroom-studios and teleconferencing rooms. A space has been identified in the Instructional Media Center for the Faculty Computer Training and Production Facility.

Many present needs cannot be resolved until construction of the new LLRC in 2001. Collaborative use of resources will simplify the growth and transitions that must occur in the intervening period.

3. Personnel and Staff Development — Moreno Valley Campus3.1.

October 1997

Instructional Computing Services	1.0 Technician (not funded) 3.0 Lab Aides (not funded)
Distance Learning	0.0
Faculty Lab	0.0
Instructional Media Center	1.0 Media Technician

Five year projection:

Instructional Computing	1.0 Lab Manager 3.0 Technician 8.0 Interns 10.0 Lab Aides
Distance Learning	1.0 Coordinator of Medical Programs 1.0 Technician 1.0 Clerical
Faculty Training / Production Labs	1.0 Lab Manager 3.0 Lab Aides
Instructional Media Center	1.0 Instructional Media Technician 1.0 Media Clerk

3.2. Overall summary description: Technicians and lab aides are needed immediately to support installation and operation of the new general purpose lab in the Science building, and to properly maintain the other computer laboratories on the campus.

Continued growth of the Moreno Valley campus and programs ensures resources to support orderly growth as proposed here. The specialization in medical technology should provide a resource for distance learning in the State of California, and it is suggested that, in addition to the regular distance learning courses via television and Internet, that Moreno Valley originate distance learning courses in medical technology.

4. Personnel and Staff Development Identified by Norco Campus

4.1 ***October 1997***

Instructional Computing Services	1.0 Technician (not funded) Lab Aides (not funded)
Distance Learning	0.0
Faculty Lab	0.0
Instructional Media Center	1.0 Hourly Classified

Five Year Projection – year 2002:

Instructional Computing	3.0 Technician 8.0 Interns 10.0 Lab Aides
Distance Learning	2.0 Technician 1.0 Clerical 1.0 Coordinator of Engineering Program
Faculty Training / Production Labs	1.0 Lab Manager 3.0 Lab Aides
Instructional Media Center	1.0 Media Clerk 1.0 Instructional Media Technician 1.0 Instructional Media Assistant

4.2. Overall summary description: Technicians and lab aides are needed immediately to support installation and operation of the new general purpose lab in the Humanities building, and to properly maintain the other computer laboratories on the campus.

Continued growth of the Norco campus and programs ensures resources to support orderly growth as proposed here. The specialization in engineering, computer science and multimedia should provide a resource for distance learning in the State of California. It is suggested that, in addition to the regular distance learning courses via television and Internet, that Norco originate distance learning courses in engineering, computer science, megatronics, and related technologies.

5. Personnel and Staff Development — District Level

5.1. October 1997

Division of Learning Technologies	1.0 Dean 1.0 1.0 Secretary to the Dean
Instructional Computing Services	1.0 Computer Laboratory Coordinator
Distance Learning	0.4 Distance Learning Coordinator
Faculty Lab	1.0 Instructor (not funded)
Instructional Media Center	1.0 Manager

All of these positions are located on the City Campus and travel to Norco and Moreno Valley based on need.

Five year projection — year 2002:

Division of Learning Technologies	1.0 Dean 1.0 Administrative Assistant 1.0 Grants/Proposal Writer 1.0 Secretary
Instructional Computing Services	1.0 Computer Laboratory Coordinator 1.0 Network Engineer 1.0 Silicon Valley Partners Liaison
Distance Learning	1.0 Distance Learning Coordinator 1.0 Telecommunications Engineer 1.0 Program Specialist 1.0 Clerk
Faculty Lab	2.0 Instructor
Instructional Media Center	1.0 Media Coordinator 1.0 Media Clerk

It is expected that district staff will play a significant role in improving teaching and learning through technology. It will be responsible for district wide services such as

computer and television networks, and district wide programs such as distance learning. It will be responsible for long term planning, proposal writing, partnerships, identifying and obtaining new sources of state and non-state funds and optimizing support for technology related programs throughout the District.

Number of Computers to Achieve a Computer:FTES Ratio of 1:4.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Annual Purchase
City Campus	220	770	1320	1870	2420	2750	2750	2750	2750	2750	2750	2750	2750	550
Moreno Valley	240	370	500	630	650	650	650	650	650	650	650	650	650	130
Norco	280	430	580	710	750	750	750	750	750	750	750	750	750	150
Total Inv.	740	1570	2400	3210	3820	4150	4150	4150	4150	4150	4150	4150	4150	830

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APPENDIX O

Riverside Community College District

Riverside City Campus ~ Norco Campus ~ Moreno Valley Campus
Campus Educational Master Plan 1997- 2005+

This chapter reflects facility requirements for Instructional Computing, Distance Learning, the Faculty Computer Training and Production Lab, and the Instructional Media Center

Chapter 11:

Overall Technology/Equipment Requirements

1. Overview of Current Technology / Equipment Districtwide and by Campus

The Instructional Media Center (IMC) provided classroom support with projectors, sound and video playback, public address systems, production of audiovisual materials for instruction, a learning resources center, and technical support for campus events. Until recently, **audiovisual** was the principal communication technology for instruction in the Riverside Community College District.

Television is used in classroom instruction. The campus has a satellite downlink and an interactive television system that works on digital telephone lines.

Distance learning distributes tape-recorded television lessons via local cable and wireless-cable. The broadcast lessons are complemented by 15 hours of on-campus instruction. Over 1,000 students enroll each semester in approximately 22 courses..

Computer laboratories have been developed to support interactive learning in applied technology, art, engineering, English, computer and information technologies, music, science, social science, and writing. Computers have become integral to teaching and learning in almost every area of the curriculum. The marriage of computers with telecommunications has created networks. The Internet, a global network of networks, has caused the computer to take center stage as an emerging educational technology.

Current Technology and Equipment

This section will deal with technologies under the organizational units that manage them and/or are proposed to manage them in the future.

Instructional Media Center (IMC)

The IMC is responsible for the following functions:

1) Acquire, manage, operate and maintain equipment and systems installed in classrooms and smart-classrooms
2) Check-out equipment and materials for classroom use — projectors, audio/video playback, public address systems, video equipment
3) Record events on videocassette; produce video lessons in collaboration with faculty

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4) overheads, videos, and multimedia
5) Schedule, downlink and connect satellite lessons to classrooms and conference rooms; setup and operate two-way interactive video between campuses and with external organizations
6) Record off-air; edit and/or copy audiocassettes and videocassettes
7) Operate Learning Resources Center — where students can listen to and watch prerecorded materials
8) Operate video library - select, acquire, catalog, store, loan, and maintain

Note: Discussion is underway with the Librarian to resolve which parts of functions **4),** 6), 7) and 8) will be transferred to the library as part of the proposed Library—Learning Resources Center building in 2001.

The IMC supports classroom instruction with equipment such as television sets and overhead projectors, slide projectors, audiocassette and videocassette players, videodisc players, CD players, public address systems, and other items of equipment as needed. Some equipment is permanently installed in classrooms. The instructor must request equipment and media from the IMC.

With the exception of the newly purchased interactive video system, the equipment inventory is quite old. Many projectors and television sets are more than l5 years old and breakdown of such equipment occurs with increasing frequency. In some instances parts are no longer available to repair the equipment.

The media library is approximately 6,000 videocassettes that include lesson materials previously supplied as 16mm films, slides and filmstrips. Some videos are reserved for students to view in the Learning Resources Center. To receive credit, students must log in at the Learning Resources Center, view the assigned video, and log out.

The IMC produces slides, graphics, audio, video, and multimedia. Other production services include media duplication, editing, sound mixing, and documentation of campus events.

IMC services include operator support for classroom use of media, public address systems for auditoriums and stadiums, satellite television downlink and recording, interactive video for classes and videoconferences, design and installation of *smart* classrooms (classrooms with permanently installed display and internet equipment) and equipment maintenance.

There are periodic training sessions for faculty in media production. There is also a laboratory to enable faculty to produce their own instructional materials using audiovisual and computer-based materials.

Distance Learning

Distance learning is a way to reach unserved segments of the population. It serves those who are geographically remote from the campus, those with schedules not compatible with class times, those physically unable to attend for a variety of reasons, and non-traditional learners whose learning styles are not compatible with traditional methods of teaching.

Two technologies play a dominant role: television for group teaching, and the computer for individualized learning.

Broadcast television translates the classroom paradigm of group teaching into multiple classrooms, industries, and homes. Live television classes are a *synchronous* method of teaching and learning that link people together according to a fixed schedule. The focus is on teaching and the teacher. It has the advantage of low cost distribution and is accessible on broadcast or cable television. The "drop in" audience may be much larger than those enrolled for degree or certificate credit and should be considered as a community service and a promotional device for college programs.

Individualized learning is usually asynchronous. It can occur anywhere and at any time. It accommodates different learner preferences, schedules, and pace of learning. It can be interrupted and resumed at will. It opens educational opportunities for persons who travel, have families, or otherwise cannot participate according to a predetermined schedule.

Videotapes can be used for asynchronous learning, but the new knowledge media — computers and telecommunications — are powerful instruments for interactive learning. It is notable that ten of eleven distance learning institutions with enrollments over 100,000 focus on individual learning, not on group teaching (the exception is the Chinese Television University system).

Telecourses and Teleconferencing at RCC

RCCD receives satellite teleconferences and courses on tape and distributes television lessons by supplying videocassettes to local cable companies. At this time RCCD cannot originate live broadcast or satellite programs. The RCC campus is a head-end for Cross County (Wireless) Cable. Moreno Valley is negotiating a head-end for TCI Cable. In the future, it will be possible to originate live and recorded programs via local cable from each campus.

RCCD has interactive video (teleconferencing) equipment on each campus. Interactive video requires ISDN telephone lines and a multi-point connection where more than two sites are to be connected. Picture quality is improved when multiple ISDN lines are used. Each campus has purchased three ISDN lines (384K) under the Education First program from Pac Bell. An internal multi-point bridge can connect up to four sites using a single ISDN line (128K). External bridging can be rented for connection at higher data rates. All participating campuses must use the same data rate. *RCCD equipment was recently upgraded to meet the current standard for the community college system and the California State University.*

Interactive video connections for RCCD campuses can be accessed from one of the following classrooms on each campus:

Riverside City Campus (patched by RCC IMC):

AD 122 (Board Room), Administrative Conference Room, BE 10, LB 102, LS 108, Quad 134, Quad 144, (Hall of Fame is yet to be installed).

Moreno Valley Campus (Patched by IMC Office in Hum 220): Hum 120, Hum 129, Hum 209

Norco Campus (patched locally): ATec 114, Hum 111, Student Services 101, (Little Theatre is yet to be installed)

Under the Pac Bell *Education First* initiative, three ISDN lines are provided to each campus at a flat rate of $75 per campus per month for the local area ($2,700 year unlimited use for the three campuses). It is possible for RCCD to connect to any educational organization in the Greater Riverside area including: California State University, San Bernadino; University of California, Riverside; Riverside Unified School District; California School for the Deaf; and similarly equipped classrooms and conference rooms in adult education centers, government and community agencies throughout the United States.

Computer Labs and Networks

In 1996 the RCCD Academic Senate set up two goals for computer technology:

- Open computer labs on each campus to provide students in all disciplines access to computer technology in order to complete academic assignment and projects.
- Acquisition and implementation of adequate and current technology for support of student access to word processing, computers, lab equipment, current software, in-class computer demonstration equipment, and student access to the Internet.

In March of 1997 a Dean of Learning Technologies was recruited to develop a technology plan and manage the development of instructional computing.

Computer labs are attached to teaching departments except for large general-purpose labs recently installed at Moreno Valley and Norco. The facilities at Moreno Valley and Norco are relatively new, and new labs were constructed and new computers procured in 1997 as a result of secondary effects funding. On the City Campus the only shared lab is on the first floor of the Business Education building. The City Campus has a computer inventory dating back to 1983 (8088) along with 286, 386, 486 and some older Macintosh computers

Table 1
Computers and Computer to FTES Ratios

Campus	Obsolete Macintosh	Macintosh	Obsolete 8088-486	Pentium	Total < 5 years old	Est. 97-98 FTES	Ratio
City Campus	14	60	107	180	220	11000	1:50
Moreno Valley			38	242	242	2600	1:11
Norco	21		17	280	280	3000	1:11
Total	35	60	163	700	740	16,600	1:23

Table 1 shows the number of computers for instructional use by Campus as of October 1997. After eliminating the obsolete computers in the shaded columns, there are 740 computers to support 16,000 Full-Time Equivalent Students (FTES) — a ratio of one computer for every 23 FTES.

Computing this statistic separately for each campus gives a different picture. The computer to FTES ratio at Moreno Valley and Norco is of the order of 1:11 while on the City Campus it is about 1:50.

If labs are open for an average of 60 hours/week; that equates to an average of 14 minutes per course per week for students on the City Campus and one hour and ten minutes per course per week at Moreno Valley and Norco.

1.2. Anticipated or Already Scheduled Additions

Instructional Media Center. The greatest immediate change in IMC function is installation of new television monitors and digital video projectors in classrooms, and possible addition of computers or computer connections to some of these devices to make *smart classrooms.* To provide flexibility, digital video projectors will also be available on carts for checkout or supplied with an operator. This will be standard on all three campuses, although the level of video and computer support is much higher at Moreno Valley and Norco.

Part of the IMC space on the City Campus will be the site of the proposed Faculty computer training and production lab described later in this section. Equivalent spaces will be identified at Moreno Valley and Norco. At Moreno Valley the IMC will house the head end for cable television. Similar spaces will be identified for cable head-ends at City Campus and Norco. It is expected that graphic and video production capabilities of the IMCs will increasingly be used to support development of World Wide Web pages for campus instruction.

One-time capital funds have been released for instructional technology needs. About 90% will be used for computer related purchases and 10% for television related equipment and classrooms.

Faculty computer training and production lab. Instructor training is a prerequisite to effective use of the new student computer labs. All three campuses will promote use of student and faculty labs starting with computer literacy and basic skills with word processing, spreadsheets, and databases.

Specifically, the Faculty computer training and production lab will train faculty to:

- Use computers, computer applications, networks and the Internet.
- Design, produce, implement and evaluate computer developed printed materials, instructional presentations, and interactive teaching and learning media.
- Acquire or develop, implement and evaluate lessons segments, lessons and courses that involve text and graphics, presentation graphics, color overhead projectuals, desktop publishing, 3-dimensional graphics, digital audio and video, animations, interactive multimedia, CD-ROMs, Web pages
- Teach advanced workshops and assist individual faculty to design, produce, implement and evaluate lessons and courses.
- Test, demonstrate, implement and evaluate new and emerging learning technologies

Advanced workshops will be conducted on scanning, optical character reading, creating graphics, digital photography, digital image processing, digital audio and digital video editing and conversion, PowerPoint presentations, creating interactive multimedia, creating CD-ROMs, authoring multimedia programs using Authorware, Netscape and Explorer, and authoring techniques for the World Wide Web.

The faculty lab on the city campus will Have 12 networked Pentium II computer stations with Internet access, a WWW server, flatbed scanner, slide/negative scanner, color printer, high speed B&W production printer, and an extensive variety of applications software and authoring programs. This model will be replicated with smaller numbers of computers at Norco and Moreno Valley.

Distance Learning. Distance learning will facilitate off-campus learning using print, computers, audiotapes and videotapes and CD-ROM, and instructional telecommunications.

Instructional telecommunications includes:

Broadcast courses and programs -

commercial, public and educational broadcast courses

live and videotaped (videocassette) courses

satellite and digital satellite courses and and teleconferences

Instructional Television Fixed Service and wireless cable

cable television

videos on CD-ROM

two-way interactive video

Interactive Internet courses and programs

Email, bulletin boards, listservs, chat rooms, computer forums and conferences

MOOs, MUDs, and three-dimensional graphic Worlds

Internet information resources and electronic libraries

World Wide Web and interactive multimedia

Distance learning will be a major area of future growth for the RCCD. It substitutes telecommunications and virtual classrooms for brick and mortar costs. It is the only practical way for many people to attend College because of their complex lifestyles, time barriers, and geographic barriers.

The British Open University is the largest Distance Learning organization in the world. It attributes its success to four key elements:

1. High quality multi-media learning materials produced by multi-skilled academic teams. Study materials are excellent and varied to make the campus in the home or workplace a congenial experience.
2. Dedicated personal academic support. Each Open University student has his own tutor for each course, one of Open University's 7,000 adjunct faculty.

They comment on and mark the student's assignments, hold group meetings, and give support by phone, email, and computer conference.

3. Effective logistics. Each individual student receives the right materials and information at the right time. With over 150,000 students around the world, that requires attention to detail.
4. A strong research base. When thousands of students use the material for each course and millions of people view each TV program, the content must be academically up-to-date and presented clearly. Thanks to economies of scale, the Open University has resources to move the academic paradigms steadily forward.

RCCDs approach to distance learning will increase courses taught live on television and strengthen interaction and support by telephone, email, chat room and forums on the Internet.

RCCD will initiate distance learning that can be shared on a statewide basis. The CCC will shortly fund a pilot project for Statewide Delivery of Distance Education that is designed to select, purchase or site-license, revise and/or produce distance education courses for statewide delivery.

Television courses. Developments already underway include courses taught K-College and telecourses available on local broadcast and cable channels. It is important to note that RCCD assigns instructors to distance learning students, but not with the level of mentoring offered by the British Open University.

Computer and Internet Courses. As computer and telecommunications infrastructure is installed, RCCD will make courses available on the World Wide Web. This will be a large enterprise in the future are requires a comprehensive plan, staff, production areas, and production oriented hardware, software and authoring programs. It is projected that secondary effects after construction of the new library will convert the second floor of the existing library building for distance learning classrooms, teleconferencing, and production of World Wide Web pages for instruction.

Another approach is benchmark against similar organizations that use computers to offer comparable courses and programs. This produced some interesting statistics shown in Table 2.

For planning purposes, a goal is 1:4 as proposed for the RCCD, the ratio proposed for the State of California K-12. This would require 4,150 computers compared to the present inventory of 740, a difference of 3,410 computers. The majority of these are needed on the City Campus because of its higher FTES.

Table 2
Computer:FTES Ratios for Selected Schools and Colleges

Institution	Number of Computers	FTES	Ratio
Ngee Ann Polytechnic-Singapore	4,500	12,000	1:2.7
California State University, San Bernadino	4,000	12,000	1:3
Goal for State of California K-12			1:4
Redlands East Valley High School	400	2,000	1:5
RCC Norco	280	3000	1:11
RCC Moreno Valley	240	2600	1:11
State of California K-12 — current ratio			1:14
RCC City Campus	220	11,000	1:50

Doing more with less

Computers are a scare resource and will continue to be so. It will take five years to build the inventory assuming that sufficient dollars are available. Since the goal is five years in the future at best, it is imperative to explore ways to maximize use of the existing inventory. It mandates shared access for faculty for the time being in a faculty lab or shared office environment. The exception will be power users who can justify a state-of-the-art computer for personal use, or who will accept an older computer because their primary need is word processing and Internet access.

Scarcity mandates against departmental labs open a few hours a week and teaching labs where the primary use is demonstration and discussion. Priority will be given to large open labs with extended hours each day and on weekends, shared labs for disciplines such as the physical sciences with specific requirements, and consolidation of small labs to extend lab hours and minimize supervision cost.

A further multiplier would be Internet access to programs used in campus labs to enable students to do lab assignments at home or in the workplace. This will require changes in policies and procedures. For example, performance measures should replace seat time as a way to measure learning. Mentoring and the equivalent of line-of-sight supervision can be provided online using email, bulletin boards, chat rooms, forums, and programs that enable instructor and student to share the same screen and control it from his or her local keyboard and mouse.

Economy can also be achieved through specialization. If present trends continue, Norco and Moreno Valley will be high tech campuses that require a large numbers of computers compared to their FTES. Norco will specialize in engineering, computer science, computer-assisted design, graphics and multimedia. Moreno Valley will specialize in high-tech medical sciences. If the mission of the City Campus is to support more traditional types of courses, it may need fewer

computers. The gap analysis between needs and available resources (space, infrastructure and budget) suggest that it is impractical to achieve the 1:4 ratio on the City Campus prior to construction of the proposed LLRC in 2001. For this reason, it is proposed that a more realistic short-term goal for RCC City Campus would be "50% in five years."

First Steps

In 1997, RCCD is upgrading infrastructure for computer labs and networks as follows:

1) Token ring networks at Norco and Moreno Valley instructional labs and library were replaced by Ethernet in as part of Secondary Effects — *completed.*
2) A large (120 station) General-Purpose lab was setup at Norco (Secondary effects) — *completed*
3) A large (120 station) General-Purpose lab was setup at Moreno Valley (Secondary effects) — *near complete*
4) District standards were setup for computers, networks, servers, and printers. Pentium II computers using Windows 95 or Windows NT will be purchased until replaced by a newer technology — *completed*
5) District Standards were setup for networks. 3Com switched networks with ATM backbone were selected — *installation in process*
6) A bid was initiated in Summer 1997 to purchase computers and related equipment — *completed.*
7) A *band aid* action added 30 state-of-the-art computers on City Campus at the beginning of the Fall Semester so that Office 97 could be taught on all three campuses. An additional 30 computers were added in October — *completed.*
8) Departments on City Campus and the Senate Technology and Equity Committee are meeting with the Dean of Learning Technologies to establish needs that can be satisfied within this year's budget and initial priorities for next year's budget — *ongoing.*
9) Grant applications were generated for multimedia, distance learning, and faculty computers— *completed.*

Standards, Policies and Procedures

Steps have been taken to ensure reliable equipment operation, reduce service requirements, and assure prompt service when needed:

a. Standardize on one type, make and model of computer. This simplifies purchase, service, operation, and ultimately, replacement. It minimizes the number of makes and models for technical support and facilitates identical configuration.

b. Buy the most current model. The average useful life of a computer is five years. Buying last-years model reduces useful life to four years and lacks the features and power of the newer technology. When installation cost is added and cost is amortized over four years, last year's model is more expensive.

c. Have the manufacturer configure hardware and software. This requires planning and ensures a common configuration. Opening a new computer to install hardware doesn't make sense since it violates the integrity of the configuration determined by the manufacturer. Also, technician time is expensive. Technical support should be *lean and mean,* yet responsive when needed.

d. Have the manufacturer unpack and test equipment on-site. ***Note:*** *This was tried, found* ***not*** *cost effective, and discontinued.* The intent was to accelerate installation of hundreds of new computers in Fall 97

e. Replace token ring networks with Ethernet. Token-ring networks are unreliable and difficult to maintain. Instructional labs now have Ethernet.

f. Use *Switched* Ethernet so that multimedia does not overload networks. Two or three multimedia programs can overload a *shared* network. *Switched* Ethernet provides each user with up to ten-megabits of data per-second compared to a total of ten-megabits per-second for all users on a *shared* network.

g. Use Asynchronous Transmission Mode (ATM) for the network backbone. The backbone must support all of the traffic on the network so its collective bandwidth must be substantially greater than bandwidth to the desktop.

h. Standardize networks, servers, printers, and lab procedures. Labs will be similarly equipped and one network will serve administrative and instructional use across all three campuses. Computer systems and operating procedures will be standardized and optimized to ensure a uniformly high *Quality of Service.*

i. Establish policies and procedures for faculty training. Faculty training will be supported by one trainer position shared between three campuses.

Establish policies and procedures for lab support, procurement, maintenance and replacement of equipment and software. One lab technician per campus will be recruited to support the general-purpose lab, networks and other instructional uses of computers. Instructional computing will have a technical team separate from administrative computing to ensure responsive support for the academic mission. It will collaborate closely with the administrative computer support team.

k. Growth of inventory. Computers will be purchased in sufficient numbers to achieve the desired inventory in a five-year period.

l. Replacement policy. Obsolete computers will be replaced, usually when they are about five years old. Over a period of time, a pattern will be established where annual replacement will be 20% of the current inventory plus a margin for growth.

m. Software purchases. Site licenses will be purchased wherever possible to reduce cost, simplify management, and facilitate software upgrades. Site

licenses will be purchased and managed through the Office of the Dean, Learning Technologies.

n. Lab Management. Software will be obtained to log student activity and time in computer labs.

o. Lab Security. Equipment will be locked down and virus protectors will be installed on all equipment. Security of administrative data will be assured using Virtual Local Area Networks (VLANS).

p. Energy Saving. All equipment will be setup to use energy saving features when the equipment is not in use.

q. Illegal Use. A condition of use *for all patrons* will be a signed agreement to refrain from illegal or unethical use of computers, networks, and the Internet. Access will be declined to persons who break this agreement.

Resource Requirements

Computers, networks and software are only part of the cost of computer installations. Space must be assigned for labs, classrooms; technician work areas, and telecommunication equipment such as network hubs and servers, storage; offices for instructors, counselors, and support personnel; a central service desk to monitor and support lab activities; and a help desk to provide campuswide support for computer users.

Electricity and air conditioning must be sized to the room capacity and the electrical requirements of computers, color monitors, printers and servers, hubs and routers. Network wiring must be enclosed in raceways separate from power, with a patch bay to connect each computer via a hub to servers, the Intranet and the Internet.

Personnel cost needs to be considered also.

Operating cost

Operating cost is a composite of equipment and software amortization and maintenance cost; personnel cost including technicians, lab managers, lab aides, help desk, instructors, and security personnel; electrical power and telecommunication cost; contracted services such as Internet Service Provider and the telephone company; and supplies such as toner and printer paper.

So long as computer labs are a necessary expense for the College, the question is how to contain or avoid costs on the one hand, and how to maximize cost-benefits and results on the other.

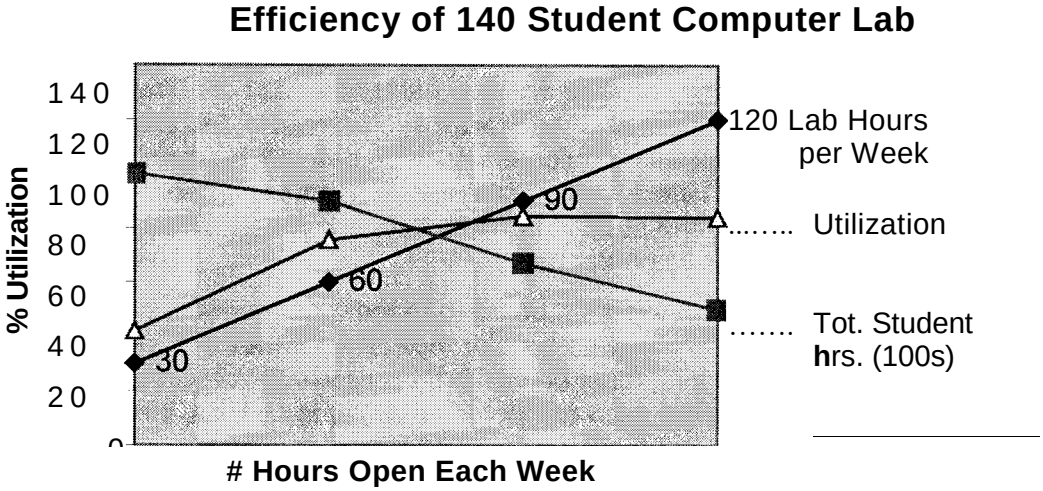
Based on the level of utilization from hour to hour, the greatest cost benefit will be achieved by having large labs (to spread supervision cost over a larger number of users) and keeping labs open for an extended number of hours each day.

Example: A 30-station lab with server and networking, including network hub, cost of the order of $185,000. A 120-station networked lab with multiple servers and expended networking costs $750,000. The number and size of labs should be optimized to serve the largest number of students at the lowest possible cost.

Amortizing Equipment Cost.

Consider the following hypothetical example. The installed cost of each computer, including servers and networks, is $6,000. A lab is kept open for 30 hours per week for 50 weeks and the life of the equipment is four years, the amortized cost of equipment is $1 per computer per hour if the lab is utilized 100%. If the lab is open 90 hours per week and utilization is 67%, cost averages 50c per hour.

If the lab is open 120 hours a week and utilization averages 50%, the cost is 50c per hour. For a 140 station lab open 30, 60, 90, and 120 hours the actual hours of student use is 4,200, 7,560, 8,400, and 8,400 respectively. In other words, there is no increase in the number of student hours of use beyond 90 hours.



Personnel cost. Large labs are less expensive to supervise and maintain. Assuming the people needed to support a 140-station lab are: one classified full-time, one classified hourly, and 0.5 technician and .25 janitor, cost with benefits is less than $70 per hour or 50 cents per station per hour. If the same level of support is needed for a 70-station lab, then the large lab is twice as efficient. In practice this tends to be a logarithmic scale, particularly when multiple labs and large numbers of students are involved. Lab support and lab size should be optimized to meet the educational need and the desired quality of service.

Other Operating Cost. This includes electrical power for computers, printers, peripherals and room lights, telecommunication services, and Internet Service for a total of $1.00 per station per hour.

Ways must be devised to augment funding or to significantly increase the use of computer resources. External funds and partnerships will be needed to augment State budgets. Effective utilization of computer resources is crucial — large labs reduce supervision cost and extended lab hours give greater value for each equipment dollar. Policies need to be changed to allow students to use computers at home or in the workplace to reduce the load on computer labs.

Administrative Network

Key administrative offices and approximately 15% of faculty offices are connected with Shared Ethernet to the mainframe, Intranet and Internet services for administrators, faculty and staff. The network connects all three campuses via T1 telephone lines.

Data Security

Administrative and instructional computers are connected to the network as separate Virtual Local Area Networks (VLANs). The VLAN allows the physical sharing of the network infrastructure yet provides absolute protection against students accessing administrative data or the administrative VLAN.

Networks and operating systems

10Mbps Switched Ethernet is the standard selected for workstations on the RCCD Instructional Network. The backbone connecting computer labs, faculty offices, and classrooms will use ATM, 100Mbps Ethernet, or 10 Mbps Ethernet depending on data requirements and location with respect to the backbone. All computer stations are wired with Category 5 wire to support data rates up to 100 Mbps. The campus backbone is fiber optic cables with multiple pairs of fiber including unused (dark) fibers for future system expansion.

Student labs constructed or refurbished in the second half of 1997 have switched Ethernet. All student labs will eventually have switched Ethernet to permit network intensive activities involving graphics, sound, video, multimedia, and transfer of files and overlays.

New and upgraded student labs are concurrently installing 300 Mhz Pentium II computers, Compaq Proliant file servers, and Hewlett Packard 5SiMX printers. Software includes the Windows 95 operating system, Office 97, and either Novelle Netware or NT Workstation for the network operating system. Manufacturers, model and versions will be periodically changed and updated to ensure a high quality learning environment.

Older labs on the City Campus will be upgraded, as budget is available. Student stations in some labs installed prior to 1997 have no hard disks and run from the file server. Some computers still use the DOS operating system and Windows 3.11 as the user interface. Instructional labs that are not refurbished with new equipment will be upgraded to PCs with hard disks and extended RAM memory, Windows 95 or Windows **NT** for the operating system, and switched Ethernet for networking. Similarly, shared network hubs will be replaced by switched hubs, and network printers will be upgraded as necessary.

Computer Communications and the Internet

Computers communicate with other computer via Local Area Networks (LANs). LANs communicate with other networks across a wide area via Wide Area Networks (WANs). WANs connect LANs through telephone lines, fiber, cable, microwave or satellite based on availability and cost. The Internet is a global network of networks.

Routing of Internet data is transparent to the user. Multiple telephone and telecommunication companies are dynamically linked wire, cable, fiber, microwave and satellite to make a connection. Telecommunication company computers select the preferred path, and for practical reasons this anonymous linkage is called a "cloud." Control is shared dynamically between multiple telephone companies and

Internet Service Providers (ISPs) so that no single organization controls the flow of information.

Access to the Internet

Communications via the Internet have become as important as computing itself. It provides almost instantaneous access to information resources of every conceivable kind in more than 100 countries. It supports email, electronic libraries, chat rooms, computer forums, multimedia, electronic libraries, electronic publishers, the World Wide Web, and distance learning in a variety of interactive formats. It is used by tens of millions of students worldwide and by business, industry, government, military; international, regional and community organizations; and by public and private foundations and research organizations.

Quality of Internet Access

For electronic libraries and text-based systems, shared networks can support a large number of users. As traffic increases, the system slows down. Substantial delays may occur, or even failure to make a connection.

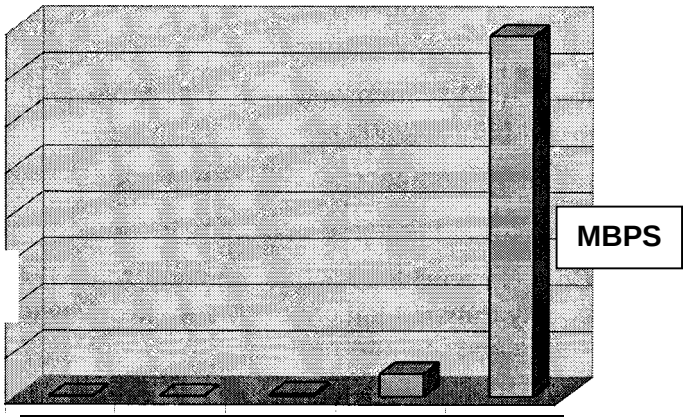
The bandwidth of the Internet connection must be sized to the volume and nature of use. Home users have telephone modems up to 56 Kilobits per second (56 KBPS) or ISDN digital telephone lines up to 128Kbps. Institutional connections require one or more **T1** lines with a capacity of 1,200 Kbps, usually described as 1.2 Megabits per second (1.2Mbps). Eight **T1** lines are equivalent to 10Mbps Ethernet. Digital satellite is offering delivery up to 200Kbps for home use, and may provide an economic means of supporting some college operations. Large information technology users such as the Library of Congress and Microsoft Corporation use ATM lines with a capacity of 156Mbps or 624Mbps

In the College environment, it is anticipated that hundreds of users may be accessing the same timeframe. Just as 10Mbps Ethernet can be overloaded by data intensive tasks such as downloading files and graphics and interactive viewing of multimedia, one T1 line with one eighth of the capacity of Ethernet will not provide an adequate quality of service. At the discounted education rate of $800 per month for a dedicated T1 line, cost rather than *Quality of Service* may be a determining factor.

District Net

Connection between campuses within the District requires T1 lines for the administrative network, the instructional network, 4Cnet and the Internet. To have sufficient capacity will require the purchase of several T1 lines for each campus. Assuming four T1 lines per campus, this would cost of the order of $120,000 per year. Expansion for better Internet service could double this amount by the year 2,000 and continue to expand.

Network Mbps compared to ATM



Modem	ISDN	T1	Ethernet	ATM
0.056	0.128	1.2	10	156

Digital Link in MBPS

Several alternatives were explored.

1) leasing dark fiber. This would require connection through multiple vendors that would include telephone companies from whom we procure these services at a highly discounted rate. No benefit could be expected from this approach.

2) Bury RCCD fiber between campuses. Even if we had the right of way, this is impractical because of high construction cost.

3) Use ITFS frequencies. Unfortunately RCCD does not have any ITFS and no more frequencies will be available in this area. Pac Bell (the new owner of Cross Country Cable) has secured available bandwidth on the University of California Riverside ITFS frequencies.

4) Connect via microwave. Northern Arizona University (NAU) uses this for its statewide network. The system links multiple two-way television programs, campus telephone, and Internet between sixteen campuses.

Microwave requires line-of-sight connections between transmitters and receivers. One mountain site new Flagstaff AZ can see all Northern Arizona campuses. The system was constructed primarily with grant money is very cost affordable.

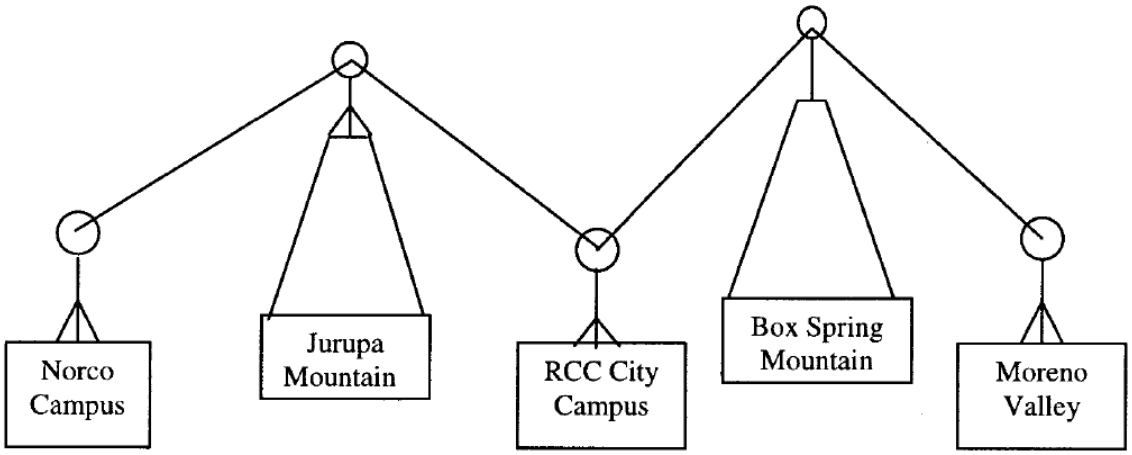
A preliminary consultant study showed that direct connection between the three RCCD campuses is not possible due to geographic barriers. City Campus and Moreno Valley have a clear view of microwave towers on Box Spring Mountain; another mountain site such as Jurupa Mountain or Radio Hill may be required to connect Norco. An additional study is needed to determine the most cost-effective option.

It is proposed that the RCCD district-wide network will be linked by microwave towers on each campus relaying their signals via mountain top transponders. For the cost of T1-level services for the next three years, RCCD can construct a microwave link with extended capacity for future growth. An operational fully redundant DS3 (56 Mbps) link between all three campuses would cost of the order of $600.000. This would have the capacity of 28 T1-lines connecting each campus. ATM would triple this capacity for an additional $400,000. (A non-redundant ATM system would cost $600,000. However, in the event of technical problems there may be interruption of service.)

A fully redundant ATM system, with *hot-swappable* components, is recommended for the following reasons:

1) the redundant system assures reliable 24-hour 7-day service year after year.
2) ATM would provide the same backbone technology across three campuses.
3) Using 3-Com Corebuilder 7000 technology, the ATM link would simultaneously transmit telephone, video, two-way interactive video, computer data and the Internet.
4) The system would operate without major upgrades for 20 years. It would pay for itself, based on the projected telecommunications cost, in four years.
5) For the next several years there will be excess capacity. This could be used as leverage for partnerships or as a source of income for RCCD.
6) The broadband ATM link would qualify RCCD to received Internet II support.

Proposed RCCD ATM Microwave System



Connectivity on each campus is an integral part of the network plan. Some parts of the infrastructure for Moreno Valley and Norco was supplied as part of secondary effects funding. For the most part, it will be an entire new network. 3Com Engineers have designed a system that will extend the ATM backbone across each campus to support instructional and administrative computing, video, and campus telephone and fax.

Design information and some initial cost projections will be forthcoming. The costs provided are retail and will be heavily discounted. However, there will be additional equipment needed to support the projected number of computers and service points for the network.

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APPENDIX P

Academic need and uses for the proposed computer network on RCC city campus

1. The proposed City Campus Network is needed for the City Campus to interface with RCC Norco Campus and Moreno Valley Campus to complete the RCCD Intranet.
2. Norco and Moreno Valley networks have a NetBuilder DS3 interface, an ATM backbone, and switched 10/100 Mbps Ethernet to the desktop. These were installed as part of secondary effects funding. They will combine video, voice and data for transmission on a DS3 telephone line.
3. City Campus has fiber ready to install the new network. All computers purchased for the past two years and many of our older computers accept 10/100 Mbps Ethernet. City Campus lacks the NetBuilder, ATM Interfaces, and switched hubs needed to complete the three-campus Intranet.
4. The Intranet will have ten times the capacity of the existing telephone and data connections. It will facilitate the use of electronic libraries, online courses, two-way video, and central distribution of video lessons to classrooms.
5. Existing computer networks on the City Campus do not have the capacity for instructional video or interactive multimedia. There is currently ***no*** electronic distribution system for video.
6. This proposal provides the basic infrastructure to support every classroom, laboratory and faculty office. It connects the RCCD Intranet and the Internet to every building. *It does not include fiber or copper to connect each classroom, laboratory, and faculty office. These will be done, based on demand, from technology budgets provided by the Chancellor's* Office. (Note: Some faculty offices already have network connections.)
7. From an instructional point-of-view, the proposed network will initiate or expand the following services between RCC campuses:
    a) Sharing library resources. RCC library resources and databases stored in digital format will be accessible on all RCC campuses.
    b) Sharing video resources. *Existing City Campus networks cannot share video from broadcast, cable, satellite, classroom-studios, or video playback from tape. Currently it is necessary to make and/or transport videotapes and ship them between campuses.* The proposed network will enable multiple-campus classes where a single campus does not have enough students for the class to make; it will facilitate efficient sharing of video library resources; and it will facilitate joint meetings for district-wide committees.

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c) Sharing RCC online courses. Courses and learning resources stored on RCC file-servers and CD-ROM servers can be accessed in RCC laboratories and connected classroom on any RCC campus.

d) Access in classrooms. As classrooms are connected, services a-c above will be available for instructors to use in classroom instruction.

e) Network management. When the proposed City Campus network is installed, levels of network traffic can be observed and managed from anywhere in the system. In event of problems, it will be possible to troubleshoot and in many instances correct network problems from any point in the system. This will save time and reduce the number of technicians needed for efficient operation.

8. From an instructional point-of-view, the proposed City Campus network will initiate or expand access to the following external services:

a) Access to electronic libraries. This includes a large number of library services and Internet based services such as Yahoo and Alta Vista.

b) Sharing video resources. A single connect point to broadcast, cable or satellite can service all three campuses. It will increase options for reception of satellite classes. It will also permit RCC telecourses to be distributed from a single cable head-end.

c) Sharing online courses. A single connection to the Internet can efficiently support all three campuses. From a security point of view, it is easier to manage one connection; from a cost point of view one large connection is much less expensive then three smaller ones.

9. City Campus is the Weak Link in the System. The Norco and Moreno Valley campus networks cannot be used effectively until the City Campus network is installed. At that point the three campuses will be one Intranet with broadband connectivity.

10. Jobs require graduates to have networked-computer skills. Business, industry and government are making extensive use of computers, networks, and the Internet in their daily activities. There are relatively few jobs that do not or will not require such skills. For this reason, access to computers with a wide range of network services is essential for RCC to train its students so they are knowledgeable and competitive in information age jobs and environments.

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APPENDIX Q

LEASE PLANS & RATES

For Your Small- and Medium-Sized Business Customers

Fair Market Value | Lease Plan

Advance Due: Two payments due in advance as a security deposit.

Purchase Option: At lease termination, Lessee may purchase the equipment at its then Fair Market Value; return the equipment to the Lessor; or continue to lease at the then Fair Market Value Rental Renewal Rate.

Example: Fair Market Value Lease Plan

Net equipment cost	$5,000
Term	36 months
Rate factor	.0325
Monthly lease payment	.0325 x $5,000 = $162.50
Two payments due in advance as security deposit	$325.00

Lease Value	24 MO.	36 MO.	48 MO.	60 MO.
$1,000-2,499	.0486	.0355	N/A	N/A
$2,500-4,999	.0471	.0335	.0279	.0246
$5,000-14,999	.0457	.0325	.0266	.0232
$15,000-24,999	.0455	.0319	.0262	.0226
$25,000-49,999	.0452	.0317	.0257	.0221
$50,000-74,999	.0450	.0315	.0253	.0218
$75,000 +	Please call for rates*			

Cost Cutter | Lease Plan

Advance Due: Two payments due in advance as a security deposit.

Early Purchase Option: Lessee may exercise the guaranteed early purchase option: 20% at month 36 for the 39-month plan; 15% at month 48 for the 51-month plan; 10% at month 60 for the 63-month plan.

Purchase Option: At lease termination, Lessee may purchase the equipment at its then Fair Market Value; return the equipment to the Lessor; or continue to lease at the then Fair Market Value Rental Renewal Rate.

Example: Cost Cutter Lease Plan

Net equipment cost	$5,000
Term	39 months
Rate factor	.02975
Monthly lease payment	.02975 x $5,000 = $148.75
Two payments due in advance as security deposit	$297.50

Lease Value	39 MO.	51 MO.	63 MO.
$1,000-2,499	.03250	.02650	N/A
$2,500-4,999	.03030	.02550	.02275
$5,000-14,999	.02975	.02500	.02225
$15,000-24,999	.02950	.02475	.02175
$25,000-49,999	.02925	.02450	.02150
$50,000-74,999	.02900	.02425	.02125
$75,000 +	Please call for rates*		

$1 Buyout | Lease Plan

Advance Due: Two payments (first and last payments) due in advance.

Purchase Option: At lease termination, Lessee may purchase the equipment for one dollar, or return the equipment to the Lessor.

Example: $1 Buyout Lease Plan

Net equipment cost	$5,000
Term	36 months
Rate factor	.0347
Monthly lease payment	.0347 x $5,000 = $173.50
Two payments (first and last payments) due in advance	$347.00

Lease Value	24 MO.	36 MO.	48 MO.	60 MO.
$1,000-2,499	.0517	.0380	N/A	N/A
$2,500-4,999	.0501	.0360	.0310	.0259
$5,000-14,999	.0490	.0347	.0276	.0239
$15,000-24,999	.0488	.0344	.0275	.0234
$25,000-49,999	.0485	.0342	.0271	.0227
$50,000-74,999	.0484	.0340	.0265	.0224
$75,000 +	Please call for rates*			

*For transactions of $75,000 or more, or for custom lease terms, contact your Compaq Capital Account Representative, or call 888-277-5942.

Tax Note: Depending on the lease plan used and the state in which the equipment is to be located, you may need to add sales tax to the equipment cost prior to calculating the monthly payment. If you are unsure of the proper tax amount, please contact the Compaq Capital Documentation Department (888-277-5944) for assistance.

Minimum lease payment: $50

FOR MORE INFORMATION

TOLL-FREE PHONE
1-888-277-5942

TOLL-FREE FAX
1-888-277-5945

WEB SITE
www.compaq.com/capital

COMPAQ Capital

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APPENDIX R

UCD Acceptable Use Policy on Computing http://www.ucdavis.edu/AUP.html

UC DAVIS
Computer and Network Use Policy

Revised June 16, 1995

http://www.ucdavis.edu/AUP.html

Part 1

I. Introduction

This acceptable use policy governs the use of computers and networks on the UC Davis campus. As a user of these resources, you are responsible for reading and understanding this document. This document protects the consumers of computing resources, computing hardware and networks, and system administrators.

II. Rights and Responsibilities

Computers and networks can provide access to resources on and off campus, as well as the ability to communicate with other users worldwide. Such open access is a privilege and requires that individual users act responsibly. Users must respect the rights of other users, respect the integrity of the systems and related physical resources, and observe all relevant laws, regulations, and contractual obligations. Since electronic information is volatile and easily reproduced, users must exercise care in acknowledging and respecting the work of others through strict adherence to software licensing agreements and copyright laws.

Existing Legal Context

All existing laws (federal and state) and University regulations and policies apply, including not only those laws and regulations that are specific to computers and networks, but also those that may apply generally to personal conduct.

Users do not own accounts on University computers, but are granted the privilege of exclusive use. Under the Electronic Communications Privacy Act of 1986 (Title 18 U.S.C. section 2510 et. seq.), users are entitled to

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privacy regarding information contained on these accounts. This act, however, allows system administrators or other University employees to access user files in the normal course of their employment when necessary to protect the integrity of computer systems or the rights or property of the University. For example, system administrators may examine or make copies of files that are suspected of misuse or that have been corrupted or damaged. User files may be subject to search by law enforcement agencies under court order if such files contain information which may be used as evidence in a court of law. In addition, student files on University computer facilities are considered "educational records" under the Family Educational Rights and Privacy Act of 1974 (Title 20 U.S.C. sectionl232[g]).

Misuse of computing, networking or information resources may result in the loss of computing and/or network access. Additionally, misuse can be prosecuted under applicable statutes. Users may be held accountable for their conduct under any applicable University or campus policies, procedures, or collective bargaining agreements. Illegal production of software and other intellectual property protected by U.S. copyright law is subject to civil damages and criminal punishment including fines and imprisonment. The Davis campus of the University of California supports the policy of EDUCOM on "Software and Intellectual Rights."

Other organizations operating computing and network facilities that are reachable via the UC Davis network may have their own policies governing the use of those resources. When accessing remote resources from UC Davis facilities, users are responsible for obeying both the policies set forth in this document and the policies of the other organizations.

IV. Enforcement

Minor infractions of this policy, when accidental, such as consuming excessive resources or overloading computer systems, are generally resolved informally by the unit administering the accounts or network. This may be done through electronic mail or in-person discussion and education.

Repeated minor infractions or misconduct which is more serious may result in the temporary or permanent loss of computer access privileges or the modification of those privileges. More serious violations include, but are not limited to unauthorized use of computer resources, attempts to steal passwords or data, unauthorized use or copying of licensed software, repeated harassment, or threatening behavior. In addition, offenders may be referred to their sponsoring advisor, department, employer, or other appropriate University office for further action. If the individual is a student, the matter may be referred to the Office of Student Judicial Affairs for disciplinary action.

Any offense which violates local, state, or federal laws may result in the immediate loss of all University computing privileges and will be referred to appropriate University offices and/or law enforcement authorities.

Part 2

Conduct which violates this policy includes, but is not limited to the activities in the following list.

- Unauthorized use of a computer account.
- Using the Campus Network to gain unauthorized access to any computer systems.
- Connecting unauthorized equipment to the campus network.
- Unauthorized attempts to circumvent data protection schemes or uncover security loopholes. This includes creating and/or running programs that are designed to identify security loopholes and/or decrypt intentionally secure data.
- Knowingly or carelessly performing an act that will interfere with the normal operation of computers, terminals, peripherals, or networks.
- Knowingly or carelessly running or installing on any computer system or network, or giving to another user a program intended to damage or to place excessive load on a computer system or network. This includes, but is not limited to, programs known as computer viruses, Trojan Horses, and worms.
- Deliberately wasting/overloading computing resources, such as printing too many copies of a document.
- Violating terms of applicable software licensing agreements or copyright laws.
- Violating copyright laws and their fair use provisions through inappropriate reproduction or dissemination of copyrighted text, images, etc.
- Using university resources for commercial activity such as creating products or services for sale. Using electronic mail to harass or threaten others. This includes sending repeated, unwanted e-mail to another user.
- Initiating or propagating electronic chain letters.
- Inappropriate mass mailing. This includes multiple mailings to newsgroups, mailing lists, or individuals, e.g. "spamming," "flooding," or "bombing."
- Forging the identity of a user or machine in an electronic communication.
- Transmitting or reproducing materials that are slanderous or defamatory in nature, or that otherwise violate existing laws or university regulations.
- Displaying obscene, lewd, or sexually harassing images or text in a public computer facility or location that can be in view of others.
- Attempting to monitor or tamper with another user's electronic communications, or reading, copying, changing, or deleting another user's files or software without the explicit agreement of the owner.

  It is the intention of the Joint Campus Committee on information technology in adopting this policy, that it should be reviewed annually by a Subcommittee of the Joint Campus Committee on information technology. It is further our intention that this policy should be incorporated into the UCD Policy and Procedure Manual as soon as possible.

For further information refer to:

- University of California Electronic Mail Policy
- UC Davis Directive #90-108 "Principles of Community"
- UC Davis Policy & Procedure Manual Section 210-70 "Copyright"
- UC Davis Policy & Procedure Manual Section 280-05 "Prohibited Discrimination"
- UC Davis Policy & Procedure Manual Section 320-20 "Privacy and Access to Information"
- UC Davis Policy & Procedure Manual Section 380-12 "Sexual Harassment"
- UC Davis Code of Academic Conduct
- University of California: Standards of Conduct for Students
- UC Davis Administration of Student Discipline
- The EDUCOM Code: Software and Intellectual Rights
- Office of Student Judicial Affairs (463 MU, 752-1128)
- Information Technology IT-EXPRESS (Shields Library, 752-2548)

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APPENDIX S

Glossary of Technological Terms

The number of terms commonly used to describe the technology of modern times is often bewildering, yet continues to expand rapidly. The following list is therefore not intended to be inclusive, but should afford the reader with a sufficient amount of information to understand much of the language that is used most often.

Accelerator:

A circuit card containing electronic components designed to be plugged into a computer to make it run faster.

Access Time:

The amount of time it takes a computer to locate an area of memory for data storage or retrieval.

AI:

Artificial Intelligence -- the field of computer science dedicated to developing computers that mimic the complex relational functions of the human brain. Expert systems are an early form of AI.

Algorithm:

Any computing process that uses a well-defined series of steps to predictably solve a particular kind of problem. In programming, algorithms are used as either a specific solution or a starting point for experimentation.

Alpha Testing:

Conducted internally by the manufacturer, alpha testing takes a new product through a protocol of testing procedures to verify product functionality and capability.

Analog:

A process or device which represents or calculates data in a continuously variable form rather than in separate steps.

Anonymous FTP Site:

A public FTP server that can be accessed by any user of the Internet.

Application Software:

A computer program or system designed to perform specific tasks. Broad examples of computer applications are word processing and graphics programs such as Microsoft Word(TM), QuarkXPress(TM) and Adobe Illustrator(TM).

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Architecture:

Refers to the physical configuration of a computers internal operations, including memory, input/output structure, instruction set and registers. The term is also used to describe the specific components and the interactions that form a computer system.

Archival Storage:

Copies of digital information stored on magnetic tape, floppy disks, optical disk, CD-ROM or other media used to ensure against loss in case the original materials are deleted or damaged.

ARPANet:

Advanced Research Projects Administration Network. This was the precursor to the Internet. The Department of Defense as an experiment in wide-area networking that would survive a nuclear war developed ARPANet in the late 1960s.

Array:

A table of numbers or text, which the computer holds in its memory-used in programming, a list of data values, all the same type.

Array Processors:

Identical processors connected together and acting synchronously, often under the control of a CPU. Some systems use array processors for high-speed floating-point math operations to speed up video operations.

ASCII:

American Standard Code for Information Exchange. This is a world standard for the codes used by computers to represent the characters of the alphabet and numbers, etc. There are 128 ASCII codes, which are represented by an eight-digit binary number: 00000000 through 11111111.

Asynchronous Communication:

Also known as serial communication. A way for one computer to send data to another without requiring precisely synchronized data pulses.

Special codes are embedded in the stream of pulses so that the receiving computer can locate each byte of data.

ATM (Asynchronous Transfer Mode):

A switching protocol that can handle all types of traffic - voice, data, graphics, and video.

@:

Used to separate the user ID and domain name of an Internet address (pronounced "at"). Authentication Security feature that determines a user's identity and legitimacy.

BBS:

Bulletin board system; once referred to stand alone desktop computers with a single modem that answered a phone, but can now refer to systems as complicated and interconnected as commercial services.

Backup:

The process of copying a file or program in the event the original is damaged, lost or unavailable. Bandwidth The data transmission capacity of a network, used colloquially to refer to the size of the Net; some information transmittals; some information (for example, a multitude of graphic files) are considered a "waste of bandwidth."

Bandwidth:

A measurement of how much information can be sent through a network connection in a given time interval. Bandwidth is usually measured in bits per second (bps).

Baud:

A measure of the rate by which data is transmitted and is most commonly used in rated modems. Expressed in bits per second, one baud equals one bit per second.

Beta Testing:

The second stage test version of a newly developed piece of hardware and/or software which is distributed free to a limited sampling of users so that they can subject it to daily use and report any problems to the manufacturer before release to the public.

Binary:

The base-two numbering system which uses only the digits 0 and 1. It is the format for processing data in computers.

BINHEX:

BINary Hexadecimal. Binhex is a method for converting non-text files (non-ASCII) into ASCII. This is relevant because Internet E-mail is ASCII.

Bit:

Abbreviation for "binary digit." Internally, computers store information as patterns of ones and zeros. Tiny transistors are either "on" (storing a value of "1") or 11 off (storing a value of "0"). The digits "I" and "0" are "bits"- the smallest pieces of information a computer can handle.

Bitmap:

A computerized image made up of dots. In the simplest form of bitmap, each dot is either on (white) or off (black) and is stored as a single "bit" of information in the computer's memory.

BITNET:

Because It's Time NETwork. A network of educational sites separate from the Internet, although E-mail is freely exchanged between BITNET on the Internet. Listservs, the most popular form of E-mail discussion groups, originated on Bitnet. Bitnet machines are IBM VMS machines. Bitnet usage is declining as the WWW expands.

BPS:

Bits per second.

Browser:

Software that allows users to "browse" the World Wide Web. Browsers include Mosaic, Netscape Navigator, and Microsoft Internet Explorer. Services such as American OnLine are not browsers but provide access to browsers.

Buffer:

A segment of computer memory used as a temporary data storage area, used to provide a flexible data bridge to smooth communication between parts of an operating system that have different data transfer rates.

Bulletin Board:

An electronic information and data transfer service that can be accessed through the telecommunications network from any computer terminal configured with a modem and telecommunications software.

Bus:

The main "data pathway" inside a computer enabling the CPU to communicate with other devices, such as the video monitor or the disk drive(s). Byte A unit of information consisting of a sequence of eight adjacent binary digits (bits) and usually sufficient to store one character of information.

CCD:

Initials standing for "Charged Coupled Device." An array of light-sensitive solid-state measuring devices that react electronically to exposure of light. It is the technology used most often in desktop scanners. CD-ROM Compact Disk-Read Only Memory. A medium for storing 670 megabytes of digital information that can be retrieved repeatedly but cannot be changed.

CERN:

The European Particle Physics Laboratory in Geneva, Switzerland; the organization responsible for creating the World Wide Web.

Chip:

A small electronic component containing a chip of silicon on which many miniaturized transistors and other devices have been etched. Microprocessors are largely made up of chips.

Circuit Board:

Also referred to as a "board" or "card." A rectangle of thin plastic with electronic components mounted on it. It plugs into a computer's bus to add a feature or function that is not otherwise available. For example, a video card may give a computer additional capability for displaying colors.

Client:

A computer connected to a more powerful computer (see server) for complex tasks.

Clone:

A copy. In microcomputer terminology, a clone is a look-alike, act-alike computer that contains the same microprocessor and runs the same programs as a more expensive, better-known name brand. Although a clone is supposed to be exactly alike, in some instances there may be small internal variations that can cause operating problems without the manufacturer's assistance.

Commercial Services:

General term for large commercially-oriented online services (e.g. America Online, CompuServe).

Communications Protocol:

The preliminary signals and settings (handshake) that must be shared by two computers before data can be exchanged between them, usually via a modem. A typical communications protocol will establish the speed of the data flow in bps, error-correction methods that will be used (if any) and data compression systems (if any).

Compression:

The use of special coding techniques so that data can be stored more compactly in order to reduce the amount of room it takes to be transmitted to a modem or via another transmission method.

Configuration:

The special assemblage of components and devices that make up the hardware parts of a complete system.

Console:

An electronic workstation that includes a video monitor.

Control Character:

In an alphanumeric code, it alters the meaning of the codes that follow it until another control character is used. Usually this signifies what follows should be regarded as a command rather than data.

Conventional Method:

Describes the manual process of producing a job. CPU Central Processing Unit. In a modern microcomputer, is generally a single silicon chip which acts as the "brain" of the computer by performing fundamental arithmetic operations and moving bytes of data inside the computer's memory.

Cracker:

A person who maliciously breaks into a computer system to steal files or disrupt system activities; not to be confused with hacker.

Cursor:

A location marker on a computer screen controlled by a mouse or directional keys on the keyboard. It can be an underline, rectangle, cross, arrow, or other special indicator.

Cyberspace:

A term originated by author William Gibson in his novel Neuromancer, the word currently describes the range of information resources available through computer networks.

Data Shift:

In process color printing, it describes a shift in one of the channels of data that comprise the image file and could cause inconsistent color in some area in the image.

DDES:

Direct Digital Data Exchange Standards. A set of established formats, protocols and values allowing one vendor's equipment to exchange data with another vendor's equipment.

Dedicated Device:

A piece of hardware that is permanently assigned to one task. The task however, can be changed by reprogramming or by the introduction of different software.

Dedicated Link:

An exclusive port dedicated for a dial-up IP account.

Dedicated System:

Describes the permanent assignment of an entire electronic system to one task.

Default:

Software setting that returns specifications to a relative "home-base" in the absence of other instruction from the operator. Depending on the software, new default settings can be made for one or more functions.

Desktop Publishing:

Sometimes abbreviated DTP. The process of mixing type and graphics via a microcomputer to create and control page layouts and save them in a form that is portable to various types of printing equipment.

Device Driver:

A miniature program that acts like a translator, converting the output from one device into data that another device can understand.

Device Independent:

A program or file format that can be used with two or more different computing devices and produce identical results. For example, a page saved in PostScript format should be printable on a LaserWriter or on a Linotronic output device. Device independent color refers to the ability to have color images appear the same on different output devices, including monitors and printers.

Dial-up link:

Also called a switched line, a dial-up link is a low-cost connection to the Internet through a non-dedicated communications line.

Digital:

Information that relies solely on Arabic numerals for expression. In computers, all information is processed in binary numerics (0 and 1) through on/off electrical impulses. Computer programs are written in alpha-numeric code (all keys on a keyboard) and are translated by programs or devices into binary code that can be read by the computer's CPU.

Disk Drive:

An electronic device that through a read-write head, can store information on, or read from, a magnetic disk.

Disk Operating System:

Often abbreviated "DOS," a kind of low-level program which must be present in the computer's memory at all times while the computer is running, in addition to any other programs that are being used. The system (known as DOS in PC-compatibles or The Finder on a Macintosh) manages all disk operations.

DNS:

Acronym for Domain Name System. The distributed. naming service used on the Internet.

DNS Server:

A server that contains IP addressing information.

Domain:

The highest subdivision of the Internet, which are usually by country or type of entity (for example, government or commercial). DNS organizes groups of computers on the Internet through a hierarchy of domains.

Domain Name:

The unique name that identifies an Internet site. Domain names always have two or more parts, separated by dots. The part on the left is the most specific; the part on the right the most general. middle sections of the name fall, appropriately, somewhere between the two extremes of specificity (e.g. cpec.ca.gov)

Download:

The transfer of data from a computer or telecommunications network to another electronic device or storage medium.

DPI:

Dots Per Inch. The measure of resolution in a halftone or printed image. It is also used to describe pixels per inch in a bitmapped image.

DSU:

Acronym for Data Service Unit. The side of the communications channel equipment connected to the bridge or router. It converts all incoming data into the proper format for transmission over the T1 or fractional T1 circuit.

E-mail:

Electronic mail, as distinct from paper mail (which is known in Net parlance as snail mail). A network service that enables users to send and receive messages.

Electronic Publishing:

A technology through which information (text and images) that has been converted to digitized form can be processed in an interactive electronic environment.

EPS:

Encapsulated PostScript. A way of storing visual data so that it can be exchanged between programs or different computer systems. When you save in EPS format, you save a description of your art or page layout in the PostScript language together with some minimal instructions enabling the graphics to be displayed on a non-PostScript video device.

Encode:

The term used to describe the translation of information, such as text or photographs, into binary code.

Encryption:

A method of securing privacy on networks through the use of complex algorithmic codes.

Ethernet:

A local area network (LAN) hardware standard capable of linking up to 1,024 nodes.

Exabyte:

An eight-millimeter, two-gigabyte tape drive providing substantial data storage and archiving on a small cartridge. It is more cost effective than standard magnetic tapes as fewer Exabyte tapes are required to store information.

Expansion Bus:

The main "data pathway" inside a computer, usually fitted with slots which will accept circuit cards to expand and enhance the capabilities of the computer.

Expansion Slot:

A long, thin socket mounted in an expansion bus which accepts an expansion card.

Export:

To move data in a form that another program can read.

FAQ:

Frequently asked questions, a list of questions and answers that is the most common means of reducing the number of newbie requests in online discussions.

File Fragmentation:

The condition in which, as a consequence of enlarging files and saving them on a crowded disk that no longer contains contiguous blocks of free space to hold them, saves them as fragmented parts in separate areas of the disk and ultimately slows down read-write access time.

File Server:

A powerful microcomputer containing programs and data which may be accessed by other microcomputers that are linked with it via a network.

Firewall:

A feature that protects a network connected to the Internet from being accessed by unauthorized users.

Flame:

A violent and usually personal attack against another person in a news group or other area for public messages.

Floppy Disk:

A thin, flexible plastic disk which has been coated with iron oxide and is capable of storing computer data as a magnetic -pattern. Floppy disks are a convenient way of saving data or swapping information for use on another computer.

Font Bitmapping:

A bitmapped rendering of a screen font.

Frequency:

The lines per inch (Ipi) in a halftone screen.

Freeware:

Free software, not to be confused with shareware.

Front end:

A program that improves the appeal and ease of use of other programs, normally run locally on a user's computer.

Front-End System:

A workstation or group of workstations that provide one or more operators with the ability to interact with a large scale computer system. For example, a Macintosh computer is a front end for a mainframe.

FTP:

File transfer protocol, a method for accessing file archives and transferring files over the Internet.

Gamut:

The common expression for the entire range of color that can be shown on a computer

display.

Gateway:

A connection in the form of a cable, device or computer between two computers or systems that are similar.

GIF:

Graphics interchange format, a common file format for pictures first popularized by CompuServe (pronounced with a hard "g").

Gigabyte:

Abbreviated as Gb or GB, it equals approximately one billion bytes or a thousand megabytes.

Gopher:

A menu-based protocol that allows clients to access files and directories across the Internet.

GPIB:

General Purpose Interface Bus. An interface bus standard recognized by the Institute of Electrical and Electronics Engineers (IEEE).

Graphic Input Device:

An electronic device that digitizes and converts images into a bitmapped image that a computer can manipulate. A scanner converts two-dimensional images-, a video camera converts three- dimensional images.

Graphic Output Device:

An electronic device that converts a bitmapped image into soft or hard reproductions. A video monitor is a soft output device; image setters are hard output devices.

Graphic Tablet:

An electronic device that converts the instructions of the operator through a mouse or stylus into code that the computer can read as commands for direct interaction with the display monitor. Among the tasks that can be accomplished by moving the mouse or stylus on the tablet are computation and display of coordinates, placement and manipulation of image elements and operation of menu items.

GUI:

Graphical user interface, an interactive screen display that provides icons, windows, and point-and-click capability, as distinct from a command-line interface that requires typed instructions.

Hacker:

A computer enthusiast who explores computer systems and programs to the point of obsession; not to be confused with cracker.

Handshake:

The protocol used by two computer systems to establish communication.

Hard Disk:

A mass storage device for digital data. One or more magnetic platters in a single casing. It can store data more precisely and access it more quickly than other forms of magnetic

Hard Copy:

A printed paper copy of output in readable form. It is also a transparency film or photograph of an image displayed on the monitor.

Host:

Any computer system or device attached to the Internet.

Home Page:

The first page of a Web site.

HTML:

Acronym for Hypertext Markup Language. The scripting language used to create Web documents.

HTTP:

Acronym for Hypertext Transport Protocol. The network protocol used by the World Wide Web.

Hypertext:

A link between one document and other, related documents located elsewhere. By clicking on a word or phrase that has been highlighted, a user can skip directly to files related to that subject.

Icon:

A thumbnail-sized picture representing an application, file or document.

I/O Input/Output Image:

The digitized representation of a graphic element (photograph, painting, film) bitmapped in computer memory for display on a video monitor for output in paper or film form.

Image Enhancements:

Electronic functions such as shading, coloring and highlighting that accent an image or a portion of an image.

Image Processing:

The manipulation of an original image from digitization through manipulation to output on a plotter, printer, image setter or plate setter.

Import:

To merge text or graphics into a document that is being created or edited with the aid of a computer program. Usually, the imported file is generated with a different program.

Inkjet Printer:

An electronic output/proofing device that prints by spraying streams of ink onto the paper.

Installation:

The process of delivering, setting up and testing a complete or partial electronic system at a site specified by the purchaser.

Interface:

The hardware and software that enable electronic devices to share information.

Internet:

The world's largest collection of networks with an estimated 30 million users reaching universities, government research labs, military installations and business organizations in many countries.

Internet Service Provider:

A company or other organization that offers connections to the Internet through its own computers, which are part of the Internet.

Intranet:

An internal corporate Web site. Intranets are either not connected to the Internet or are shielded from external Internet users by a firewall.

IP Number:

Sometimes called a "dotted quad." A unique number consisting of four parts separated by dots (e.g. 165.113.245.2). Every machine that is on the Internet has a unique IP number -- if a machine does not have an IP number, it is not really on the Internet. Most machines also have one or more Domain Names that are easier for people to remember.

1 PX:

Acronym for Internetwork Packet Exchange. Default protocol used by NetWare systems to route information packets over a local or wide area network. IPX has the same functions as TCP/IP.

IRC:

Internet relay chat, real-time conversations among multiple users on hundreds of subject-oriented channels ranging from #nfl to #I 2 step to #wetfun (popular chat channels).

ISDN:

Acronym for Integrated Services Digital

Network.

A new telecommunications standard being introduced by telephone companies. It enables the transmission of voice, data, and certain images over telephone lines through end-to-end digital circuits.

ISO:

International Standards Organization.

Kilobyte:

K, Kb or KB. A unit of measuring digital information which equals 1,024 bytes.

LAN:

Local Area Network. A pathway that links workstations, printout devices and storage units through broadband cable and provides high-speed simultaneous communication in a relatively small area.

LaserPrep:

A set of commands that translates most Macintosh text and graphics files into PostScript files.

LPI:

Lines per inch.

Luminosity:

Value corresponding to the brightness of color.

Lurker:

A regular reader of online messages who never sends a post.

Low Res:

Abbreviation for low resolution.

Lynx:

A popular text-based Web browser.

Macro:

A series of keystrokes that can be called up by pressing one special key combination. Many word processing programs allow the user to create macros to speed up complex operations that are frequently used.

Megabyte:

Mb or MB. A unit of measure for digital data which is 1,024 kilobytes or 1,048,576 bytes.

Microprocessor:

The silicon chip with thousands of electronic components that serves as the central processing unit (CPU) in microcomputers.

MIPS:

Millions of Instructions Per Second

Modem:

An abbreviation for modular/demodulator, a device that translates digital signals into sound frequencies and back again for telephone transmission.

Motherboard:

The assembly in a computer into which printed circuit cards, modules or boards are connected. In a microcomputer, this is the main circuit board.

MPEG:

Moving pictures expert group, an international standard for video compression and desktop movie presentation, required to view movies on a computer.

Multitasking:

Running two or more computer programs simultaneously.

MUD:

Multi-user dimension or multi-user dungeon, a virtual world created solely from text descriptions by many users, with applications ranging from role-playing games to academic conferences.

Net:

A colloquial term used to refer to the entirety of cyberspace including, for example, the Internet, commercial services, and BBS's.

Netiquette:

The rules of cyberspace civility, enforced exclusively by fellow users.

Newbie:

A newcomer to the Internet.

News Group:

A public bulletin board on the Internet; collectively, the more than 12,000 news groups, organized by subject, are known as Usenet.

Networking:

The process of accessing and manipulating files through communication pathways between workstations, printout devices, such as print servers and storage units, such as file servers.

NSFNET:

A network that serves as part of the current Internet backbone funded by the National Science Foundation.

Noise:

Unwanted electronic or optical signals that cause interference in the reproduction of data or images.

Object-Oriented:

A type of drawing that defines an image mathematically rather than as pixels in a bitmap.

OCR:

Optical Character Recognition. A function of specialized software capable of interpreting a scanned image of text into machine code for later manipulation of text.

Off-Loading:

Relieving the intensive amount of data processing associated with a specific application from the CPU by performing those calculations in a dedicated or specialized processor.

Off-line Storage:

Storage of digital data on devices separate from the main system.

One-Bit Image:

An image with only black and white pixels.

Operating System:

The essential software that directs the flow of information to and from the different components of a computer system.

Optical Disk:

A type of high-capacity computer storage disk which stores information in a mode similar to CD-ROM but is erasable and reusable.

Output:

Information that has been manipulated by the CPU of the computer and displayed either on the video monitor or rendered as usable information by another device.

Output Resolution:

Stated in lines per inch or lines per millimeter, output resolution reflects the number of pixels per unit size that can be output.

Parallel Transmission:

Sending data from a computer down several wires simultaneously, the pulses in one wire being precisely synchronized with the pulses in the other wires.

PDL:

Page Description Language.

Peripherals:

A connectable device that has an auxiliary function outside of the permanent system configuration.

PICT/PICT-2:

A picture file format developed by Apple for use on the Macintosh. The format

defines bitmapped or object-oriented images on the screen. PICT-2, a more recent version, supports 24-bit color.

Pixel:

The abbreviation for picture element. The separate elements of a bitmapped image on a video monitor.

Pixelate:

The electronic function by which pixel size can be increased to enable easy manipulation in creating special effects.

Point of Presence:

A POP is the regional hub by an Internet Service Provider to connect networks.

PPI:

Pixels per inch.

Port:

A socket, usually at the back of a computer, that allows the computer to be connected to other devices.

PostScript:

A page-description language (PDL) developed by Adobe Systems. When a page is stored as a set of instructions specifying the measurements, typefaces and graphic shapes that make up a page.

PPP:

Point-to-Point Protocol connection between a computer and the Internet, offering advantages over dial-up access such as support for a graphical Web browser (for example, Netscape) and simultaneous multiple

connections; requires special software and a PPP service provider.

PPD File:

PostScript Printer Description File. A file that contains information on screen angle, resolution, page size and device-specific information for a file to be printed on a PostScript device.

Print Engine:

A mechanism that uses a laser to create an electrostatic image of a page and transfers it to a sheet or roll of paper.

Queue:

A multi-element data structure from which elements can be removed only in the same order in which they were inserted; in a priority queue, removal is based on factors other than order of insertion and removed according to some priority value assigned to each.

RAM:

Random Access Memory. The memory a computer needs to store the information it is processing at any given moment. This is short-term memory and is lost when the power is shut off.

Rasterization:

The process of converting mathematical and digital information into a series of dots by an imagesetter or recorder as digital data that will be used for output.

Read:

The process by which the CPU is instructed to find specified digital data for display or output.

Real-time:

The Net term for live as in "live broadcast;" real-time connections include IRC and M1JDs.

Refresh:

The process by which more information is brought to the video display after an alteration or other action.

Repagination:

The process used to change page numbers in multi-page documents while retaining a uniform format and proper numerical sequence.

The **Repeatability:**

The precision with which a device can position an image, usually measured in microns. For example, a capstan imagesetter has low repeatability compared with a drum imagesetter which is more accurate in its operation.

Resolution:

The number of pixels per unit of linear measurement on a video display or the number of dots per inch in printed form.

RGB:

Red, Green and Blue. The additive primaries which are used in video monitors.

RIP:

Raster Image Processor. The hardware/ software which converts data stored in a computer into a series of lines of tiny dots which are output to film, proof, plate or printer. In line work, the dots can be grouped to create solid areas. RIPing is most commonly associated with the conversion of a PostScript File to a "raster" that can then be imaged by the image setter.

ROM:

Read Only Memory. The computer memory that can be read by the CPU of the computer but cannot be altered.

Router:

A special-purpose computer (or software package) that handles the connection between two or more networks. Routers connect local area networks to wide area networks, creating an internet (small i, simply a combination of any two other networks). Routers are used extensively on the Internet (capital I, the global network successor to the ARPANet).

Scanner:

An input device that digitizes and converts two-dimensional information, such as photographic prints, transparencies and paper images into bit-mapped images that can be manipulated electronically.

Screen Angle:

Angles used to offset the different patterns for overprinting each other in process color printing. Proper angles are critical to the prevention of more patterns.

Screen Ruling:

Sometimes confused with resolution, screen ruling is the number of printing dots per millimeter or per inch on the exposed film. The screen ruling is a critical factor in determining the resolution need. The finer the screen ruling, the higher the resolution needs to be, due to the amount of information required to generate the printing dots.

SCSI:

Small Computer Standard Interface. An industry standard enabling external devices, such as a disk drive, to be plugged into a computer made by any manufacturer whose product conforms to the SCSI specification.

Sectors:

Divisions on magnetic media used for storing digital information. A single sector is the smallest contiguous unit of information; multiple sectors make up a track.

Sequential Storage:

Recording data in a linear mode, stringing codes sequentially on a magnetic tape. Although it is a less expensive storage form, it is a more time- consuming method of retrieval.

Serial Communication:

See asynchronous communication.

Server:

A computer connected to a network that offers various services, such as document viewing or file transfers, to other computers called clients.

Service Bureau:

A company that provides the various services required to transform the elements used to produce a page or publication into the correct digital format required to output it to a particular chosen media. These include conventional print, various forms of direct digital printing, disk-based and other forms of alternative media.

Shareware:

Freely distributed software, often available from vast FTP archives on the Net that includes a request from the programmer for voluntary payment.

Sharpen:

The electronic manipulation of an image to alter the edge contrast of its elements.

SLIP:

Serial Line Internet Protocol connection between a computer and the Internet, offering advantages over dial-up access such as support for a graphical Web browser (for example, Netscape) and simultaneous multiple connections; requires special software and a SLIP service provider.

SMTP:

Simple mail transfer protocol, an e-mail protocol used to transfer e-mail from one server to another

for distribution to the appropriate client.

Soft Proof:

A proof that is viewed on a color-calibrated video monitor as opposed to a hard proof on paper.

Spam:

The posting of an article to many newsgroups, regardless of the appropriateness of the topic; for example, "You can grow rich overnight."

Spectrum:

The bands of color formed when white light is dispersed. Each color has a specific wavelength from the shortest -- violet, to the longest -- red.

Spooler:

A method by which a computer can store data and feed it gradually to an external device, such as a printer which is operating more slowly than the computer.

Stripping:

The process of manually creating composite films and fully imposed flats for plate-making. Most of this work is being done electronically, bypassing the traditional craftsman.

Style sheet:

A list of page format specifications including typographic and layout specs. In desktop publishing, a style sheet can be stored, retrieved and applied to individual elements of the page displayed on the screen.

System:

An integrated assembly of electronic hardware and software designed to implement a given application or set of applications.

T-1:

A leased-line connection capable of carrying data at 1,544,000 bps. At maximum theoretical capacity, a T-1 line could move a megabyte in less than 10 seconds. That is still not fast enough for full-screen, full-motion video, for which you need at least 10,000,000 bps. T-1 is the fastest speed commonly used to connect networks to the Internet.

T-3:

A leased-line connection capable of carrying data at 45,000,000 bps, more than enough for full-screen, full-motion video.

TIFF:

Tagged Image File Format. A graphics and page layout file format for desktop computers. Used as an intermediary file format for both color and black and white images, TIFF is used to transfer documents between different applications and computer platforms.

Tape Drive:

An electronic device that can read or write information on a formatted magnetic tape.

Task Switching:

A feature offered by some disk operating systems allowing the user to copy two or more programs into computer memory at the same time so that the user can switch quickly from one program to the other. This is different than multitasking in which programs not only reside in memory simultaneously, but may be used simultaneously.

TCP/IP:

Acronym for Transmission Control

Protocol/Internet Protocol. Default protocol used by UNIX systems to route information packets over a local or wide area network. The standard protocol upon which the Internet is based.

Telnet:

An Internet program that allows a user to log on to other Internet-connected computers.

Terabyte:

Tb or TB. Equal to approximately one billion kilobytes and often used to measure optical disk storage capacity.

Tiling:

An electronic function for use with documents that are larger than the specified paper size. The document can be broken into sections the size of the paper and then assembled.

Tracking:

Small, uniform adjustment to the amount of space separating adjacent typeset letters.

Trade Shop:

A company that serves the printing "trade." Often referred to as "color separators," many trade shops have expanded services and markets and are appropriately designated as prepress trade shops or service bureaus.

TCP/IP:

Transmission Control Protocol and Internet Protocol that forms the basis of a full fledged Internet connection.

Trap:

An overlap or underlap between colors that butt against each other to hide misregistration during printing. Types of traps include shrinks (chokes) and spreads.

Turnkey System:

A completely integrated computer system that includes all the hardware and software necessary to perform specific tasks.

UNIX:

An operating system often implemented on high-powered workstations. It has advantages in situations where one computer serves many users or where two or more tasks must be executed simultaneously on one computer.

URL:

Uniform Resource Locator, the World Wide Web address of an Internet resource, for example, GE's URL is http:/ /www.ge.com.

User Interface:

The method by which a user gives instructions to a computer and receives a response.

USENET:

A distributed, Internet-wide bulletin board system that is the basis of network news.

Vector Graphics:

Object-oriented graphics in which an image is stored as a series of numbers defining size, position and shape. Such objects must be "rasterized" prior to processing for output.

Veronica:

Very Easy Rodent Oriented Net-wide Index to Computerized Archives. Developed at the University of Nevada, Veronica is a constantly updated database of the names of almost every menu item on thousands of Gopher servers. The Veronica database can be searched from most major gopher menus.

Virtual Memory:

The use of a portion of the hard disk to swap-out data when insufficient RAM exists to hold all such data.

Virus:

A small program commonly embedded in another program, that infects programs and causes them to malfunction. It is often designed to destroy data and infect other programs, drives and disks.

WAIS:

Wide Area Information Servers. A commercial software package that can index huge quantities of information, and then make those indices searchable across networks such as the Internet. A prominent feature of WAIS is that the search results are ranked ("scored") according to how relevant the "hits" are, and that subsequent searches can find "more like this" and thus refine the search process. WAIS is a prominent feature in such search engines as Excite and Yahoo.

WAN:

Acronym for Wide Area Network. A physical communications network that operates across large geographical distances.

Web Browser:

A client program that enables the viewing of Web pages, the most popular Web browsers are Netscape Navigator and Microsoft Internet Explorer.

Web Page:

A hypertext document available on the World Wide Web that can incorporate graphics, sounds and links to other Web pages, FTP sites, gophers, and other Internet resources.

Windows:

Transparent areas that show space allocated for an image on a video display of a page layout. Also, an operating system marketed by Microsoft Corp. for use on PC-compatibles to offer a graphical user interface similar to that of Macintosh.

Workstation:

A configuration of computer equipment designed to be used by one person at a time. A workstation may have a terminal connected to a larger computer or may be independent with local processing capability. In four-color process printing, it usually consists of an input device such as a keyboard, digitizer or scanner, a video display device, a memory and an output device such as a printer or plotter.

World Wide Web:

A hypermedia-based system on the Internet that is navigated by selecting hypertext links between text or graphics and other Web pages or Internet resources, also called Web or WWW.

WORM:

Write Once/Read Many. It refers to the permanent, unalterable nature of data in certain kinds of storage media.

Zoom:

An electronic function that increases or reduces the magnification of the image displayed on the video screen.

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APPENDIX T

Memo of Understanding

November 21 1997

To: Don Perrin

From David Bell

CC: Jim Buysse, Sandy Foster

Subject Microcomputer Support Responsibilities

I've put pen to paper to clarify and define roles and responsibilities shared between our two entities. These are defined from my point of view so please feel free to add comments and concerns.

I. Primary responsibility of Computing Services is the configuration, purchase, deployment, and maintenance of the administrative computing system and attached peripherals. This includes:

A. All server based systems, software, and all equipment directly attached to the network that serves that system.

B. All local and wide-area networks that connect the buildings and campuses to each other. Does not include instructional labs nor the local area networks within those labs.

C. All the switches, routers, hubs, modems, and cabling (copper and fiber) over which the backbone flows.

D. Responsibility will extend from the backbone to a demarcation point inside an instructional lab's main distribution facility.

E. Responsibility will include software maintenance and upgrades on all backbone attached equipment.

F. Includes the assignment of IP addresses to all nodes attached directly to the backbone but will not include equipment/nodes directly attached to an instructional lab's local area network.

G. Configuration, configuration approval, installation, and support, including hardware maintenance, of all equipment attached to the administrative network. This includes PC's assigned to classified, certificated, and management staff.

H. Maintenance of the District's DNS equipment (rccd.cc.ca.us).

I. Telephone systems and equipment. Hardware and software configuration, maintenance, and support.

J. Library system support. This includes both hardware and software.

II Instructional Support Services - Learning Technologies (Academic Computing)

is responsible for the following:

A. Configuration, configuration approval, installation, and support, including hardware maintenance, of all equipment attached to an instructional, local area network.

B. Configuration, configuration approval, installation, and support of all software, operating system and application, to be used in any instructional lab.

C. Scope of responsibility will extend from the desktop PC, the file server, and network attached printers, through any hub, switch, or router that serves an instructional lab. Academic Computing will be responsible for all software and hardware issues from the desktop to the file server, inclusive.

D. Maintenance of Academic Computing's DNS equipment (acad.rccd.cc.ca.us). This includes software upgrades, home page development, e-mail address assignments, and all hardware related issues. If Academic Computing replaces the DNS equipment, the current equipment will be returned to Computing Services.

E. Issuance and control of IP addresses assigned to the academic computing network.

F. Configuration, installation, and maintenance of instructional file servers, both hardware and software.

III. To affect an orderly transition, I am recommending that the following schedule be implemented:

A. Support services will continue, as usual, until January 19, 1998.

B. Starting January 20, 1998 (start of Spring semester), in addition to the above listed responsibilities, Academic Computing will assume responsibility for instructional lab software, installation and support.

C. Starting July 1, 1998, in addition to the above listed responsibilities, Academic Computing will assume responsibility for instructional lab hardware maintenance.

D. For budget purposes, the following amounts can be transferred to Academic Computing for maintenance support in the 1998-99 fiscal year (1997-98 budget dollars):

1.	From 100 DMC 6780000000	5643	$40,000
2.	From 100 EMC 6780000000	5643	$10.000
3.	From 100 FMC 6780000000	5643	$10,000

RCCD Memorandum

March 16, 1998

To: Dr. William Andrews, Academic Vice President

From: Don Perrin, Dean, Learning Technologies

Subject: **Need to Expedite New Technical Positions**

This item was tabled at the Budget Bunch meeting in February so you could be involved in the decision. The positions were originally set up for range 22 on the classified salary schedule. Subsequently, Brenda Davis, Richard Tworek, Della Condon and myself reviewed the qualifications required and recent hiring on other campuses and rewrote the request as range 27. I volunteered funds transferred from the Computing Center to Academic Computing to make up the difference in cost. The Director of Computing services objected to range 27 positions because, in his opinion, technicians at this level were not needed. Below is my position on this issue:

1. The explosive growth of academic computing within the college gives a current total of 740 networked computers in student labs, libraries and work places on three campuses. This will exceed 1,100 by January 1, 1999. Pending issues that require technicians at this level are:

- The complexity of programming and troubleshooting new hardware, software, network and Internet systems, especially network routers, hubs and servers.
- The need for logon and management systems to ensure security and cost recovery.
- The need for a web server for academic programs and courses.
- The need to interface new and old equipment and software.
- The high market price for technicians with the required competencies.

2. RCCD is facing new requirements in the next year that demand technicians at this level:

- Plans for teaching Microsoft and Novell Certified Courses.
- These courses will provide interns to expand the cadre of technicians supporting labs and classrooms.
- Plans to develop online courses. These will require webmaster and server management skills with added technical and programming support.
- Raising the educational requirement to a Bachelor level position in Computer Science filters out less able applicants and ensures minimum skill level with current hardware, software, network, programming and training. The alternative is to hire technicians who are specialists in a single area — an even more expensive option.
- The College of the Desert, Cerritos College, and UCR recruited recently at the proposed level or above for less skilled positions.
- The choice of level 27 positions is intended to provide quality support to academic users and new Certification programs.
- A third position at this level is needed for the City campus, which is larger than Norco, and Moreno Valley combined.

I disagree with David Bell's statement before the ***budget bunch*** that the principal task of these positions is to load applications on computers — that will be done by trained classified hourly personnel under supervision. The proposed new positions should be judged based on the academic needs. I am concerned that this difference in opinion was interpreted by the meeting as a lack of cooperation between David Bell and myself. We are collaborating closely on design and installation of ATM networks on the three campuses and in providing quality support to faculty and students.

cc: David Bell, Jim Buysse, Della Condon, Brenda Davis, Rich Ramirez, Stephan Robinson, Richard Tworek

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