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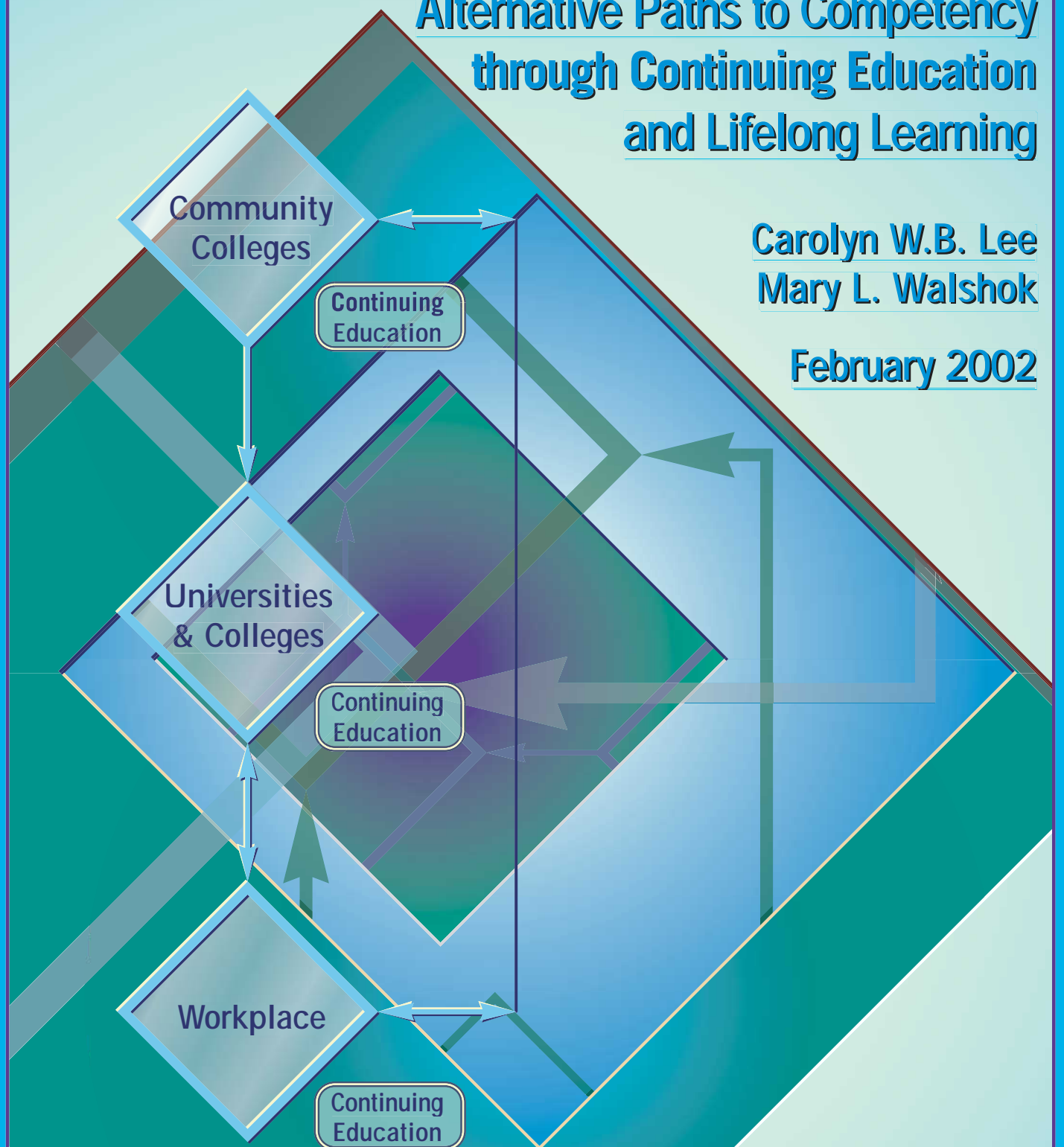
Alternative Paths to Competency through Continuing Education and Lifelong Learning

Community
Colleges

Continuing
Education

Universities
& Colleges

Continuing
Education

Workplace

Continuing
Education

Carolyn W.B. Lee
Mary L. Walshok

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CALIFORNIA COUNCIL ON SCIENCE AND TECHNOLOGY

ALTERNATIVE PATHS TO COMPETENCY THROUGH CONTINUING EDUCATION AND LIFELONG LEARNING

A REPORT PREPARED FOR

THE CALIFORNIA COUNCIL ON SCIENCE AND TECHNOLOGY

CAROLYN W.B. LEE

COORDINATOR OF PUBLIC PROGRAMS

EXTENDED STUDIES AND PUBLIC PROGRAMS

UNIVERSITY OF CALIFORNIA, SAN DIEGO

MARY L. WALSHOK

ASSOCIATE VICE CHANCELLOR FOR PUBLIC PROGRAMS AND

DEAN OF EXTENSION

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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1. EXECUTIVE SUMMARY

In today's fast moving economy, job knowledge and skill requirements are changing so rapidly that workers at all levels require continuous re-education and training. The rise and fall of specific industries typically translate into an under-supply of highly skilled workers with specialized knowledge bases. Instead of viewing workforce training and investment as providing training for special workers in specific industries, we must change our thinking to account for "move up" strategies.

These "move up" strategies view workforce training as providing continuous skills improvement for a wide spectrum of workers so that all workers progress steadily up the ladder to fill jobs requiring higher skill sets than they presently possess. If the high-demand, high-skill jobs could be filled with strategic education and training programs aimed at general baccalaureate level workers, then more middle level positions (i.e. "less highly skilled, less in demand" positions) could open up for high school and community college graduates with appropriate education and training. In turn, those semi-skilled jobs currently held by high school and community college graduates could then be open to currently unemployed or under-employed citizens, with proper training. In order to account for the interdependencies between the myriad systems of education and training across a diverse range of industries and skills, policymakers must pursue monitoring, planning and funding for a wide continuum of workforce education and training programs.[1]

Paradoxically, the data we tend to gather, and thus the way we plan, relies almost exclusively on data from currently publicly funded programs only, namely:

1. Enrollment and graduation statistics on regular full-time and part-time high school, community college, California State University (CSU) and University of California (UC) students.

2. Statistics on state-funded training programs through California's Employment and Development Department (EDD) targeted towards low-skilled workers or those California residents transitioning from welfare to work.

Unfortunately, these statistics paint an incomplete picture of workforce training because they do not include self-supported educational programs that span the entire continuum of workforce training, and yet, do not receive state funding.

There is little to no systematic data collected on:

- workplace training by corporate education centers;

- fee-based, practice-oriented courses offered by professional societies;

- continuing education in law and medicine offered by the appropriate professional schools; and

- continuing education certificates and other credential granting programs offered by every community college and publicly funded university in the state.

Without these data, our picture of the State's education and training capacity is basically flawed.

This study is a very preliminary and partial look at some of these self-funded sources of education and training for workers in California's extraordinarily diverse economy. We focus on the contribution of these self-funded community college, CSU and UC training and certificate programs to high-tech

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1 Steve Levy, *Shared Prosperity & the California Economy: Implications for California's Workforce Investment Strategy*, Center for the Continuing Study of California's Economy, forthcoming, May, 2001.

workforce development. These programs are important to understand because:

1. They play a vital role in qualifying generally educated students with industry specific skills and competencies (e.g. a biology graduate with skills in clinical trials management; or a literature graduate with technical writing skill or a sociology graduate with project management skills).

2. These programs reflect industry trends and priorities at the regional level because they evolve out of regional needs for competencies.

3. They relate to immediate employment opportunities and are often subsidized or reimbursed by employers.

4. These programs provide a fuller, more inclusive and more accurate picture of the diverse sources of funding (private exceeds public by many times) for workforce education and funding.

1.1 WHAT THIS RESEARCH IS TELLING US

The research reported in this study is a very preliminary analysis of data which heretofore has not been reported in any comprehensive or systematic way. The fact is that hundreds of thousands of California's citizens participate in non-state-funded science and technology education and training programs. Results indicate that there is a significant under-reporting by traditional agencies of the amount of education and training that is taking place in the State.

We find that there are no comprehensive studies of the self-funded education and training programs within the University of California (UC) system, California State University (CSU) system, and California Community College (CCC) System, let alone studies of privately funded corporate universities or other proprietary continuing education and training programs.

We have been able to pull data together on continuing education programs at UC, CSU and the Community Colleges by making personal phone calls and requests to individual campuses as well as to the system-wide offices. We received superb cooperation but repeatedly heard from system-wide and campus based offices such comments as:

— "we don't collect that kind of data"
— "no one has ever asked us for this kind of data before"
— "our university or the state do not require us to report this kind of data"

Nonetheless, we persisted, in part because of the compelling finding from the U.S. Department of Commerce, that fully 25% of the science and technology workforce in the United States comes out of non-technical fields.[2] To us, this meant that someone, somewhere was providing specific education and/or training to generalists. We also know from macro studies that *all* jobs are being affected by changes in science and technology – the clothing industry, agriculture, healthcare.[3] We therefore feel it is very important to also understand the ways in which traditional fields are re-skilling and upgrading the skills of workers in science and technology related competencies.

This report contains many tables and many comparisons between systems and regions. Nonetheless, the findings can be summarized in terms of four main issues.

1. Non-credit, post-secondary education and especially non-credit post baccalaureate education represents a critical and underreported element of California's science and technology workforce development capabilities.

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2 U.S. Department of Commerce, Office of Technology Policy, *The Digital Workforce: Building Infotech Skills at the Speed of Innovation*, June 1999.

3 Doug Henton and Kim Walesh, *Linking the New Economy to the Livable Community*, Collaborative Economics, April, 1998.

Our data reveals large, annual enrollments in UC Extension, and CSU Extended Studies courses. A significant fraction of these students are taking courses or completing certificate programs that are directly relevant to science and technology fields and competencies. Tables 1.1 and 1.2 present comparative data on enrollments in these systems which points out the extent to which non-degree oriented but highly demanding and content rich education through continuing education and community service programs is taking place.

Community colleges also contribute significantly to California's post-secondary enrollments. The total number of full-time/part-time students enrolled at California's community colleges are listed in Table 1.3. However, it is not possible to break out "continuing education" students from the regular student body with existing data.[4]

Furthermore, while our results indicate that a substantial fraction of UC and CSU Extension students pursue professional development courses that are directly applicable to high-tech industries, it is unclear what fraction of community college students are pursuing workforce training in preparation for high-tech careers. Data on community college associate degree and certificate holders, broken down by subject areas, indicate that the numbers trained for science and technology careers are not high. See Table 1.4.

2. Enrollments in non-degree oriented, post-secondary and post-baccalaureate education and training appear to reflect the regional character of industrial clusters, in particular science and technology clusters.

This was discerned by doing a detailed comparison of enrollment data for the UC, CSU and community college systems in the Riverside-San Bernardino ("Inland Empire") and San Diego areas. When comparing professional continuing education enrollments at the University of California, Riverside (UCR) and the University of California, San Diego (UCSD) in Information Technology, the differences are dramatic even though both campuses have large Extension programs. These differences appear to reflect the demand for education in the two regions. In San Diego county, the largest number of Extension and Continuing Education enrollments are in Information Technology (UCSD) and Business and Management (San Diego State University - SDSU). Science and Engineering enrollments are growing significantly and represent primarily enrollments in biotech and telecommunications related courses. By contrast, the largest number of enrollments in the Inland Empire are in Education. Business and Management and Information Technology enrollments rank very low compared to other categories such as General Interest and Liberal Arts. There are few Science and Engineering courses offered at UCR Extension and even fewer at CSU San Bernardino's College of Extended Studies. The few Science courses offered at both campuses are general interest courses such as astronomy, bird identification or desert flora and fauna. There are no biotech specific courses similar to those offered at UCSD and SDSU. UCR is seeing significant enrollment growth in Geographic Information Systems, and this may be a bellwether of high-tech development in the region. (See Table 1.4 for details.)

3. The motivation to pursue non-degree oriented and non-credit professional and vocational education seems to be very much tied to career development and job opportunities at the regional level.

Our preliminary data suggests very high levels of employer reimbursement for tuition in these programs. Survey results from 1,916 UCSD Extension students (of >6,000 surveyed) and 355 UCR Extension students (of >1,000 surveyed) indicate that students are in courses

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4   Continuing education can be clearly defined for UC and CSU as those students who are not enrolled as full-time or part-time degree students. However, given the continuum of training received at the community college level, it would be much more difficult to define a "continuing education" from a full-time/part-time degree student.

because they see them as career relevant and/or expect employer reimbursement.

Over 90% of survey respondents indicate that course taking activities are career-related. Less than 5% report taking course(s) for personal interest. Career maintenance/skills upgrading and career advancement are the main motivations behind course taking activities. A small minority indicate career change as a factor.

4. It is also our impression that the significance of these non-degree oriented post-secondary and post-baccalaureate continuing and professional education programs increases as the rate of technological change increases.

The rise and fall of particular skill sets within particular industrial clusters requires access to timely education and training which is not typically available through college degree programs. Degree programs may be too inflexible in format or have too many course requirements to meet the workforce training needs of regional industry. Campuses also impose lengthy review processes prior to approving new degree programs and this also may not serve industry training needs.

Were we to have had more time and resources, a much more complete analysis of Extension fields of study as well as certificate graduates could have been reported. Nonetheless, this preliminary data suggests that something very important is happening in the area of non-degree related, in particular post-baccalaureate, education and that it merits better documentation and fuller analysis.

1.2 RESEARCH IMPLICATIONS AND POLICY RECOMMENDATIONS

Clearly, our research suggests the need for some entity within the State of California, to do a much better job of gathering data on the varieties of institutions and programs addressing the science and technology education and training needs of the State. Our very preliminary data suggests that non-state funded programs represent a significant

contribution to the manpower development activities of the state. Reports by organizations such as the American Society of Training and Development have indicated that corporate universities and corporate education has begun to overshadow all the publicly funded efforts of our colleges and universities across the United States. However, these publicly funded institutions, as our data reveals, also operate important self-funded education and training programs which amplify their role in their region many times more than their traditional degree program enrollments would suggest.

Based on our findings, we are making the following policy recommendations:

1. We would recommend annual reports that document and analyze the following kinds of questions:

a) What are the actual enrollments of campus-by-campus and statewide post-secondary and post-baccalaureate continuing education and certificate programs in science and technology disciplines, in the UC, CSU and community college systems?

b) What are the enrollments in independent and proprietary institutions?

c) What is the extent of corporate university/corporate education activity in science and technology related fields?

2. There needs to be some state investment in broad dissemination of periodic reports on these types of education and training programs. This can be accomplished through consolidating the types of information from the surveys and enrollment data provided in this report.

3. Regional science and technology related continuing education enrollments should be analyzed in terms of how they track not only skill development in new and emerging fields of science and technology but, in terms of how they have been designed to help upgrade skills of citizens working in traditional industries (e.g. the incorporation of information technologies into the apparel industry).

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4. Finally, it is important to evaluate the perceived value and impact of these programs. This means surveying Extension students and corporations directly about their evaluations of the quality of these continuing education programs and the relevance of these programs to workforce training needs.

In conclusion, it is clear we need to do a better job of developing data on California's valuable workforce and it's education and training resources. Important resources are available through a variety of private/public partnerships, quasi privatized and fully privatized providers of workforce education and training as well as the public sector.

Table 1.1
UC Regular Full Time Enrollment Compared to UC Extension Program Enrollments
(FY 1995-1996 through FY 1999-2000)

Fiscal Year	UC Regular Full-Time Enrollment [5]			UC Continuing Education [6]		
	Under-Graduate	*Post-bacc./ Graduate*	*Total FT Enrollment*	*Extension Enrollees[7]*	*Concurrent Enrollment*	*Total Enrollment*
1995-96	**120,198**	**26,328**	*146,526*	**431,231**	**12,145**	*443,376*
1996-97	**122,453**	**26,267**	*148,720*	**441,331**	**11,997**	*453,328*
1997-98	**125,040**	**26,595**	*151,635*	**451,738**	**11,724**	*463,462*
1998-99	**128,883**	**26,607**	*155,490*	**433,301**	**11,191**	*444,492*
1999-00	**132,712**	**27,008**	*159,720*	**409,011**	**10,470**	*442,631*

Table 1.2
CSU Regular Full Time Enrollment Compared to CSU Extension Program Enrollments[8]
(FY 1995-1996 through FY 1999-2000)

Fiscal Year	CSU Regular FT Enrollment [9]			CSU Continuing Education [10]			
	Under-Graduate	*Post-bacc./ Graduate*	*Total FT Enrollment*	*Extension Enrollment*	*Open University*	*Special Session*	*Total Enrollment*
1995-96	**264,968**	**62,747**	*327,715*	**98,074**	**44,272**	**57,478**	*199,824*
1996-97	**272,480**	**65,695**	*338,175*	**124,417**	**43,552**	**61,101**	*229,070*
1997-98	**275,164**	**69,438**	*344,602*	**133,230**	**44,041**	**70,262**	*247,533*
1998-99	**279,656**	**73,219**	*352,875*	**125,155**	**44,021**	**66,670**	*235,846*
1999-00	**286,176**	**76,570**	*362,746*	**143,922**	**48,394**	**70,332**	*262,648*

5 *1995-2000 Annual Statistical Summary of Students and Staff*, UC Office of the President, Budget Office. Post-baccalaureate students are students pursuing education/teaching credentials. These enrollments are typically small, less than 200 students per year per campus.

6 *1999-2000 Annual Statistical and Financial Report on University of California Extension and Statewide Programs.*

7 Enrollee is defined as a student enrolled in a class. A student who is studying two classes during one quarter will be double counted, by this definition. On the other hand, continuing education programs are geared to full-time working adults so there are few students who pursue the equivalent of a full-time load of courses.

8 In order to make Tables 1.1 and 1.2 directly comparable, "Extension enrollees" are defined as those students who are pursuing courses that provide continuing education units (CEUs) or non-credit courses. Open University, Concurrent Enrollment and Special Session Students are not included. We recognize that CSU Extended Studies serves a large population of working adults who are pursuing regular credit courses on a part-time basis. For a full discussion, see Appendix A.

9 *1995-2000 CSU Annual Statistical Reports*, CSU Chancellor's Office, Analytical Statistics Division.

10 Summer Session enrollments excluded.

Table 1.3
Fall Term Enrollments at California Community Colleges (FY 1995-1996 through FY 1999-2000)[11]

Fall Term	Enrollments
1995	1,203,816
1996	1,305,380
1997	1,314,680
1998	1,331,758
1999	1,400,954

Table 1.4
Percentage of California Community College Graduates in Science and Technology, Health Sciences and Business and Management (1989-1990 through 1998-1999)[12]

	S&T	S&T + Health	S&T + Health + Business	TOTAL	%S&T	%S&T + Health	%S&T + Health + Business
1990	6,398	13,321	22,586	52,821	12.10%	25.20%	42.80%
1991	6,602	14,372	23,930	57,263	11.50%	25.10%	41.80%
1992	5,968	12,918	21,334	54,263	11.00%	23.80%	39.30%
1993	6,724	15,010	25,158	68,648	9.80%	21.90%	36.60%
1994	6,795	15,158	24,235	66,763	10.20%	22.70%	36.30%
1995	6,294	15,038	24,528	68,547	9.20%	21.90%	35.80%
1996	6,381	15,489	25,178	73,047	8.70%	21.20%	34.50%
1997	7,261	17,030	27,824	80,975	9.00%	21.00%	34.40%
1998	8,510	19,207	30,045	88,671	9.60%	21.70%	33.90%
1999	8,802	20,022	30,918	93,728	9.40%	21.40%	33.00%

Table 1.5
The Most Popular Subjects Pursued by Extension/Continuing Education Students in San Diego and Riverside-San Bernardino Counties (FY 1999-2000)

Campus	Most Popular Subject	No. of Enrollments	% Enrollment
UCSD	Information Technology	10,236	26%
SDSU	Business & Management	7,132	27%
UCR	Education	9,460	37%
CSUSB	Education	6,681	54%

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11 California Postsecondary Education Commission, *Student Profiles, 2000*.

12 This table includes all associates' degree holders plus 0-2 year certificate holders.

2. ALTERNATIVE PATHS TO COMPETENCY

High technology industries such as telecommunications and biotechnology require a highly trained workforce. While these industries could not be sustained without a large workforce of scientists and engineers, these are not the only workers required by these industries. Research groups and engineering teams require skilled technical and support staff. High-tech companies require trained technical sales representatives and technology savvy senior managers.

While many technical positions in high-tech industries require specialized knowledge that can only be gained through specific study at the baccalaureate or post-baccalaureate level, some positions can be filled by qualified personnel who don't possess technical baccalaureate degrees. Specifically, workers in Information Technology (IT) are frequently not formally trained computer scientists. According to a recent Department of Commerce study, approximately one fourth of IT workers come from a non-IT, non-science or engineering background.[13] These workers were trained in the social sciences, business or other humanities.

- Where do these workers receive training?
- What types of training would one need to have in order to obtain an entry level position in these industries?
- Do workers need to sustain their knowledge base in these industries by continually maintaining and upgrading their job skills?

2.1 CONTINUING EDUCATION PROGRAMS

While it will always be important to track flows of science and engineering graduates at the baccalaureate and post-baccalaureate levels, one should not discount alternative paths to competency, given the high numbers of non-technically trained IT workers who enter the high-tech workforce. First of all, many high demand technical positions do not require four-year college degrees.[14] Secondly, training for many of these positions may require only a modest cost, in terms of time and money—typically less than two years (several months in some cases) at a cost of less than $1,000.[15]

Continuing education programs, at the university or community college level can provide this type of training. By holding classes outside of normal business hours, students can study and hold a full-time job, making this form of training ideally suited for the adult learner or career changer. Within Extension Divisions at various UC campuses, anecdotes abound of turning liberal arts graduates into Java programmers and "dot com" workers via certificate programs. At these campuses, IT courses have exploded in popularity in the past five to ten years. However, this growth has gone largely unnoticed, mainly because Extension programs are self-supported and do not have extensive reporting requirements.

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13 *The Digital Workforce: Building Infotech Skills at the Speed of Innovation*, U.S. Department of Commerce Office of Technology Policy, June 1999.

14 The Compass Group, "Information Technology Career Guide for the San Francisco Bay Area, Ride the Wave," Alameda Private Industry Council and the Center for Business and Education Partnerships, Chabot Las Positas, July 1999.

15 According to The Compass Group report, entry-level PC technicians, network administrators, computer programmers, Web designers and Webmasters in the Bay Area can be trained in less than two years, through associate degrees and other certification. These are high demand occupations with salaries that start well above minimum wage.

This report is therefore an attempt to determine:

- How many students participate in continuing education programs throughout the state?
- What subject areas are these students studying?
- Who pursues continuing education studies?
- Who pays for the cost of the training, the employer or the student?
- How does demand for continuing education programs change regionally?

2.2 COMMUNITY COLLEGES

California's community colleges serve dual roles in providing alternative paths to competency. Not only do they provide short term courses of study leading to certification in technical areas, they also serve as a cost-effective means for students to take college level courses in preparation for transfer to UC and CSU. Transfer students are also more diverse than the first time freshman population entering UC and CSU.[16] Hence, increasing the number transfer students in science and engineering subjects also represent a means by which to increase the diversity of the scientific and technical workforce of the state.

This report provides a preliminary description of:

- How many students transfer into science and engineering fields at UC and CSU
- How many students obtain associate's degrees and vocational training certificates in areas that are directly applicable to high-tech occupations and industries

2.3 MAPPING ALTERNATIVE PATHS TO HIGH-TECH WORKFORCE TRAINING

This study attempts to fill the gaps in our knowledge about the populations trained through these alternative paths (see Figure 2.1). By mapping the size of these student populations, this study attempts to determine the scope and importance of continuing education programs and community colleges for high-tech workforce training and development. If a significant fraction of high-tech workers use these continuing education programs to develop, maintain and upgrade their job skills, then what role should the state play, in providing access to these programs, documenting the results, and ensuring that these programs adequately meet the training needs of the state's high-tech workforce?

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16 UCSD Office of Student Research and Information, "Community College Transfer Students: Demographics and Academic Performance," February, 1999.

Breakout Detail of 4-Year University

Foreigners with
undergraduate NSE
degrees

Foreigners with
graduate NSE
degrees

Graduate
Education in
Science
and
Engineering

Undergraduate
Education

Private
sector research
and development

Private
sector research
and development

University
employment

NSE Degrees

Other Degrees

Post-doc
and other
holding positions

Other Private
Sector Research

Source: Romer 2000

4-Year University

K - 12

Community College

Workforce

Extension/Lifelong Learning

Figure 2.1 -- Alternative Paths to Competency

3. CONTINUING EDUCATION PROGRAMS AT UC AND CSU

Continuing Education or University Extension programs serve a variety of students with varying goals from professional development courses for high-tech executives to personal enrichment for retirees. Programs and courses span a diverse scope of topics from biotech regulatory affairs to Java programming to creative writing courses for budding novelists. While it is true that personal enrichment through lifelong learning is one of the missions for university extension divisions, this is no longer the main focus of courses at many campuses. Workforce development activities, and specifically high-tech workforce development, have overtaken enrichment programs in terms of enrollment growth.

3.1 EXTENSION PROGRAM FUNDING

In the State of California, University Extension (or Continuing Education) programs are largely self-supporting. For example, at the University of California , over 90% of the program funding derives from student fees, with the rest coming from local, state and federal grants (see Figure 3.1). Because these programs do not receive state or federal funding, none of the reporting requirements governing regular enrollments apply. Therefore, the role of these programs in workforce training has been largely overlooked by policy makers. There is very little known about student demographics, educational motivation and most importantly, who pays for the training. This study is therefore a first attempt to map out the size, scope and impact of Extension programs on training workers for high-tech industries.

3.2 A COMPARISON OF UC AND CSU SYSTEMWIDE EXTENSION ENROLLMENTS

Enrollments in UC and CSU continuing education programs can dwarf regular full-time enrollments on the same campus (see Tables 3.1 and 3.2). Unduplicated head counts for Extension/Continuing Education programs are unavailable due to technical reporting difficulties at the campus level. Nevertheless, the number of working adults participating in Extension/Continuing Education training programs on an annual basis is enormous. In FY1999-2000, combined degree enrollments at UC and CSU exceeded 520,000 while their combined Extension enrollments exceeded 700,000. More dramatically, UC Extension enrollments are four times larger than regular UC full-time enrollments. If we were to deflate these duplicate enrollments several-fold (a very conservative guess to adjust for the unknown duplication in headcounts), the total number of adult learners participating in UC Extension programs is at least on the same order of magnitude as the total number of full-time UC students, and may be considerably higher. Furthermore, the student turnover rate is substantially higher in Extension programs compared to regular enrollments. Regular students stay on campus for four or more years while the entire Extension student population changes every academic term. In terms of workforce training, this means that Extension programs impact a large number of workers in a region over a very short period of time.

The mix of enrollments between Extension and regular course offerings varies widely between UC and CSU. While Concurrent Enrollments are low at UC, Open University/Special Session at CSU make up a substantial fraction (approximately 50%) of CSU's continuing education programs. Open University, Special Session and Concurrent Enrollment refer to "occasional enrollments" in on-campus degree course offerings. Students registered under these categories *cannot* be regular full or part-time students but are taking regular university-level courses on

an occasional basis.[17] This contrasts with Extension classes, which are not a part of the regular university curriculum and offer continuing education credits (CEU's), which are of limited transferability and typically are not equivalent to regular course credit.

Extension classes fulfill more immediate education and training needs than Open University/Concurrent Enrollment classes. Extension classes typically are taught by practitioners in the field, with curriculum created to meet a specific competency need, e.g. experienced clinical trials managers teaching clinical trials management classes. In contrast, Open University/Concurrent Enrollment courses are for-credit courses taught by university faculty that can count towards degree requirements, if the student decides to pursue a regular course of study in the future.

There is very little tracking of UC Concurrent enrollments because enrollments are so small. CSU grants regular campus degrees through Special Session Degree Programs (run on a self-support basis). But since these campus programs operate as part of the regular campus, these degrees are granted by the campus with students participating in regular campus graduation. Graduation rates are not tracked by the College of Extended Studies per se. The numbers of students who graduate through this mechanism are suspected to be limited.[18] Neither UC nor CSU have undertaken studies to determine student motivations or goals, or the conversion rates of Open University/Concurrent Enrollment students to regular students but the rates are suspected to be very low.

3.3 OBTAINING SUBJECT AREA BREAKDOWNS OF UC AND CSU EXTENSION ENROLLMENTS

UC's Office of the President and CSU's Chancellor's Office track few details about Extension activities. The annual UCOP Statistical and Financial Report of Extension and Statewide Programs breaks down enrollments into degree credit, professional credit, non-credit categories and not much more. Similarly, CSU's Chancellor's Office was able to provide overall enrollment figures but no subject area breakdowns. While these reports are helpful in delimiting the size of the student population served, they do not provide a detailed subject area breakdown of courses pursued. Without a detailed subject area breakdown, there is no way to determine what fraction of Extension and Continuing Education programs serve the more specific workforce training needs of high-tech industries.

To obtain a subject area breakdown of Extension enrollments requires a detailed analysis of internal financial reports at the campus level (see Figure 3.2). Because there are no reporting requirements based on subject area breakdowns, each campus had its own site-specific definitions of subjects. Every effort has been made to disaggregate subject area enrollments as systematically as possible while recognizing that there are a few isolated instances where disaggregation into the desired subjects was impossible. Please see the Appendix for a full discussion. While some UC campuses could provide ten year trends; others could provide only enrollment data for the last three years. Finally, the subject area enrollment totals from these internal reports are close to the system-wide enrollment totals

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17 For CSU, Open University (also referred to as Concurrent Enrollment) courses provide the opportunity for occasional enrollments in on-campus degree course offerings. Students registered under this category cannot be regular full or part-time students but are taking regular university-level courses on an occasional basis. These courses provide Special Session credit. Special Session also permits CSU institutions to offer self-support resident courses on a year-round basis. CSU institutions may, with campus authorization, offer special session degrees (both regular campus degrees and special degrees authorized by the Chancellor's office) as well as regular and specialized courses for adult students. These programs serve the same purpose as Extension courses, but permit full-degree offerings on a self-support basis.

18 CSU Office of Extended Education, internal report, December, 2000.

but don't match exactly. The discrepancies arise because of report timing and possibly definitional variations. Financial reporting deadlines may not coincide with academic deadlines so enrollments in financial reports may be incomplete snapshots of an academic quarter.

The time and effort required to collate data from the 23 campuses of CSU far exceeded the resources available for this study and consequently, was not attempted. Hence, we will only report on data collected from the eight relevant campuses of UC.[19]

3.4 UC EXTENSION PROGRAMS AND HIGH-TECH WORKFORCE TRAINING

Determining the number of high-tech workers trained through Extension Programs is more complex than just determining the number of students enrolled in Information Technology or science and technology courses. While scientists and engineers do take technical courses in their field, they are just as likely to enroll in professional development courses out of their field, e.g. in Business and Management. Certain UC Extension Divisions, such as San Diego, Irvine and Santa Cruz (in Silicon Valley) even run in-depth executive management programs specifically geared for scientists, engineers and technical managers.[20] Furthermore, while students taking Business and Management courses are, for the most part, not technical personnel directly employed by high-tech companies, a significant fraction of these students do work in business and administrative positions in

high-tech companies. Hence, we have aggregated Business and Management enrollments together with other science and technical enrollments in Table 3.3 and 3.4.

Enrollments in the Health Sciences presents a challenge. While many courses cater to healthcare professionals such as nurses and hospital administrators, a significant number of courses are biotech industry specific (e.g. clinical trials management and biotech regulatory affairs). Disaggregating these enrollments from nursing courses is impossible at this level of analysis.

The film industry also presents a unique case that defies conventional definitions of high-tech. Many "behind-the-camera" jobs in the film industry are highly technical in nature. The computer animators who create movies such as "Toy Story" are a good example of the skilled technical labor required by the entertainment industry. In response to industry needs, UCLA has developed extensive course offerings to train workers for fields such as computer animation, interactive media design, cinematography, film editing, special effects and sound production, among others.[21] These enrollments have been included with science and technical subject enrollments.

Finally, the percentage of enrollments in science and technology and Business and Management courses shifts from campus to campus. In regions with a high density of high-tech industries (e.g. Silicon Valley, Los Angeles and San Diego), approximately two thirds of the enrollments are in Science and

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19 The following campuses have Divisions of Extended Studies: Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, Santa Barbara and Santa Cruz. While UCSF runs professional development programs for physicians and health workers, this campus does not have a traditional Extension Division that is comparable to the 8 other campuses.

20 The Executive Program for Scientists and Engineers (EPSE) is a year-long training program for senior technology managers at UCSD. Leadership and Management for Technology Professionals (LAMP), is a 6 month program for junior to mid-level technology managers. EPSE and LAMP originated at UCSD; LAMP has now expanded to Irvine and Silicon Valley. Companies nominate their technical managers to participate in these programs; companies also subsidize tuition and allow time off for employees to participate in these programs. Active student alumni networks also exist.

21 For further information about UCLA's Extension programs for film industry occupations, please see their course catalog at http://www.unex.ucla.edu/.

Technology and Business and Management courses. This contrasts with lower-tech regions such as Davis and Riverside where these enrollments are proportionately smaller.

3.5 UC AND CSU DATA ON CERTIFICATE PROGRAMS AND AWARDS

Each UC and CSU Extension Division offers certificate programs which are more concentrated courses of study. Unfortunately, the number of students who complete these programs are not tracked in any systematic fashion. UC's Office of the President (UCOP) does not maintain system-wide information on certificate programs offered, let alone the number of certificate awardees. Each UC campus tracks certificate awardees to a certain extent but the level of detail varies across all 8 campuses. Idiosyncrasies in the data prevent easy aggregation and hence is not summarized here.[22] Figures 3.3 and 3.4 indicate the variety of program offerings across all campuses. The highest number of certificate program offerings are in Business and Management and Information Technology.

Anecdotally, there are indications that the demand for certificate programs in high-tech areas is increasing. The number of certificate programs offered at UC has increased significantly, over the past five to ten years.

CSU's Systemwide Office of Extended Education keeps a list of certificate programs offered but does not track the number of certificate awardees. Moreover, an internal CSU report indicated that graduation records are not maintained either for all programs or for individual campuses.[23] The time and effort required to collate data from the 23 campuses of CSU far exceeded the resources available for this study and hence, was not attempted.
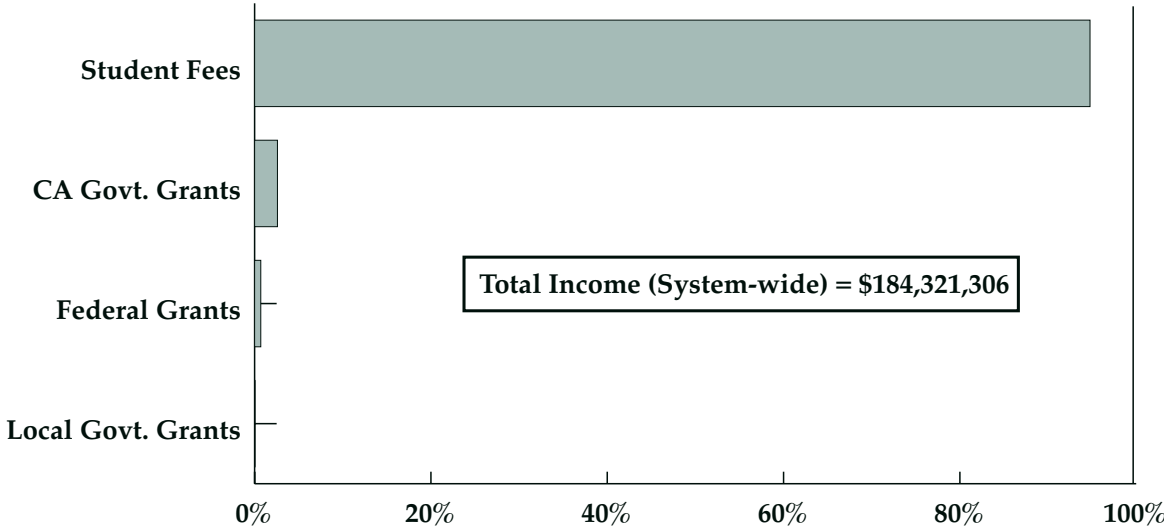
Figure 3.1 -- Selected Sources of Funding for University of California's Extension Divisions, FY 1999-2000[24]

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22 Interested parties should contact the authors regarding this data.

23 CSU Office of Extended Education, internal report, December, 2000.

24 *1999-2000 UCOP Annual Statistical and Financial Report on University of California Extension and Statewide Programs*, UC Office of the President, Office of Academic Initiatives.
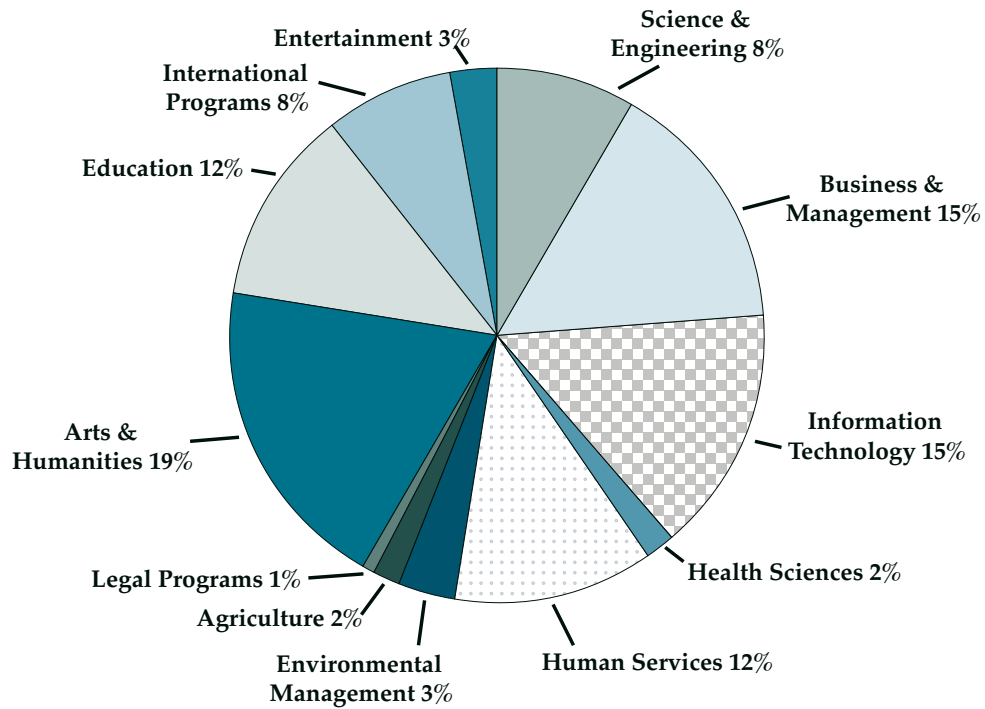
Figure 3.2 --UC Extension Enrollments, by Subject Area, FY 1999-2000 (N = 404,326)
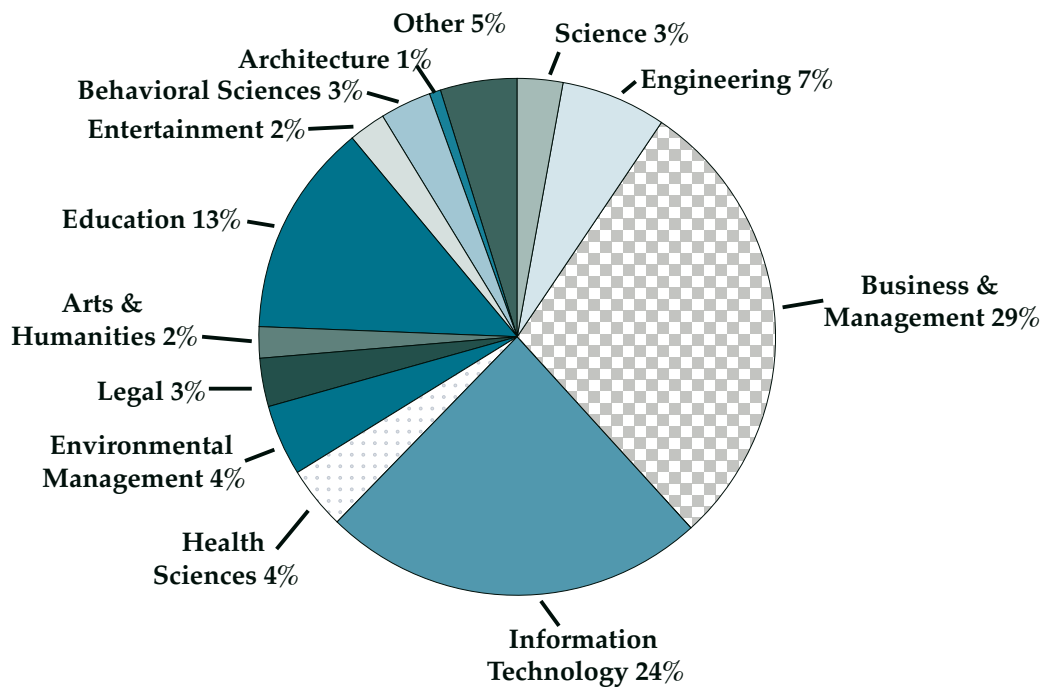
Figure 3.3 --UC Certificate Program Offerings, by Subject Area[25], FY 1999-2000 (N = 562)

25 Partial data on enrollments and awardees available upon request.
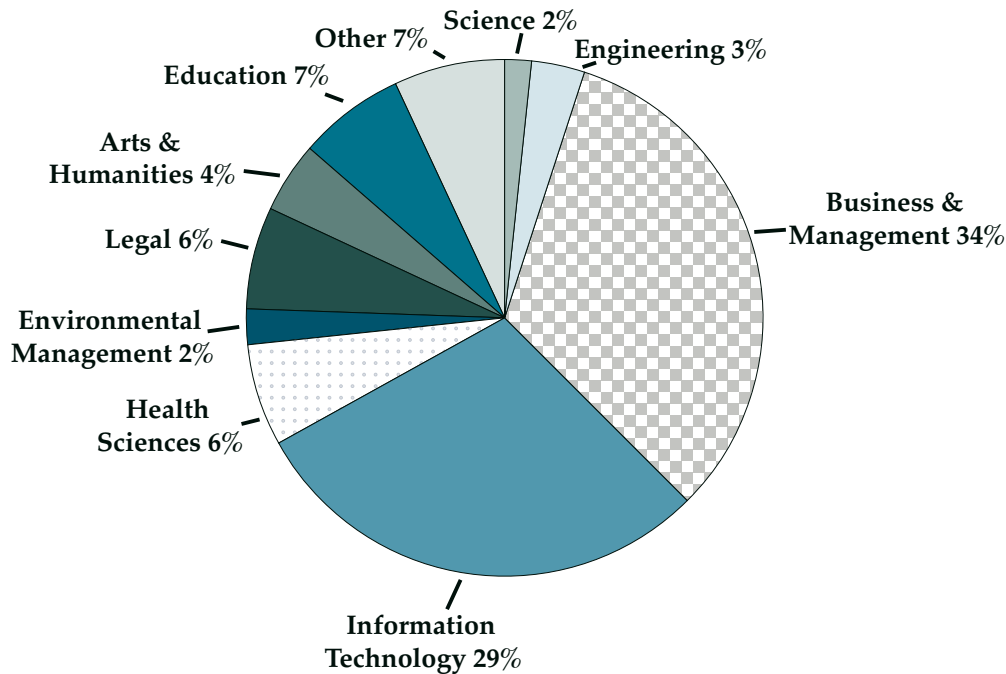
Figure 3.4 -- CSU Certificate Program Offerings, by Subject Area, FY 1999-2000 (N = 360)

Table 3.1
UC Regular Full Time Enrollment Compared to UC Extension Program Enrollments
(FY 1995-1996 through FY 1999-2000)

Fiscal Year	UC Regular Full-Time Enrollment [26]			UC Continuing Education [27]		
	Under-Graduate	*Post-bacc./ Graduate*	*Total FT Enrollment*	**Extension Enrollees** [28]	*Concurrent Enrollment*	*Total Enrollment*
1995-96	**120,198**	**26,328**	*146,526*	**431,231**	**12,145**	*443,376*
1996-97	**122,453**	**26,267**	*148,720*	**441,331**	**11,997**	*453,328*
1997-98	**125,040**	**26,595**	*151,635*	**451,738**	**11,724**	*463,462*
1998-99	**128,883**	**26,607**	*155,490*	**433,301**	**11,191**	*444,492*
1999-00	**132,712**	**27,008**	*159,720*	**409,011**	**10,470**	*442,631*

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26 *1995-2000 Statistical Summary of Students and Staff*, UC Office of the President, Budget Office. Post-baccalaureate students are students pursuing education/teaching credentials. These enrollments are typically small, less than 200 students per year per campus.

27 *1999-2000 Annual Statistical and Financial Report on University of California Extension and Statewide Programs*, UC Office of the President, Office of Academic Initiatives.

28 Enrollee is defined as a student enrolled in a class. A student who is studying 2 classes during one quarter will be double counted, by this definition. On the other hand, continuing education programs are geared to full-time working adults, so there are few students who pursue the equivalent of a full-time load of courses.

Table 3.2
CSU Regular Full Time Enrollment Compared to CSU Extension Program Enrollments[29]
(FY 1995-1996 through FY 1999-2000)

Fiscal Year	CSU Regular FT Enrollment[30]			CSU Continuing Education[31]			
	Under-Graduate	Post-bacc./ Graduate	Total FT Enrollment	Extension Enrollment	Open University	Special Session	Total Enrollment
1995-96	264,968	62,747	327,715	98,074	44,272	57,478	199,824
1996-97	272,480	65,695	338,175	124,417	43,552	61,101	229,070
1997-98	275,164	69,438	344,602	133,230	44,041	70,262	247,533
1998-99	279,656	73,219	352,875	125,155	44,021	66,670	235,846
1999-00	286,176	76,570	362,746	143,922	48,394	70,332	262,648

Table 3.3
UC Systemwide Extension Enrollments in Science and Technology (S&T),[32] Health, and Business Subjects (FY 1995-1996 through FY 1999-2000)

	1997-1998	1998-1999	1999-2000
Business & Management	63,815	62,696	62,276
Entertainment Studies	14,532	12,063	11,479
Environmental Management	15,331	13,732	13,947
Health Sciences	8,675	7,767	7,254
Information Technology	56,126	55,775	60,063
Science & Engineering	32,539	31,678	33,934
All Other Subjects	201,454	210,350	215,373
TOTAL:	392,472	394,061	404,326
Total (S&T)	118,528	113,248	119,423
Total (S&T + Health)	127,203	121,015	126,677
Total (S&T + Health + Business)	191,018	183,711	188,953
%S&T	30.20%	28.70%	29.50%
%S&T + Health	32.40%	30.70%	31.30%
% S&T + Business Management)	48.70%	46.60%	46.70%

29 In order to make Tables 3.2 and 3 directly comparable, "Extension enrollees" are defined as those students who are pursuing courses that provide continuing education units (CEUs) or non-credit courses. Open University, Concurrent Enrollment and Special Session Students are not included. We recognize that CSU Extended Studies serves a large population of working adults who are pursuing regular credit courses on a part-time basis. For a full discussion, see Appendix A.

30 *1995-2000 CSU Annual Statistical Reports*, CSU Chancellor's Office, Analytical Statistics Division

31 Summer Session enrollments excluded.

32 U.S. Census estimates (7/1999) for San Diego county is 2,820,844 and Riverside-San Bernardino counties combined is 3,200,587.

Table 3.4
Percentage of UC Extension Students Taking Science and Technology (S&T), Health and Business
Courses, by Campus (FY1999-2000)

	S&T	Health	Business & Management	% S&T	% (S&T + Health)	% (S&T + Health + Business)
UCB	23,212	0	11,095	37.5%	37.5%	55.4%
UCD	7,852	0	3,501	9.4%	9.4%	13.6%
UCI	7,557	0	7,816	25.2%	25.2%	51.2%
UCLA	32,634	1,397	18,395	32.9%	34.4%	52.9%
UCR	4,422	193	3,711	17.7%	18.4%	33.3%
UCSB	1,556	629	1,887	14.7%	20.7%	38.6%
UCSC	26,110	3,045	8,751	47.7%	53.3%	69.3%
UCSD	16,080	1,990	7,120	40.9%	46.0%	64.1%
System-wide	119,423	7,254	62,276	29.50%	31.30%	46.70%

4. REGIONAL DIFFERENCES IN CONTINUING EDUCATION PROGRAMS

Since Extension and Continuing Education programs are self-supporting, these programs tend to be highly responsive to regional needs. Course curricula are developed in conjunction with local high-tech executives to meet training needs for specific industries such as biotechnology or telecommunications. Instructors for these courses are frequently experienced practitioners employed by these companies, e.g. clinical trials managers teaching clinical trials management courses. If there is insufficient student demand and tuition fees cannot cover costs, courses are cancelled and will not be offered in future academic terms. Thus, tracking Extension enrollments in a region is a good indicator of the workforce training demands in that region.

4.1 A COMPARISON OF EXTENSION/CONTINUING EDUCATION ENROLLMENTS FOR SAN DIEGO AND RIVERSIDE-SAN BERNARDINO REGIONS

We have undertaken to study two regions, San Diego and Riverside-San Bernardino counties (the "Inland Empire"), to delineate the different workforce training needs in areas with differing degrees of high-tech industry development. These counties were chosen because of similarities in population size and growth, geographical proximity, and access to UC, CSU and community college campuses. However, these two regions differ drastically in the mix of industries that constitute their regional economies. San Diego has thriving biotechnology and telecommunications clusters. In contrast, Riverside relies on agriculture, but is transitioning to an economy based on manufacturing and distribution. While high-tech industries are gaining a foothold in Riverside and San Bernardino counties, the critical mass achieved in San Diego has not been replicated yet.

Participation rates in lifelong learning activities is uniformly higher for San Diego county than for Riverside-San Bernardino counties. San Diego county enrollments in

Extension and Continuing Education total 163,303, while in Riverside-San Bernardino counties, enrollments total 64,670, a figure that is two and a half times smaller than for San Diego. Similarly, regular university and community college enrollments are two to three times higher in San Diego county versus the Inland Empire, on a per capita basis. See Table 4.1 and Appendix A for details.

The nature of continuing education programs offered in each region also differs substantially. In San Diego county, UCSD's Division of Extended Studies and SDSU's College of Extended Studies represent the 2 largest continuing education providers in the region. Likewise, UCR's Extension Division and CSU San Bernardino's College of Extended Studies serve a similar function for the Riverside-San Bernardino area. For a regional analysis of courses pursued by Extension students, we analyzed internal enrollment reports for each Extension Division to determine a subject area breakdown of enrollments. In San Diego county, the largest number of Extension and Continuing Education enrollments are in Information Technology (UCSD) and Business and Management (SDSU). Science and Engineering enrollments are growing significantly and consist mostly of enrollments in biotech and telecommunications related courses. By contrast, the largest number of enrollments in the Inland Empire are in Education. Business and Management and Information Technology enrollments rank very low compared to other categories such as General Interest and Liberal Arts. There are few Science and Engineering courses offered at UCR and even fewer at CSU San Bernardino. The few Science courses offered at both campuses are general interest courses such as Astronomy, Bird Identification or Desert Flora and Fauna. There are no biotech specific courses similar to those offered at UCSD and SDSU. UCR is seeing significant

enrollment growth in Geographic Information Systems, and this may be a bellwether of high-tech development in the region. See Table 4-2, Figures 4.1 through 4.4 and Appendix A for detail.

Within a region, different campuses offer a different mix of courses. For instance, UCSD specializes in Continuing Education courses while de-emphasizing Concurrent Enrollment. In contrast, a substantial fraction of SDSU's enrollments are in regular credit courses offered through Open University and Special Session. These Open University enrollments are rapidly growing as SDSU shifts its focus away from Continuing Education offerings and towards regular credit offerings. In the past three years, Open University enrollments have grown from one quarter to one half of all enrollments. A similar situation exists in Riverside-San Bernardino counties. UCR specializes in Extension offerings while a substantial fraction of CSU San Bernardino's enrollments are in Open University courses. See Appendix A for a detailed discussion.

Finally, the subject areas experiencing the highest enrollment growth rates are very different between the two regions. In San Diego, the fastest growing subject category for both UCSD and SDSU is Science and Engineering. By contrast, Riverside-San Bernardino enrollments in the various subject categories are fairly flat and static.

4.2 A COMPARISON OF CERTIFICATE PROGRAMS AT UCSD AND UCR

Each UC and CSU campus offers a wide array of certificate programs requiring a year or less of study. Unfortunately, data detailing who has enrolled and who has completed certificate awards are incomplete, at best. UCSD and UCR were able to produce a fairly complete summary of certificate graduates, broken down by subject areas. This information was not available for CSU campuses. Even when this information is available, archival data is available for only limited periods of time. For instance, while

UCR was able to provide a ten year history of certificate graduates, UCSD was only able to provide data going back five years. Changes in information systems render data from prior years unavailable at this time. Finally, present information systems don't provide summary reporting of certificate enrollees and graduates. Data on individual certificate programs had to be collated and built from section ID data, a major undertaking that consumed several months' time, administrative resources and programming expertise.

The number of students who complete certificate awards are not high, compared to overall Extension enrollments. On average, less than 5% of Extension students even opt to enroll in certificate programs. The percentage who complete certificate awards is even smaller. Graduation rates appear to be much higher for UCSD than for UCR. (See Table 4.3 and 4.4 for details.)

There are two major differences when comparing the number of certificate graduates in the two regions (San Diego versus Riverside-San Bernardino). First, the number of certificate graduates in Riverside-San Bernardino counties is half that of San Diego. Secondly, a large number of certificate graduates in the San Diego region opt to complete certificates in Information Technology and Business and Management while in Riverside-San Bernardino, the two most popular disciplines are Business and Management and Education. The number of certificates granted in Information Technology ranks much lower, in third place. See Figures 4.5 and 4.6 for details.
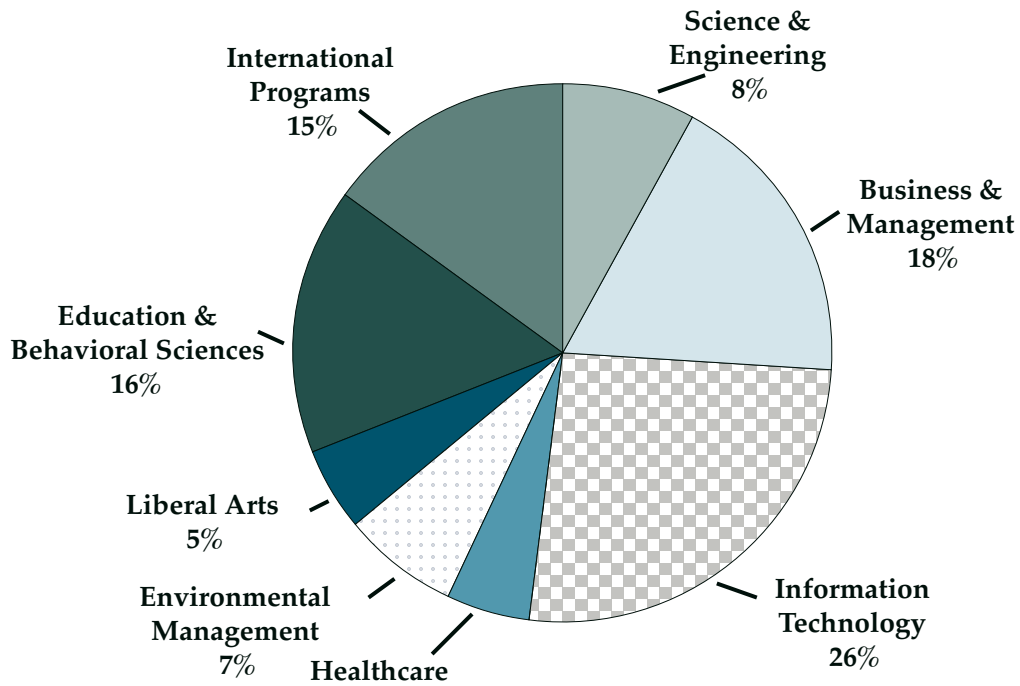
Figure 4.1 -- UCSD Enrollments in the Division of Extended Studies, by Subject, FY 1999-2000 (N = 40,458)
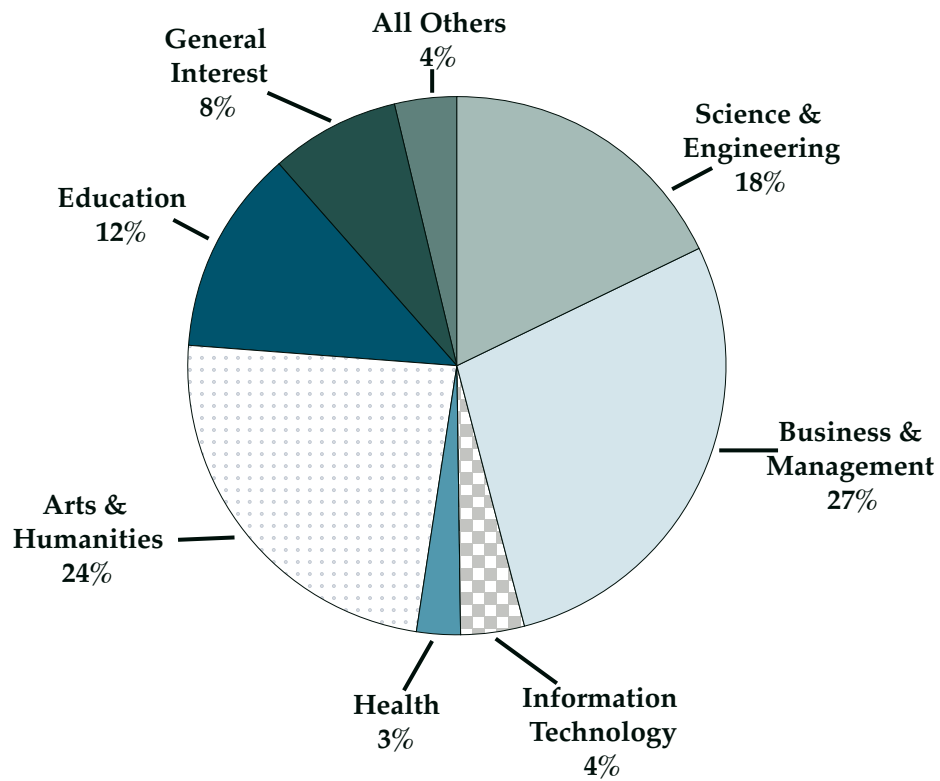
Figure 4.2 -- SDSU Enrollments in the College of Extended Studies, by Subject, FY 1999-2000 (N = 25,350)
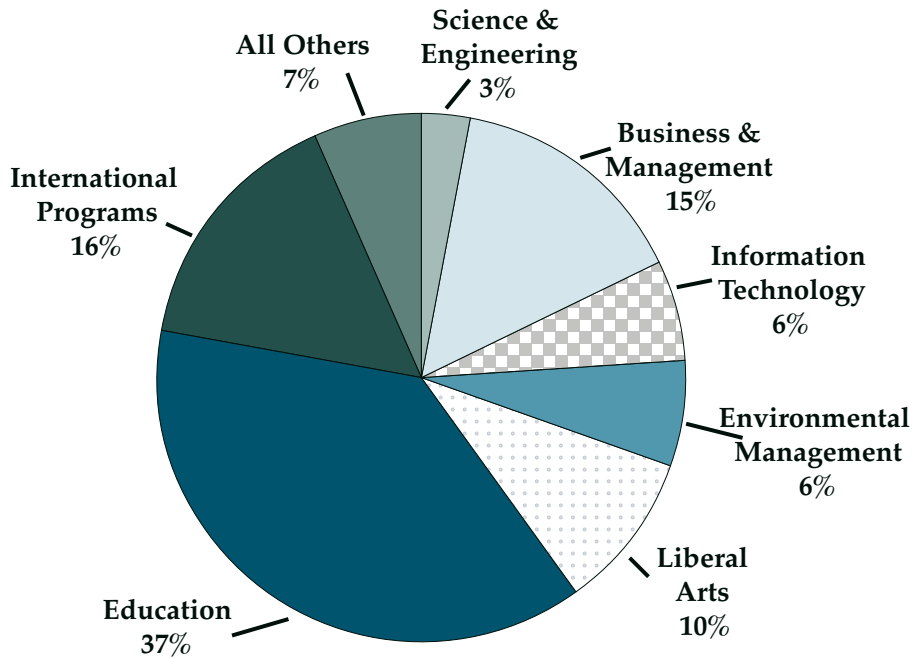
Figure 4.3 -- UCR Enrollments in the Division of Extension, by Subject, FY1999-2000 (N = 25,937)
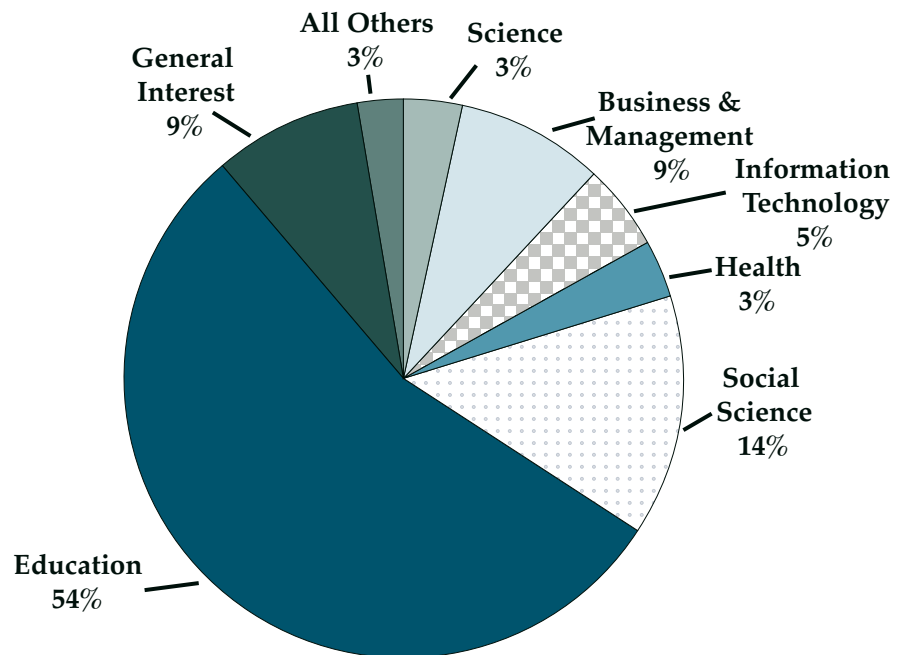
Figure 4.4 -- CSU San Bernardino Enrollments in the College of Extended Studies, FY 1999-2000
(N = 12,235)
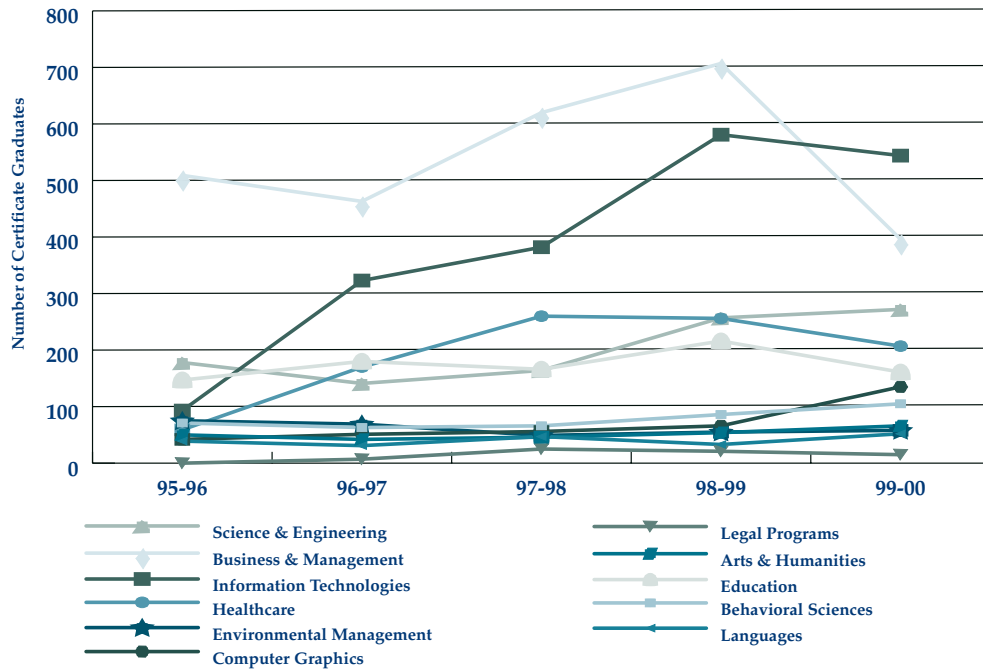
Figure 4.5 -- UCSD Certificate Graduates, by Subject (FY 1996-2000)
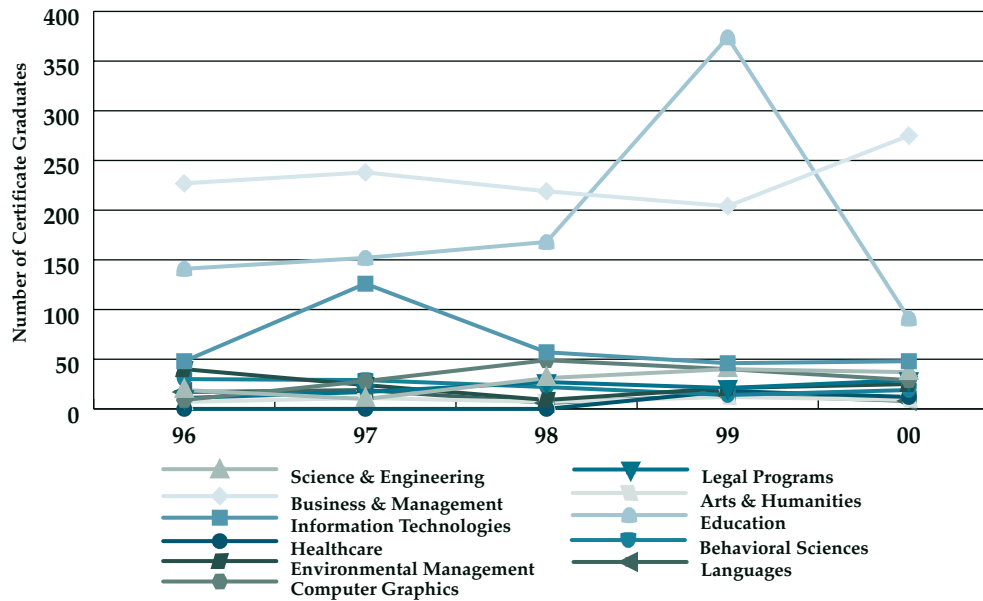
Figure 4.6 -- UCR Extension Certificate Graduates, by Subject (FY 1996-2000)

Table 4.1
Comparison of Regional Higher Education Enrollments on a Per Capita Basis,
San Diego vs Riverside-San Bernardino Counties (FY 1999-2000)[33]

Aggregated Enrollments	Per Capita (San Diego)	Per Capita (Riverside & San Bernardino)
Regular Enrollments (UC + CSU)	0.0774	0.0386
Extension Enrollment (UC + CSU)	0.0222	0.0094
UC & CSU Continuing Education (UC + CSU)[*]	0.0357	0.0108
CA Community College Enrollment	0.0579	0.0298

* Continuing Education (UC) = Extension + Concurrent Enrollments
  Continuing Education (CSU) = Extension + Open University + Special Session

Table 4.2
The Most Popular Subjects Pursued by Extension/Continuing Education Students in San Diego
and Riverside-San Bernardino Counties (FY 1999-2000)

Campus	Most Popular Subject	No. of Enrollments	% Enrollment
UCSD	Information Technology	10,236	26%
SDSU	Business & Management	7,132	27%
UCR	Education	9,460	37%
CSUSB	Education	6,681	54%

Table 4.3
UCSD Extension Certificate Enrollments and Completion Rates
(FY 1990-1991 through FY 1999-2000)

FY	Certificate Programs	Certificate Enrollees	Certificate Awardees	% Completion
90-91	N/A	N/A	N/A	N/A
91-92	N/A	N/A	N/A	N/A
92-93	N/A	N/A	N/A	N/A
93-94	N/A	N/A	N/A	N/A
94-95	66	1,677	1,288	77%
95-96	70	1,665	1,263	76%
96-97	81	1,862	1,540	83%
97-98	85	2,252	1,881	84%
98-99	92	2,658	2,332	88%
99-00	99	2,404	2,011	84%

33 Includes the following categories: Environmental Management, Entertainment Studies (UCLA only), Information Technology, Science and Engineering.

Table 4.4
UCR Extension Certificate Enrollment and Completion Rates
(Calendar Year 1991-2000)

Calendar Year	Certificate Programs	Certificate Enrollees	Certificate Awardees	% Completion
1991	38	716	339	47%
1992	41	678	456	67%
1993	46	778	550	71%
1994	47	791	484	61%
1995	56	847	481	57%
1996	56	914	549	60%
1997	64	1097	654	60%
1998	59	1168	595	51%
1999	75	992	804	81%
2000	76	1038	582	56%

5. WHO TAKES CONTINUING EDUCATION COURSES?

Very little information is systematically kept about Extension student demographics. Individual campuses conduct course evaluation surveys and occasional customer satisfaction surveys but these do not sample a comprehensive population nor do they answer the questions of student motivation for pursuing continuing education and if there are employer subsidies involved with their training activities.

In order to answer these questions, we decided to undertake a limited survey of Extension students on two campuses, UCSD and UCR. These two campuses were chosen to test for differences in Extension student demographics in a "high-tech" versus a "low-tech" region.

5.1 SURVEY INSTRUMENT AND RESPONSE RATES

A one-page survey (see Appendix A) was distributed to UCSD and UCR Extension students during the Fall Quarter of 2000. Only the subset of students taking Business and Management, Information Technologies (IT), Science and Engineering, Health Sciences, and Environmental Management were asked to complete the survey as these students are more likely to be employed in high-tech industries. Timing this survey to coincide with other course evaluation surveys resulted in a high response rate of over 30% (see Table 5.1).

5.2 STUDENT DEMOGRAPHICS AND EDUCATIONAL BACKGROUND

Survey respondents were almost equally divided on gender with a slightly higher percentage of male to female respondents. In terms of age, students are, for the most part, working adults in the prime working decades of their lives. Few are younger than 25 or older than 54. UCSD's student population is skewed to a much younger population than UCR.

While UCR's male students were evenly divided amongst the prime age groups, UCR's female population was skewed towards the older age groups. See Figures 5.1 and Appendix A.

Students were asked to list their highest educational attainment. UCSD's student population exhibited a much higher level of educational attainment compared to UCR. Fully 75% of UCSD Extension students have obtained a baccalaureate or higher degree. Only 56% of UCR students have obtained a baccalaureate degree or higher. See Figure 5.2 and Appendix A.

5.3 STUDENTS' EMPLOYMENT PROFILE

Most Extension students are working adults. Over 80% of students are fully employed. A small percentage are unemployed and a few are retired. The majority of UCSD/UCR Extension students are employed college graduates who have worked less than five years with their present employer. Over one-third of respondents earn between $25,000 to $50,000. In terms of work function, the proportion of UCSD students holding positions with engineering/technical or scientific research functions far exceed those of UCR. (See Figures 5.3 through 5.7 and Appendix A.)

5.4 EMPLOYER CHARACTERISTICS

Nearly two-thirds of UCSD students and nearly half of UCR students work in the private sector. More than 50% work for mid-sized to large firms. Less than 20% work for small firms (0-50 employees). The survey also probed for employment in certain high-tech industry clusters as defined by the San Diego Association of Governments.[34] In San Diego, students report employment in all of the

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[34] *San Diego Regional Employment Clusters: Engines of the Modern Economy*, San Diego Association of Governments (SANDAG), May-June, 1998.

clusters except for agriculture with the top three clusters being Computer Software and Services, Biotechnology/Pharmaceuticals, and Communications, all major high-tech industries in the area. By contrast, the top three clusters for Riverside include Computer Software and Services, Defense and Transportation Manufacturing, and Business Services, again reflecting the general industries of the region. While agriculture is a much larger cluster in Riverside than San Diego, surprisingly few students report working in this sector. These employment patterns could be skewed given the educational content of the Extension course offerings available at both campuses. Both campuses offer a wide variety of IT courses but there is a scarcity of agriculture related courses. See Figures 5.8 and 5.9 and Appendix A.

Further aggregation of these industry clusters leads to a clearer picture of student employment trends in the two regions. Nearly 60% of UCSD students report working in high-tech industries (IT, biotech or telecommunications) versus 26% at UCR. See the pie charts in Figures 5.10, 5.11 and Appendix A.

More in-depth analysis of student employment trends indicate that most students taking IT, science and engineering courses at both UCSD and UCR work directly in high-tech industry sectors. Approximately half of all students taking Business and Management courses at UCSD work for high-tech companies in San Diego. In contrast, only one quarter of all UCR students taking Business and Management courses work for high-tech companies.

5.5 Students' Motivation for Taking Extension Courses

Over 90% of survey respondents indicate that course taking activities are career-related. Less than 5% report taking course(s) for personal interest. Career maintenance/skills upgrading and career advancement are the main motivations behind course taking

activities. A small minority indicate career change as a factor. Because this survey samples students in courses with an explicit professional development focus, responses will be heavily skewed towards career related motivations. See Figure 5.12 and Appendix A for details.

5.6 How Many Courses Do Extension Students Take?

Survey results indicate that nearly two-thirds of students take one class per quarter. Approximately half of all students surveyed have taken 0-3 courses in the past five years. Less than half report enrolling in a certificate program. These results confirm the anecdotal evidence that Extension programs serve a population of working adults with limited time for educational activities. These questions also attempt to determine how inflated Extension enrollments are, given the inability of individual campuses to provide unduplicated headcounts of students served. See Figures 5.13 through 5.15 and Appendix A for details.

Using these results to deflate the FY2000 enrollment for UCSD and UCR yields unduplicated enrollment numbers that are approximately 65-75% of the duplicated headcount numbers. In other words, the unduplicated annual headcount was calculated to be roughly 29,000 students for UCSD and roughly 16,000 students for UCR. If the current survey results represent an accurate snapshot of the Extension student population as a whole, then unduplicated Extension headcounts are still much larger than the regular UC enrollments.

5.7 Who Paid for Course-Taking Activities?

In the San Diego region ("high-tech" economy), approximately two-thirds of UCSD Extension students report receiving an employer subsidy. Over half report their employer paid 100% of the course costs including tuition and books. By comparison, in the Riverside region ("low-tech" economy), approximately half of UCR students paid for

their course(s) themselves. Of the subset reporting receiving an employer subsidy, approximately less than one third report that the subsidy is tied to course completion. Less than 20% report that the subsidy is tied to course performance (i.e. higher grades = larger subsidy). Only 6% report that their employer subsidy is tied to completion of a certificate program. Of the students reporting employer subsidies, over 50% report working at a large firm (>500 employees). Only 10% report working for small firms (0-50 employees). Among the subset reporting *no* employer subsidy, fully one quarter of these students worked for small firms. See Figures 5.16 through 5.19 and Appendix A for details.

5.8 IS COURSE TAKING CONGRUENT WITH STUDENTS' EDUCATIONAL BACKGROUND?

In the survey, students were asked to report the field or specialization of their highest attained degree. While many respondents left this blank, a substantial fraction did reveal the field in which they were trained. We were then able to match these respondents against the course subjects pursued.

Over one quarter of respondents' course taking activities did not match their reported educational background. Of this subset of respondents, over half were taking Information Technology courses. Over 20% are taking Business and Management courses. None of the liberal arts baccalaureate degree holders were taking courses congruent with their educational background. Of the subset taking courses not congruent with their educational background, nearly 60% could be tracked as taking courses in Information Technologies.

By contrast, over 90% of students with a baccalaureate degree in computer sciences and/or computer engineering could be tracked as taking courses congruent with their educational background. In other words, it appears that IT degree holders take IT courses to maintain their skill sets. Everyone else is taking IT courses to enhance their skill sets or to change careers. (See Figures 5.20 and 5.21, Table 5.2, and Appendix A for details.)
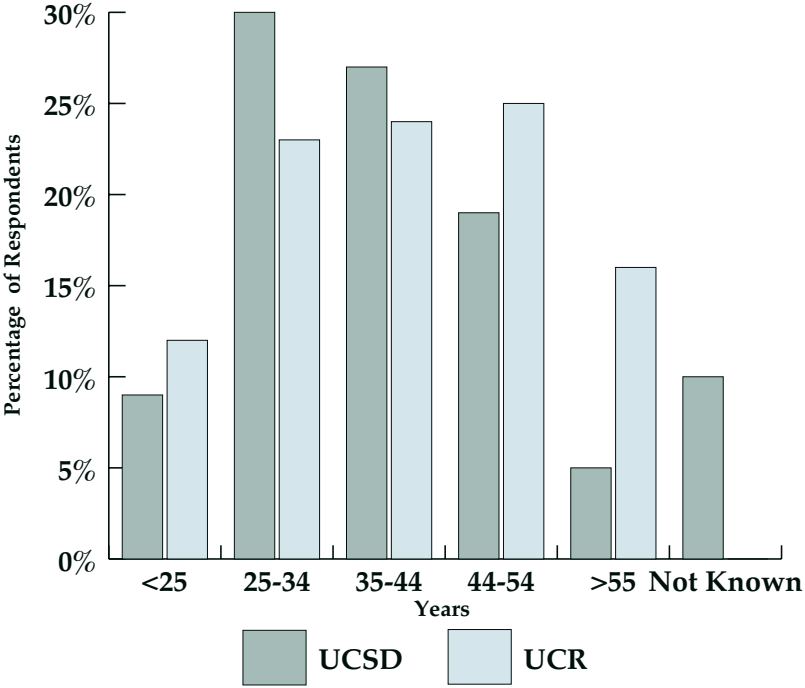
Figure 5.1 -- Age Breakdown of Fall 2000 UCSD/UCR Extension Student Survey Respondents

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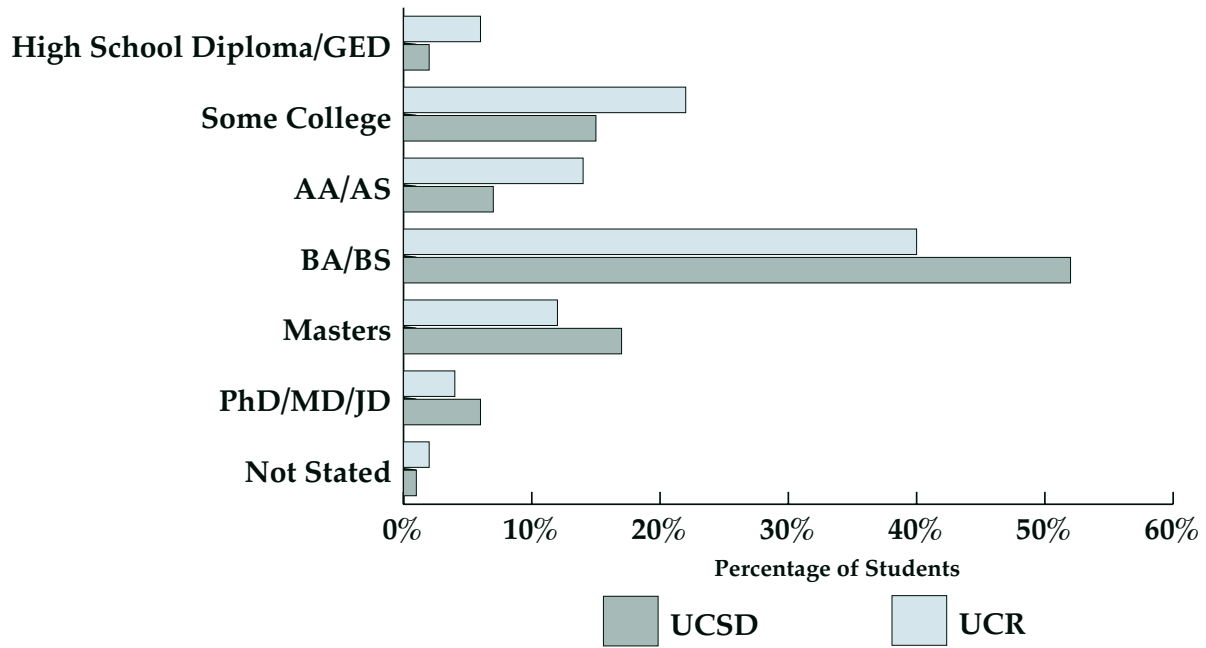
Figure 5.2 -- Highest Level of Educational Attainment of Fall 2000 UCSD/UCR Extension Student Survey Respondents
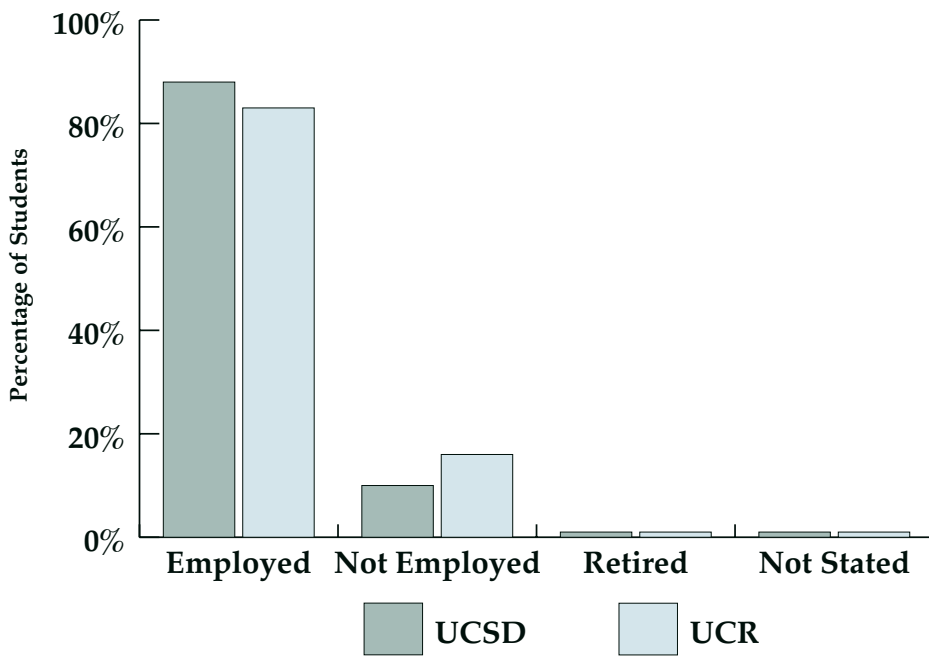
Figure 5.3 -- Employment Status of Fall 2000 UCSD/UCR Extension Student Survey Respondents
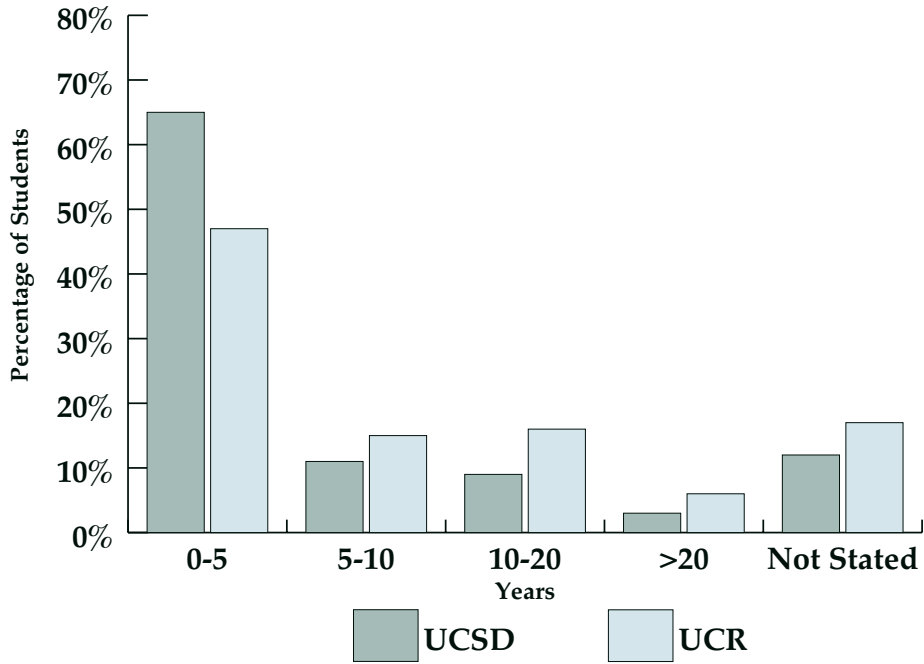
Figure 5.4 -- Employment History Profile for Fall 2000 UCSD/UCR Extension Student Survey Respondents (Years with Current or Most Recent Employer)
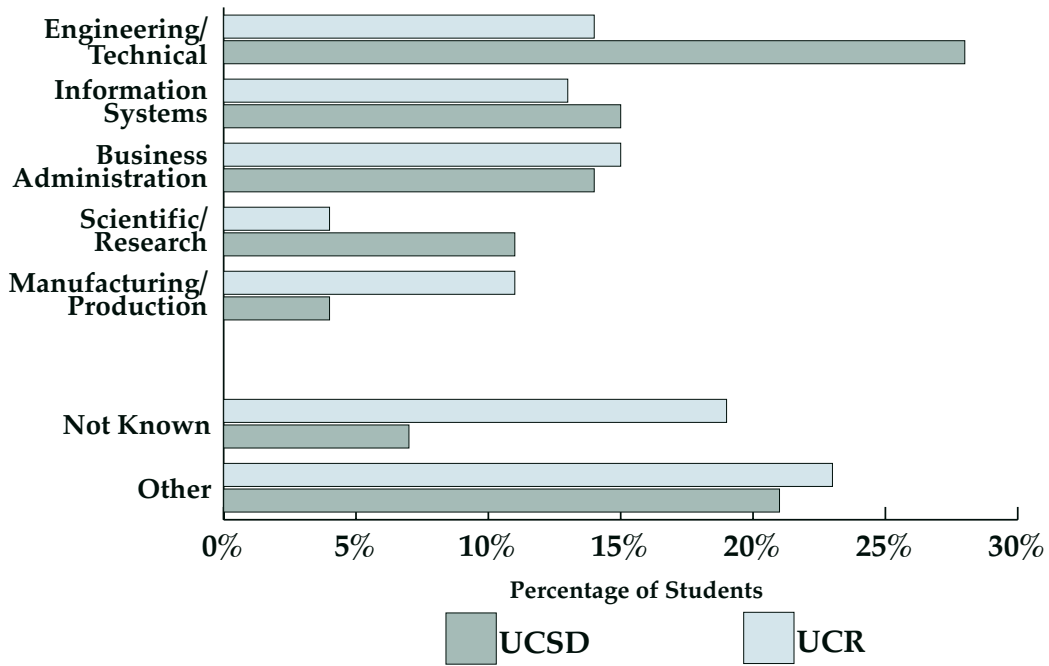
Figure 5.5 -- Work Function of Fall 2000 UCSD/UCR Extension Student Survey Respondents
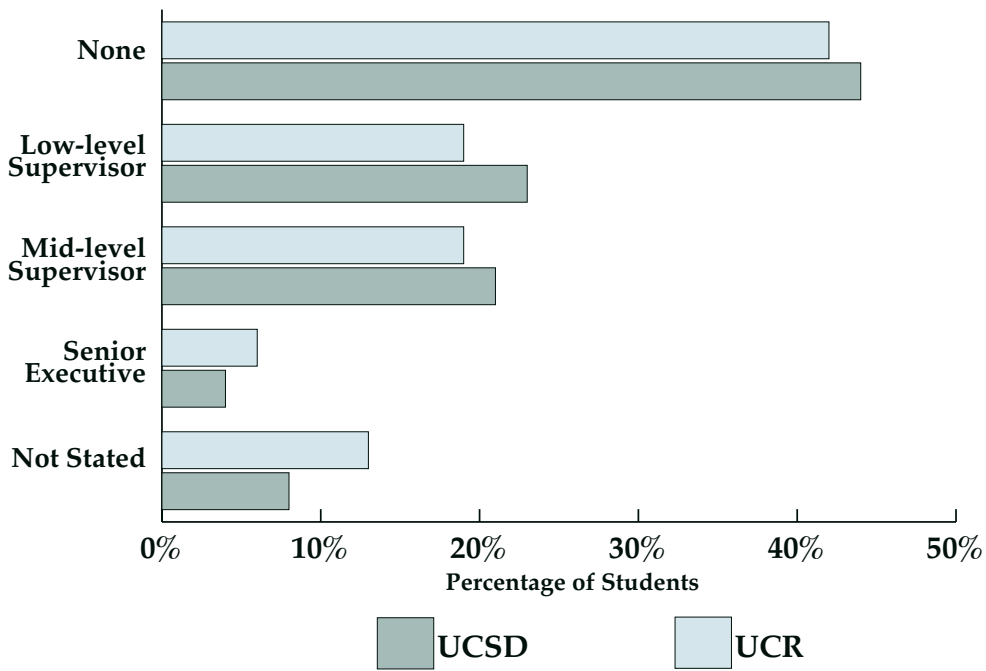
Figure 5.6 -- Management Responsibility Profile of Fall 2000 UCSD/UCR Extension Student Survey Respondents
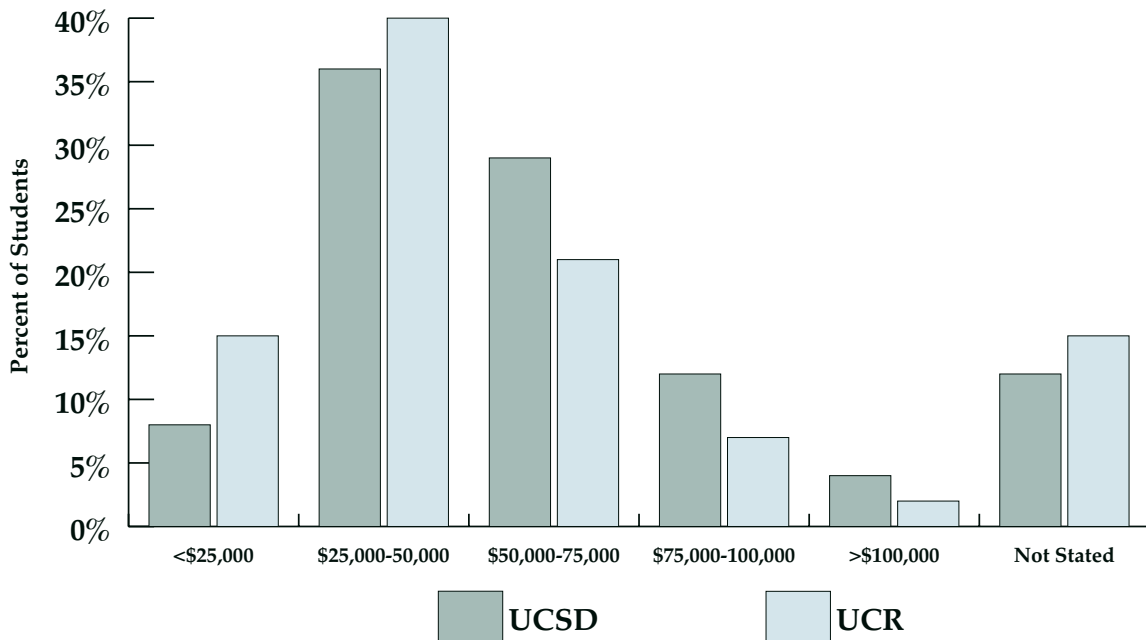
Figure 5.7 -- Salary Profile of Fall 2000 UCSD/UCR Extension Student Survey Respondents
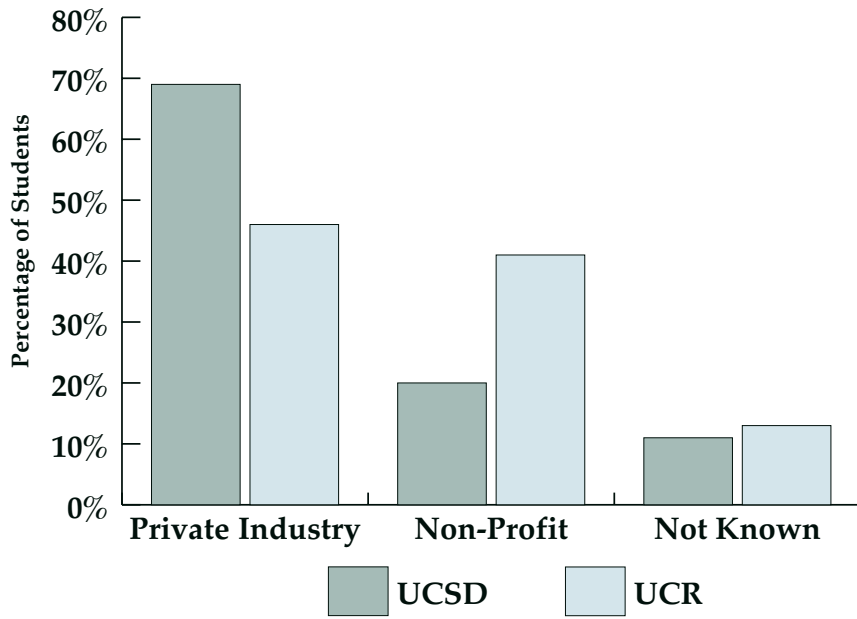
Figure 5.8 -- Employment Sector for Fall 2000 UCSD/UCR Extension Student Survey Respondents
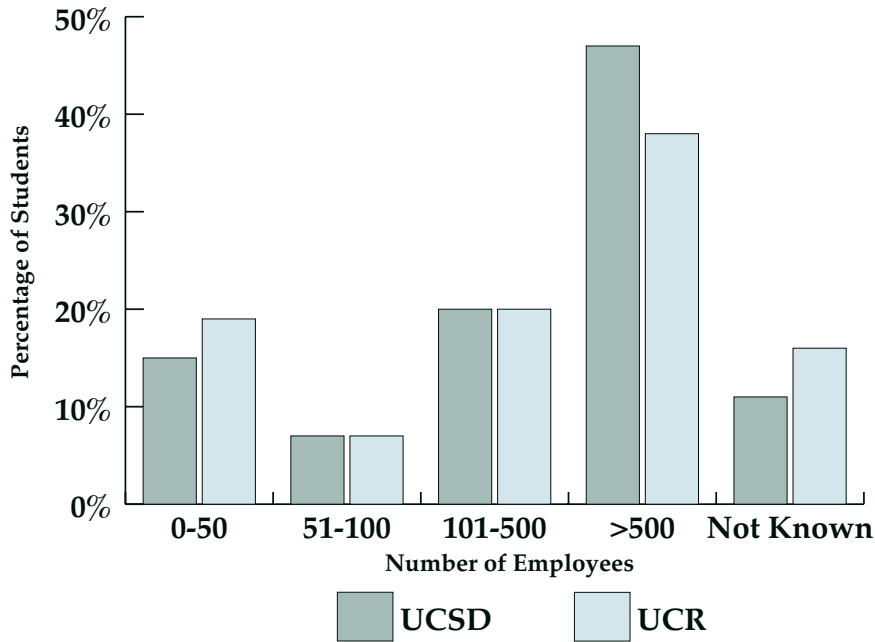
Figure 5.9 -- Employer Size Profile for Fall 2000 UCSD/UCR Extension Student Survey Respondents
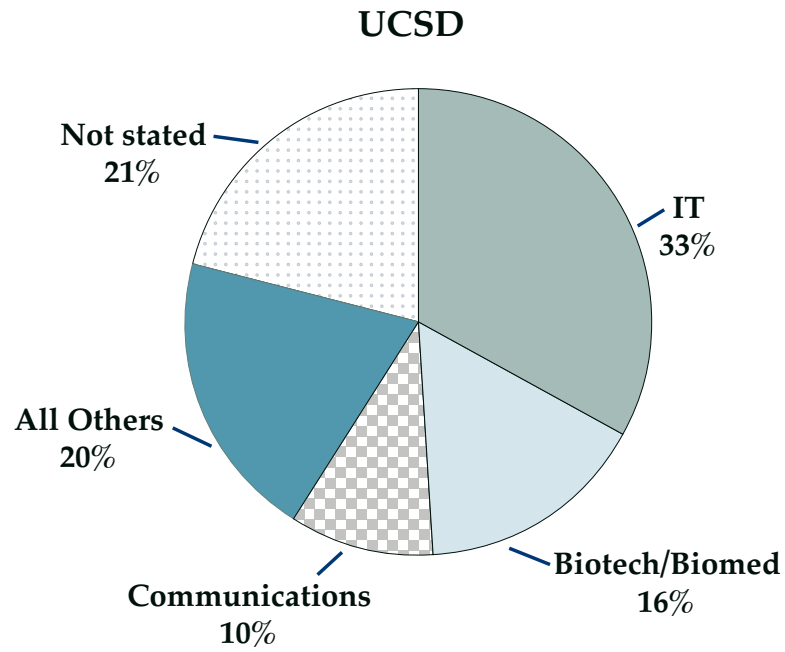
Figure 5.10 -- Percentage of Fall 2000 UCSD Extension Student Survey Respondents Employed in High-tech Industry Clusters
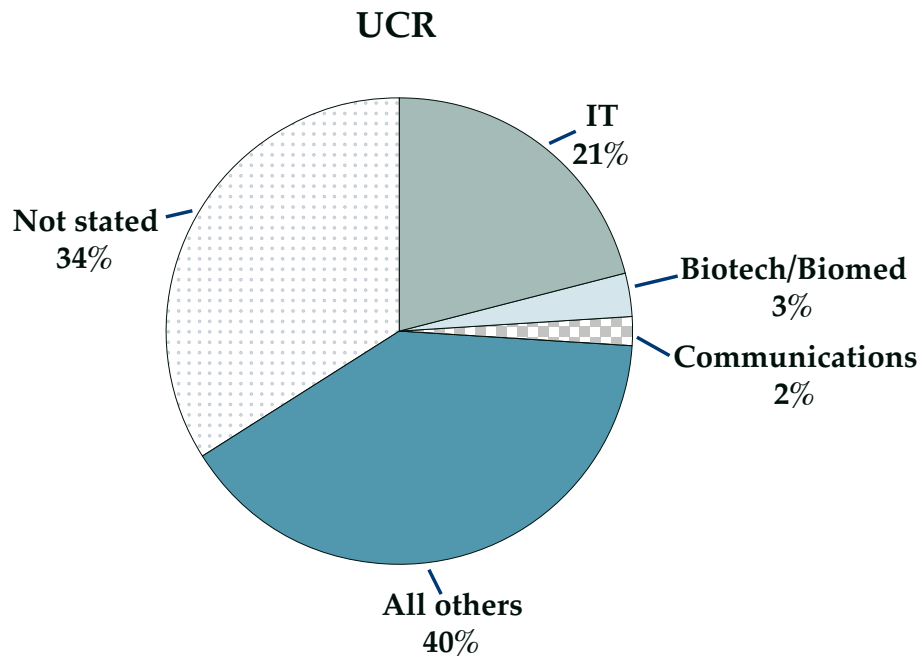
Figure 5.11 -- Percentage of Fall 2000 UCR Extension Student Survey Respondents Employed in High-tech Industry Clusters
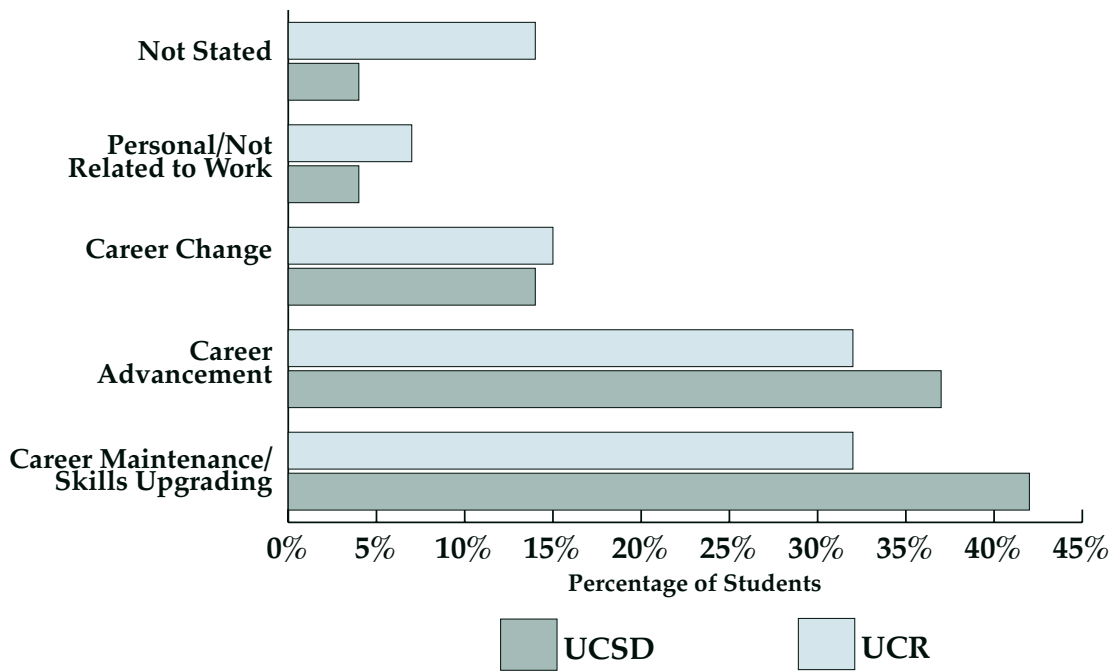
Figure 5.12 -- Motivation of Fall 2000 UCSD/UCR Student Survey Respondents for Taking Extension Courses
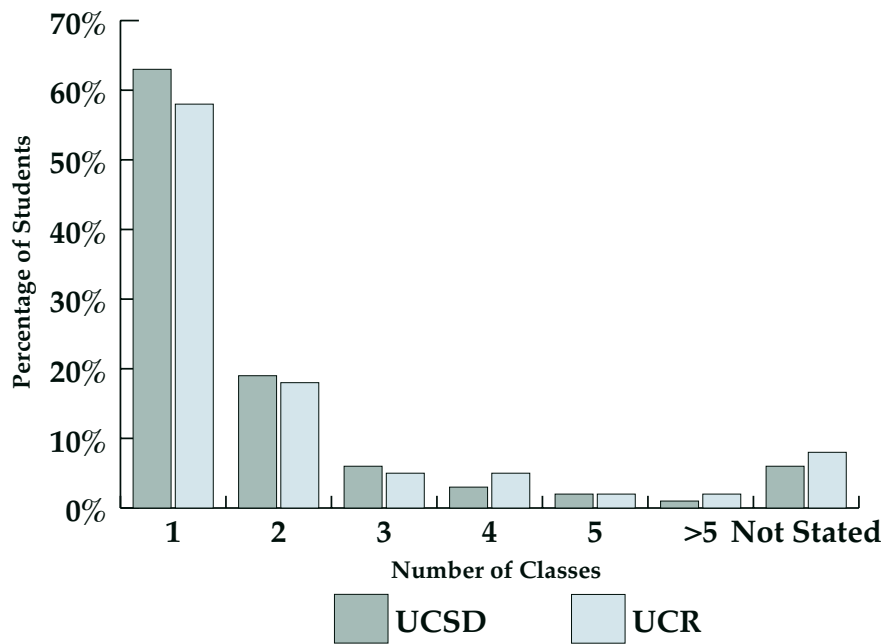
Figure 5.13 -- Number of Classes Pursued by Fall 2000 UCSD/UCR Extension Student Survey Respondents (Fall 2000 Quarter Only)
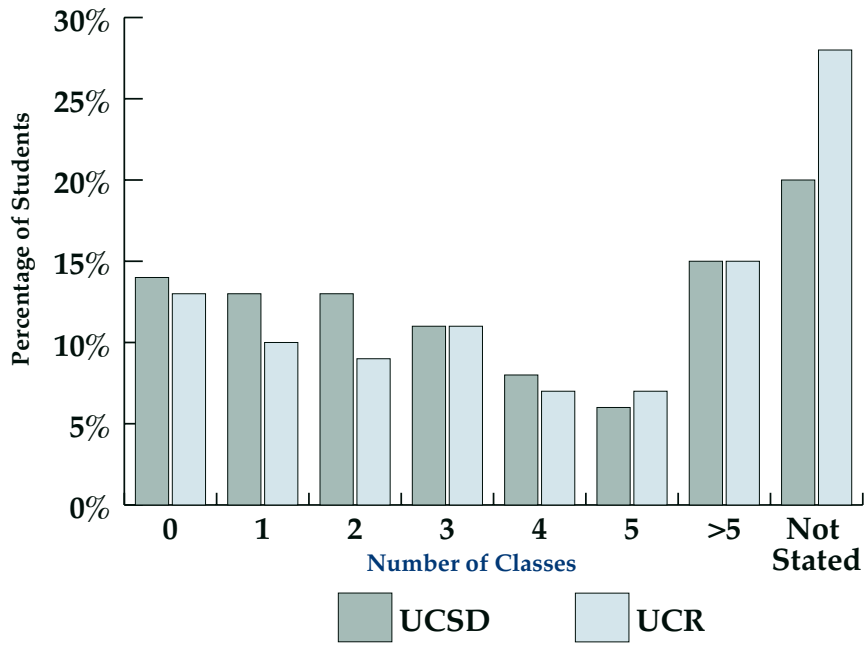
Figure 5.14 -- Number of Classes Taken by Fall 2000 UCSD/UCR Extension Student Survey Respondents (In Last 5 Years)
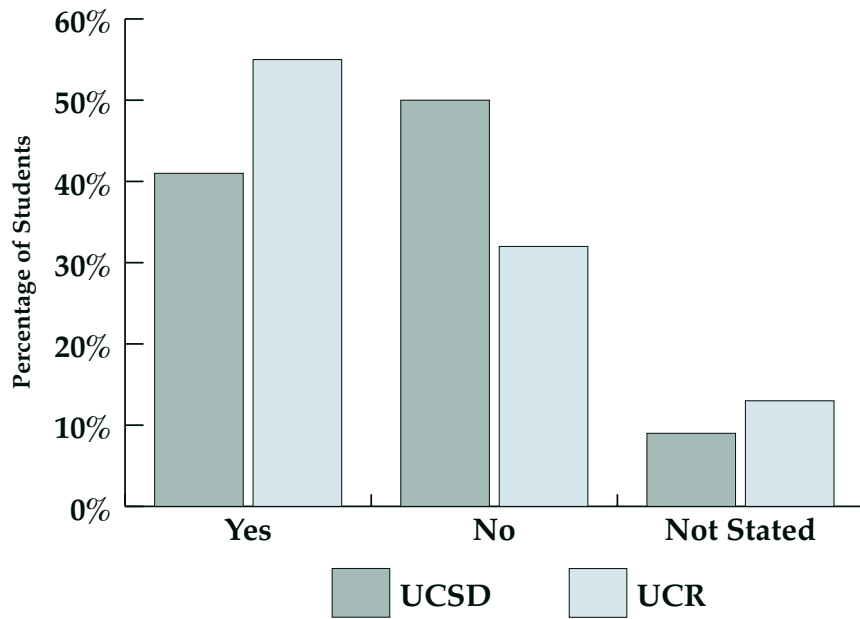
Figure 5.15 -- Percentage of Fall 2000 UCSD/UCR Extension Student Survey Respondents Enrolled in Certificate Programs
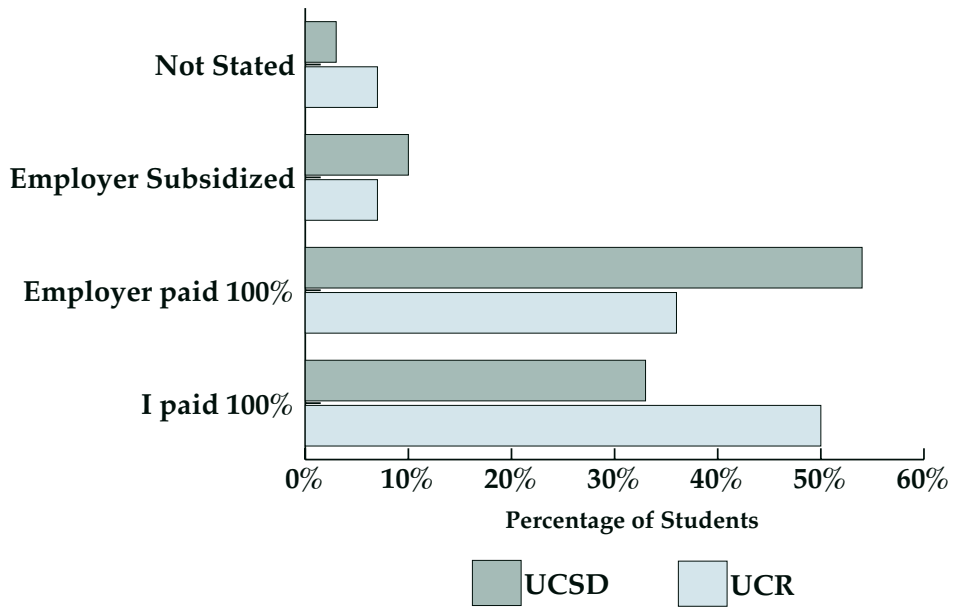
Figure 5.16 -- Who Paid Extension Course Fees (Tuition plus books) for Fall 2000 UCSD/UCR Extension Student Survey Respondents?
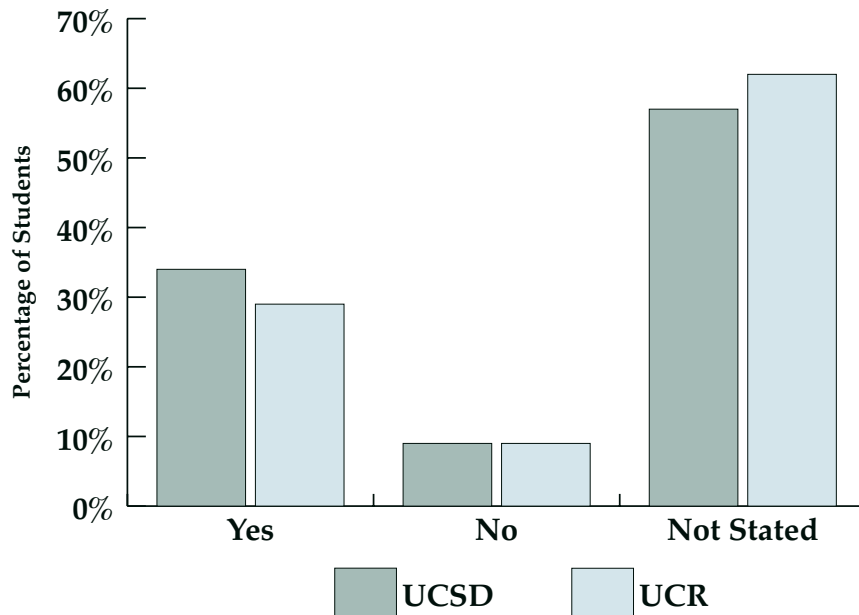
Figure 5.17 -- Is Employer Subsidy Tied to Extension Course Completion for Fall 2000 UCSD/UCR Extension Student Survey Respondents?
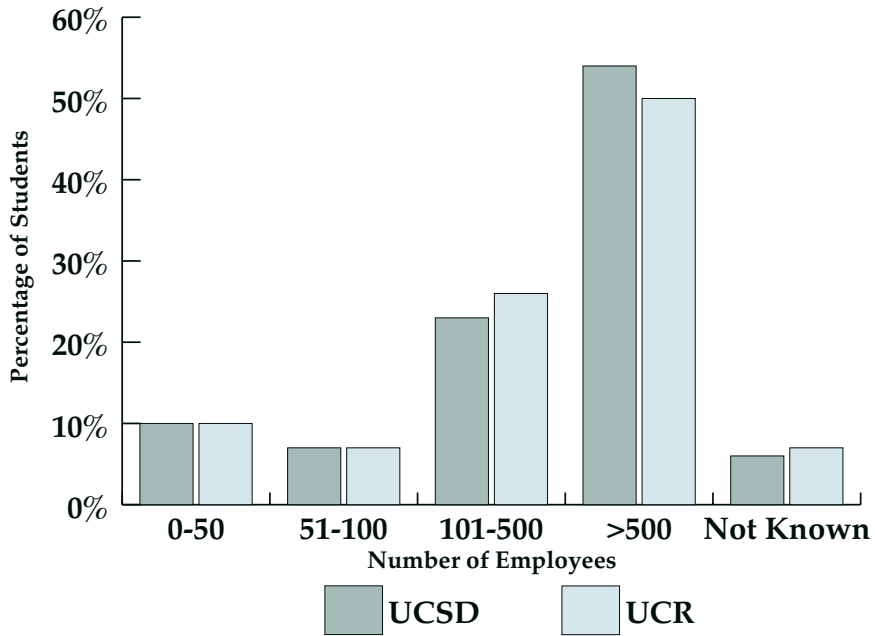
Figure 5.18 -- Employer Characteristics of Companies Subsidizing Fall 2000 UCSD/UCR Extension Student Survey Respondents' Course Taking Activities
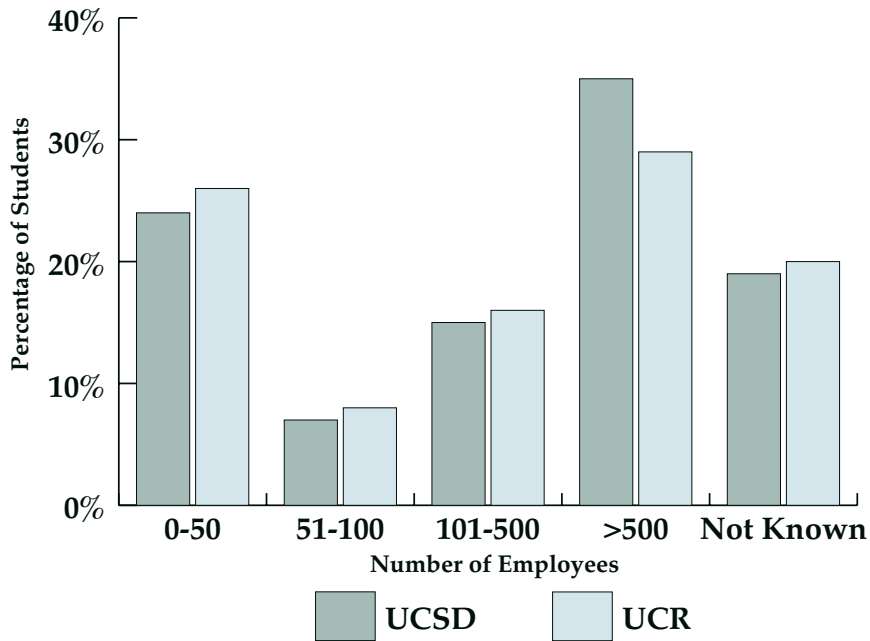
Figure 5.19 -- Employer Characteristics of Companies Not Subsidizing Fall 2000 UCSD/UCR Extension Student Survey Respondents' Course Taking Activities
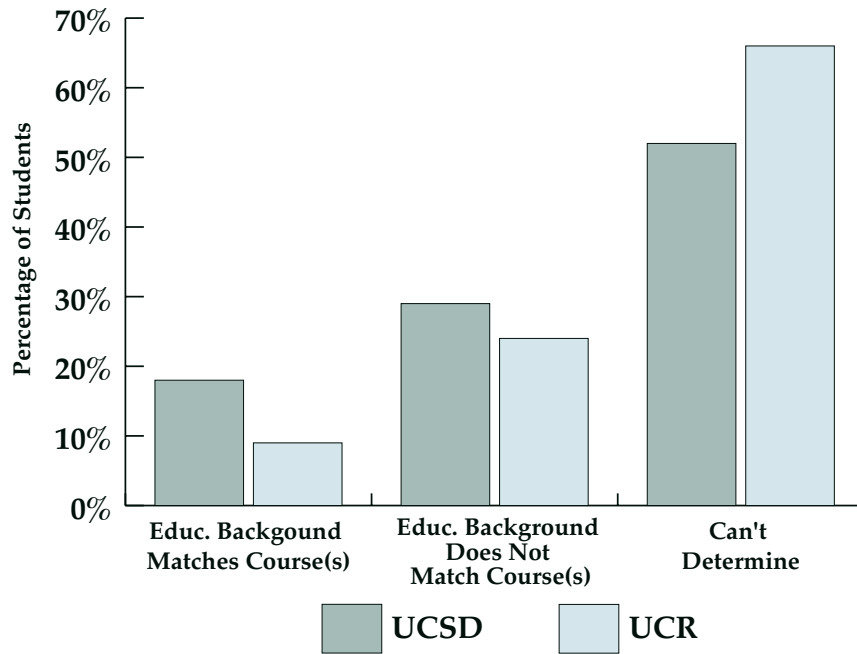
Figure 5.20 -- Is Extension Course Taking Congruent with Fall 2000 UCSD/UCR Extension Student Survey Respondents' Educational Background?
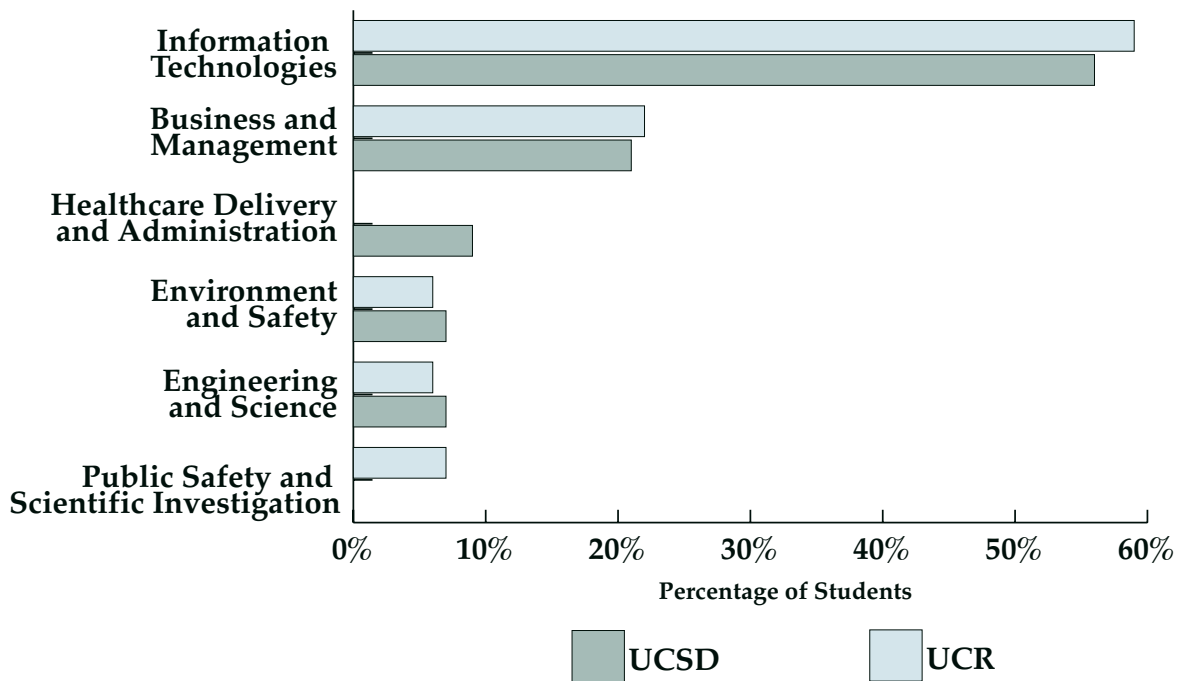
Figure 5.21 -- Subject Areas Pursued by Fall 2000 UCSD/UCR Extension Student Survey Respondents with Educational Backgrounds Not Congruent with Course Subject Area

Table 5.1

Fall 2000 UCSD/UCR Extension Student Survey Distribution and Response Rates

	UCSD	UCR
Number of Surveys Distributed	6,000	1,000
Number of Responses	1,916	355
Percent of Responses	*32%*	*36%*

Table 5.2

Is Student's Educational Background Congruent with Extension Course(s) Taken?
(Analysis of Fall 2000 UCSD/UCR Extension Student Survey)

	UCSD			UCR		
Student's Educational Background	**Yes**	**No**	**Unknown**	**Yes**	**No**	**Unknown**
Architecture	0	4	0	0	16	0
Arts and Humanities	0	64	0			
Business	84	109	0	22	13	0
Education	0	4	0			
Engineering	37	107	0	4	12	0
Environmental	5	7	0	0	2	0
Fine Arts	17	12	0	0	6	0
Information Technology	127	12	0	7	0	0
Medicine/Health Sciences	1	2	0	0	1	0
Nursing	16	3	0			
Science	61	113	0	0	10	0
Social Science	0	127	0	0	26	0
Other	0	0	37	0	0	9
Not Stated	0	0	967	0	0	227
Grand Total	348	564	1,004	33	86	236

6. ALTERNATIVE PATH TO COMPETENCY THROUGH COMMUNITY COLLEGE

Besides continuing education, another alternative path to competency for California's high-tech workforce is via community college. Community colleges provide two different routes to redirect students who may not have been admitted to a four-year institution out of the K-12 pipeline.[35] The first route is via completion of college level courses followed by transfer to a four-year institution. The other route is via completion of a vocational education program, frequently culminating in a certificate or an associate's degree. The total size of the student population taking advantage of these two routes is detailed in Tables 6.1 and 6.2.

6.1 CALIFORNIA COMMUNITY COLLEGE STATISTICS ON TRANSFER STUDENTS AND GRADUATES

The total number of transfer students has remained fairly constant and not grown substantially over the past decade (see Table 6.1).

During this same ten year time period, the total number of graduates have nearly doubled (see Table 6.2).

The majority of community college graduates are not pursuing training in high-technology related subject areas (e.g. science and technology, health sciences, or business). In fact, fully one third of all graduates in 1999 obtained associate's degrees or certificates in Liberal Arts, General Studies and Humanities. The ten most popular disciplines are shown in Figure 6.1 and a full list of disciplines is given in Appendix A.

More troubling, while the percentage of Liberal Arts graduates has remained steady over the past decade, the percentage of business, health, and science and technical graduates has declined precipitously. At the same time, the fields with the fastest growing percentages of graduates are in the fields of Protective Services and Vocational Home Economics. See Table 6.3, Figures 6.1, 6.2 and Appendix A for details. If increasing the number of community college graduates trained in science and technology related subjects is a desired policy goal, then these two issues (high percentage of Liberal Arts graduates and a declining percentage of S&T graduates) will have to be addressed.

Finally, unlike Extension certificate programs, community college degrees and certificates awarded under Health and Related Sciences are not specifically targeted to the biotech industry, e.g. there are no community college certificates for clinical trials management or regulatory affairs.

6.2 STUDENT LONGITUDINAL OUTCOMES STUDY (1993 FTF COHORT)

The system-wide statistics discussed in Section 6.1 detail gross statistics on graduates but reveal little about student motivations, progression towards goals or outcomes, nor can they be readily disaggregated for regional analysis. The data on transfer students also contain little information about students' intended major upon transferring to UC or CSU. To answer these questions, we turn to results from the Student Longitudinal Outcomes Study (SLOTS) of all first-year, full-time-freshman (FTF) entering the California Community College system between 1993 and 1999.[36] The following discussion is based on results from the 1993 FTF cohort as this cohort has been tracked for the longest period of time. The size of the 1993 FTF cohort totaled 352,150 students.

When surveyed about their goals initially upon entering community college, fully one-

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35 See J. Betts, *A Critical Path Analysis of California's K-12 Sector, California Council on Science and Technology, April 2001.*
36 For further details, see http://srtk.cccco.edu.

third desire to transfer to a four-year degree institution. Approximately a quarter of the students are undecided. This "un-informed" goal indicates the student's motivation, prior to contact with community college counseling staff. See Table 6.4 for details.

Students' subsequent actions and progression may or may not be congruent with these initial goals. Some may state a desired goal but do not pursue studies or take courses that match with the goal, (e.g. state a desire to transfer and do not take preparatory courses such as college level Math and English). Others may progress towards their desired goal for a while but never complete the required courses to transfer. While all colleges have counselors available to assist students in formulating educational goals and study plans, not all students meet with the counseling staff. Over 40% of all students do not respond when surveyed about their educational goals after being introduced to counseling services. Of the rest, the proportion reporting a desire to matriculate and transfer to a four-year institution remain relatively unchanged. However, the number of students who indicate desire to pursue vocational goals and complete their education with community college matriculation increases slightly after contact with college counselors. (See Table 6.4 and Appendix A for detail.)

The SLOTS data can also be used to measure students' progression towards their stated educational goal. The number of students from the 1993 cohort who attained a successful outcome (transfer, degree or certificate) peaks four years after entry into the community college system. Because most community college students combine work and study, it is not surprising to see such delays in achieving educational goals that would normally be completed in two years' of full-time study. See Figure 6.3 and Appendix A for details.

Student outcomes in any given year as measured by completion of an Associate's Degree or Certificate or successful transfer to UC or CSU are not high. Only 26% of the 1993 cohort completed a program of study. See Table 6.5.

Among students completing a program of study, the number of transfer students declaring science and engineering as their intended major is fairly high, totaling 4,041 or 29% of all students transferring to UC, and totaling 7,292 or 17.5% of all students transferring to CSU. Disciplines pursued by the 1993 cohort upon transfer are listed in Table 6.6 and Figure 6.4. Science is the most popular discipline for students transferring to UC, slightly edging out Arts and Humanities. For students transferring to CSU, Business and Management is the most popular declared major.

Finally, while the data are indicative of what students intend to study at their destination institutions, there is no way to check if the student's declared major upon transfer is actually the major they ultimately pursue. Also, since this data is not linked to students' transcript records, there is no way to check if a student has actually pursued a course of study at the community college level that suitably prepares them for their intended major at their destination institution.

The percentage of degrees and certificates awarded in subjects related to high-tech industries is not high. The most popular discipline completed was General Arts and Science. We examined the TOP2 and TOP4 titles of all degrees and certificates awarded and eliminated all TOP4 categories that are not relevant (e.g. automobile mechanics degrees and certificates in the Engineering and Engineering Related Technologies categories). Only 10% of graduates received degrees and awards in the science and technology (S&T) category. Expanding this to all Health related professions increases the total percentage to 19%. Finally adding Business and Administrative and Other categories increases the percentage to 32%. These percentages are very similar to those found by analyzing the

total degrees and certificates awarded annually.

6.3 A COMPARISON OF COMMUNITY COLLEGE OUTCOMES FOR TWO REGIONS (SAN DIEGO VERSUS THE INLAND EMPIRE)

Are students sensitive to regional workforce needs when they pursue training at community college? Are there any differences in subject area enrollments between San Diego county (a "high-tech" region) and Riverside-San Bernardino counties, commonly known as the Inland Empire (a "low tech" region)? We attempted to answer these questions using regional data from SLOTS. The size of the 1993 cohort in these two regions are approximately equal. The cohort size, by county, is given in Table 6.8.

The initial uninformed goal of students in all three counties follow similar patterns. The most popular goal is to obtain an associate's degree and transfer to UC or CSU. Over one quarter of all students in the cohort indicated this as their goal. See Appendix A for details.

Student outcomes for these three counties do not differ significantly from system-wide norms, but there are subtle regional differences. Among San Diego region students transferring to UC, Arts and Humanities (27.7%) and Sciences (27.6%) were equally popular. For Inland Empire students, the most popular discipline among students transferring to UC was Social Sciences (34.9%), followed by Arts and Humanities (28.4%) with Sciences (20.1%) in third place. Among students from both regions transferring to CSU, the most popular disciplines chosen include Business, Arts and Humanities and Social Sciences. Only 15% of CSU transfer students chose to major in Science or Engineering disciplines. While a higher percentage of UC bound students from the San Diego region indicate a desire to pursue Science and Engineering, it is not clear if the prevalence of high-tech jobs in the local economy factored into their decisions.

This regional student outcome data also reveals some interesting observations of interest to policy makers. Fully 60% of all community transfer students from both regions transferred to UC or CSU campuses *in their region*. The number of successful outcomes peak four to five years after initially entering the California Community College System. For a two year degree or transfer program, this means that students may take twice as long to matriculate as the program states. See Table 6.10 and Figures 6.5 and 6.6 for details.

A recent UCSD study examined transfer student performance after entering UCSD.[37] Major conclusions from this study indicate that transfer students' performance at UCSD did not differ substantially from regularly admitted students on a variety of measures (GPA's, time to completion and graduate rates). However, if transfer students' attrition rates are higher and their progression towards educational goals are longer than regularly admitted university students, then there is the distinct possibility that we may be losing many students in this pipeline.

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37 *UCSD Student Digest*, UCSD Office of Student Research and Information, Fall 2000.
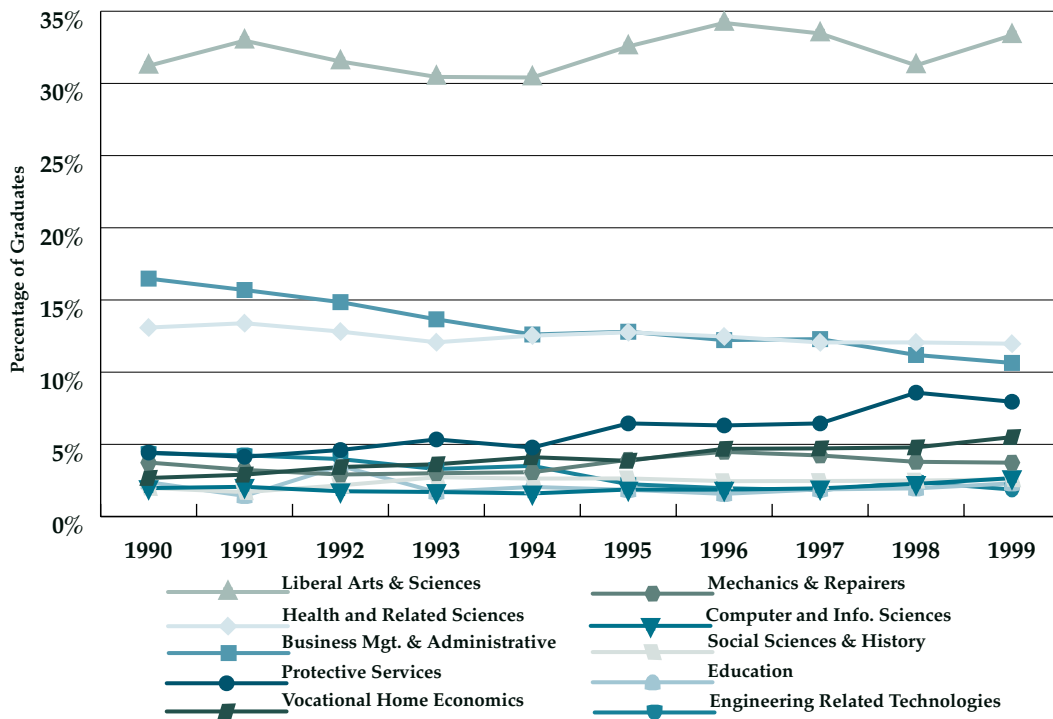
Figure 6.1 -- 10 Most Popular Disciplines Pursued by California Community College Degree and Certificate Graduates (1989-99)
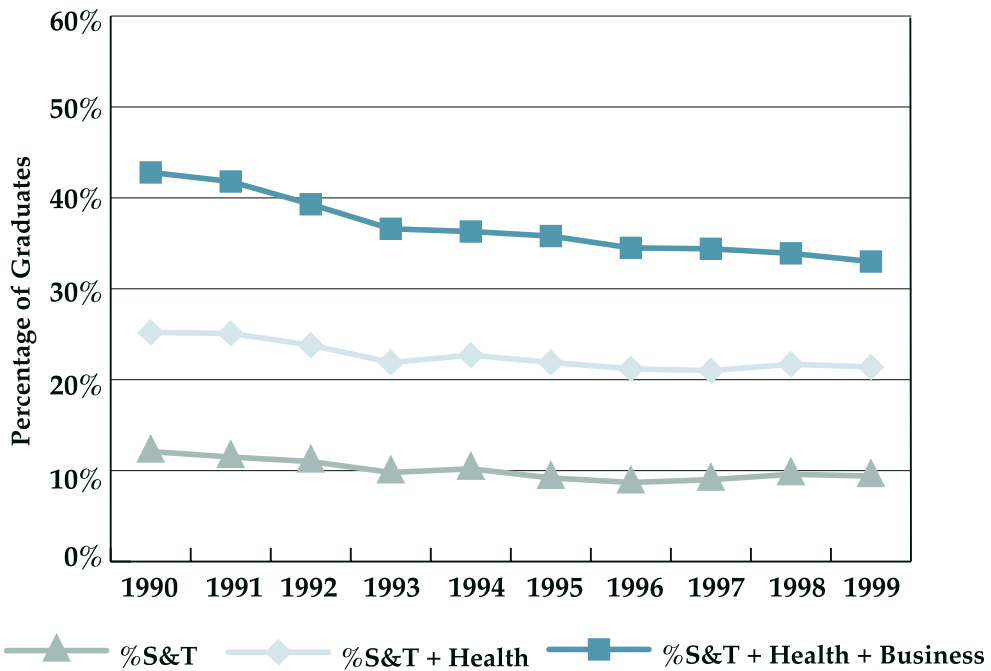
Figure 6.2 -- Percentage of Science and Technical Graduates from California Community Colleges (Academic Year 1989-1999)
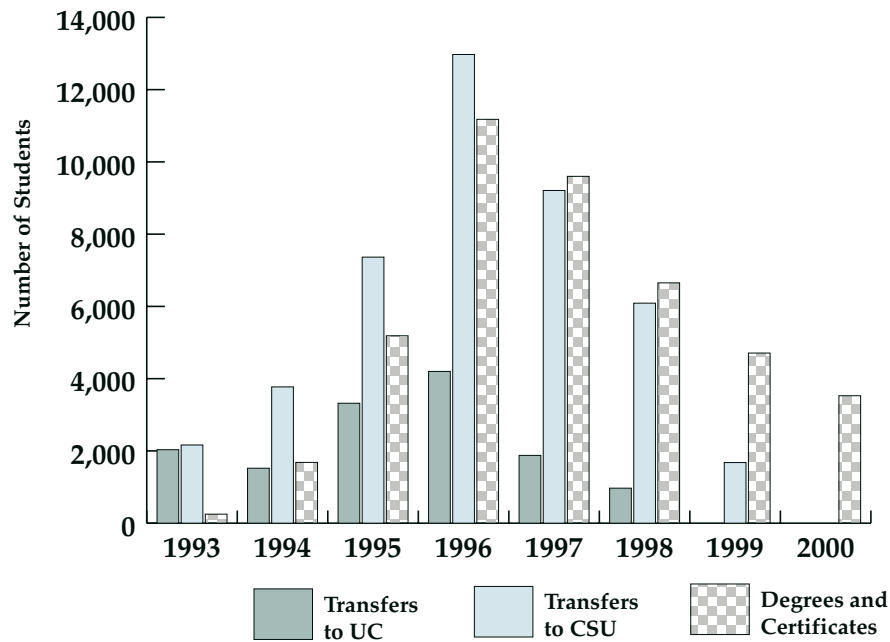
Figure 6.3 -- 1993 FTF Cohort Progression Towards Educational Goals
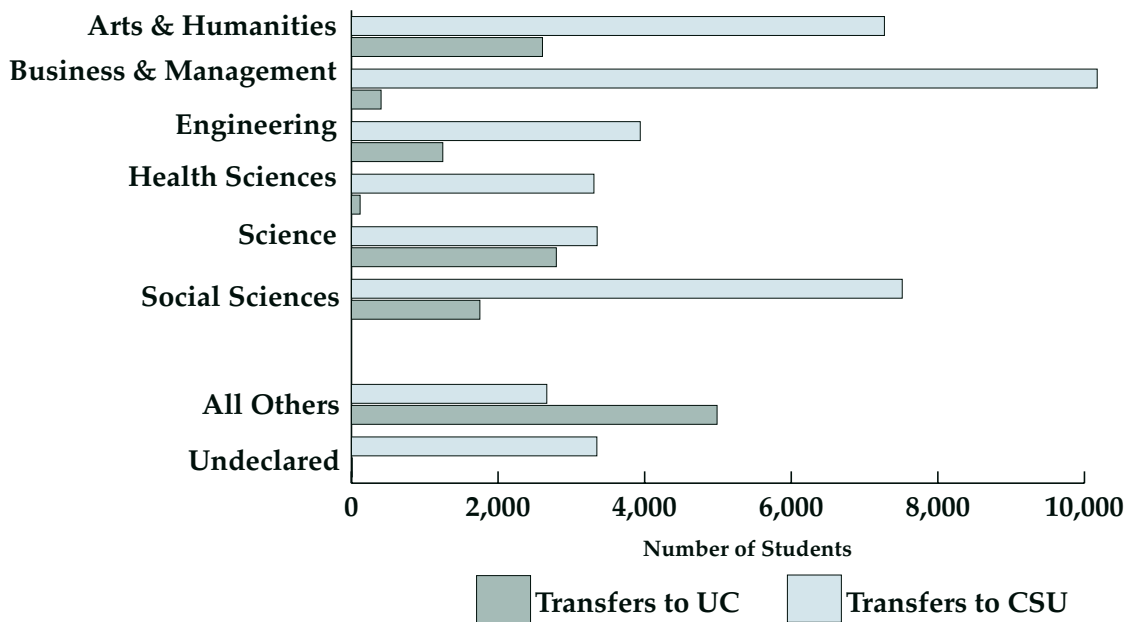
Figure 6.4 -- Aggregated Disciplines Pursued by the 1993 FTF Cohort, Upon Transfer to UC and CSU, Aggregated Between 1993 and 1998
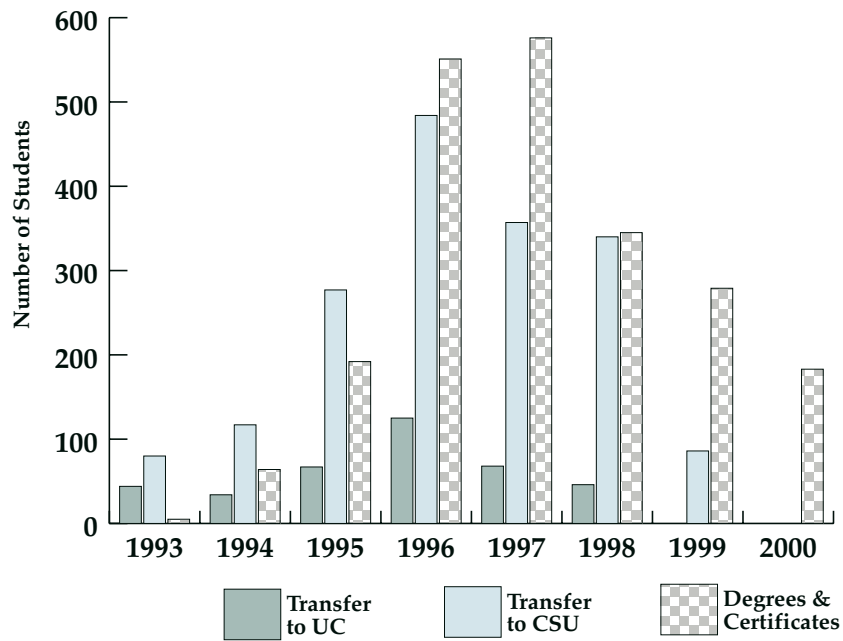
Figure 6.5 -- Progression Towards Educational Goals, 1993 FTF Cohort from Inland Empire
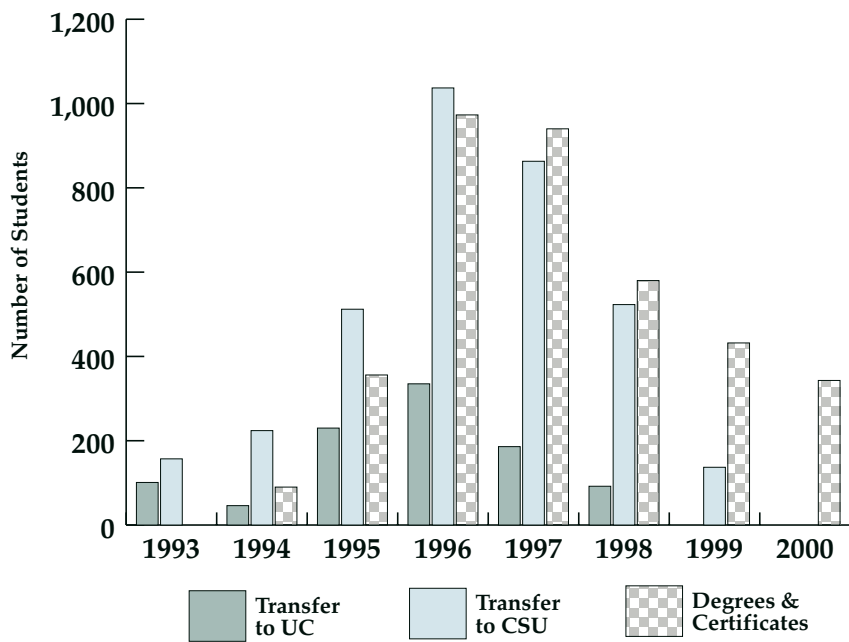
Figure 6.6 -- Progression Towards Educational Goals, 1993 FTF Cohort from San Diego County

Table 6.1
California Community College Transfer Students, by Segment, Full Year 1989-90 through 1998-99[38]

Full Year	Total CCC Transfer Students	To University of California	To California State University	To Independent Institutions [39]
1989-90	**59,492**	8,164	45,713	5,615
1990-91	**60,978**	10,032	46,670	4,276
1991-92	**59,510**	9,972	44,898	4,640
1992-93	**53,979**	9,993	40,976	3,010
1993-94	**58,510**	10,940	44,420	3,150
1994-95	**61,087**	10,929	46,912	3,246
1995-96	**62,368**	10,886	48,688	2,794
1996-97	**61,930**	10,492	48,349	3,089
1997-98	**58,270**	10,210	45,545	2,515
1998-99	**57,912**	10,161	44,989	2,762

Table 6.2
Associate Degrees and Certificates Awarded at the California Community Colleges and
Independent Institutions, 1989-90 through 1998-99[40]

Year	California Community Colleges				Independent Institutions [41]		
	Associates' Degrees	Unknown Degrees	Certificates [42]	Total Degrees & Certificates	Associates' Degrees	Pre-Bacc. Certificates	Total Degrees & Certificates
1989-90	38,548		16,496	55,044	2,261	2,248	4,509
1990-91	42,529		16,136	58,665	1,166	2,036	3,202
1991-92	40,453	449	17,068	57,970	1,403	2,338	3,741
1992-93	50,897	534	21,547	72,978	3,393	1,905	5,298
1993-94	49,553	1,070	20,454	71,077	2,951	1,514	4,465
1994-95	50,947	1,322	21,221	73,490	3,399	2,251	5,650
1995-96	53,010	1,309	22,522	76,841	4,300	2,745	7,045
1996-97	59,068	1,214	25,569	85,851	8,619	10,256	18,875
1997-98	61,040		30,809	91,849	8,163	18,784	26,947
1998-99	64,046		32,444	96,490	10,947	5,412	16,359

38 *Student Profiles 2000*, California Postsecondary Education Commission, November, 2000.

39 Full Year Data is not available for the Independent Institutions. Fall figures are provided. A variable number of Independent institutions have reported each year.

40 *Student Profiles 2000*, California Postsecondary Education Commission, November, 2000.

41 Includes only those data reported by member institutions of the Association of Independent California Colleges and Universities. Data fluctuations may indicate inconsistent year-to-year reporting by independent institutions.

42 All certificates, including the following categories: <1 year, 1-2 years, 2-4 years.

Table 6.3
Percentage of California Community College Graduates in Science and Technology, Health Sciences
and Business and Management (1989-90 through 1998-99)

	S&T	S&T + Health	S&T + Health + Business	TOTAL	%S&T	%S&T + Health	%S&T + Health + Business
1990	6,398	13,321	22,586	52,821	12.1%	25.2%	42.8%
1991	6,602	14,372	23,930	57,263	11.5%	25.1%	41.8%
1992	5,968	12,918	21,334	54,263	11.0	23.8%	39.3%
1993	6,724	15,010	25,158	68,648	9.8%	21.9%	36.6%
1994	6,795	15,158	24,235	66,763	10.2%	22.7%	36.3%
1995	6,294	15,038	24,528	68,547	9.2%	21.9%	35.8%
1996	6,381	15,489	25,178	73,047	8.7%	21.2%	34.5%
1997	7,261	17,030	27,824	80,975	9.0%	21.0%	34.4%
1998	8,510	19,207	30,045	88,671	9.6%	21.7%	33.9%
1999	8,802	20,022	30,918	93,728	9.4%	21.4%	33.0%

Table 6.4
Student Motivations (Un-Informed Goals) for Pursuing Community College Studies, 1993 First-
Time Freshmen (FTF) Cohort

EDUCATIONAL GOAL	Uninformed Goal (N = 352,150)	Informed Goal (N = 195,292)
Degree + Transfer	24.67%	25.00%
Undecided	19.11%	23.24%
Transfer, no degree	9.78%	10.04%
Acquire job skills	8.44%	7.64%
Update job skills	5.46%	3.62%
Uncollected/unreported	5.28%	--
Educational Development	5.04%	4.23%
Associate's Degree, no transfer	5.01%	6.26%
Formulate career interests	4.39%	4.17%
Basic Skills	3.48%	4.35%
Vocational Certificate, no transfer	3.28%	4.54%
Vocational Degree, no transfer	2.73%	3.73%
Maintain license	1.77%	1.57%
Complete GED	1.55%	1.59%
TOTAL	100.00%	100.00%

Table 6.5
1993 FTF Cohort Student Outcomes, Aggregate Between 1993 and 1998[43]

OUTCOME	No. of Students	% of Cohort (N = 352,150)
Transfer to UC	13,920	3.95%
Transfer to CSU	41,572	11.81%
Graduate with Associate's Degree or Certificate	34,548	9.81%
TOTAL	90,040	25.57%

Table 6.6
Aggregated Disciplines Pursued by the 1993 FTF Cohort, Upon Transfer to UC and CSU
Aggregated Between 1993 and 1998

Subject/Discipline	Transfers to UC		Transfers to CSU	
	No. of Students	% of Students	No. of Students	% of Students
Arts & Humanities	2,606	19%	7,271	18%
Business & Management	404	3%	10,174	25%
Engineering	1,246	9%	3,940	9%
Health Sciences	118	1%	3,308	8%
Science	2,795	20%	3,352	8%
Social Sciences	1,752	13%	7,514	18%
All Others	4,988	36%	2,665	6%
Undeclared	11	0%	3,348	8%
TOTAL	13,920	100%	41,572	100%

Table 6.7
Degrees and Certificates Awarded to the 1993 FTF Cohort in High-tech Related Subjects (Science and Technology, Health, or Business and Administrative), Aggregated Between 1993 and 1998

Aggregated Subjects	Total Degrees and Certificates	Percentage
Science	1,356	3.17%
Engineering	2,921	6.83%
Health	3,723	8.70%
Business & Management	5,173	12.09%
Other Related	515	1.20%
S&T	4,277	10.00%
S&T + Health	8,000	18.70%
S&T + Health + Business	13,688	31.99%
TOTAL	42,785	100.00%

43 Data between 1993 and 1998 are reported here because UC data for 1999 and UC and CSU data for 2000 are not available yet.

Table 6.8

1993 First Time Freshman (FTF) Cohort Entering Community Colleges in Riverside, San Bernardino
and San Diego Counties

County	No. of Students
Riverside	11,897
San Bernardino	9,569
San Diego	28,179

Table 6.9

Disciplines Pursued by Community College Students from Inland Empire and San Diego Regions
Upon Transferring to UC or CSU (1993 FTF Cohort)

Discipline	Inland Empire (Riverside-San Bernardino Counties)				San Diego County			
	CCC to CSU		CCC to UC		CCC to CSU		CCC to UC	
Agriculture	14	-0.8%	0	0.0%	22	-0.6%	4	-0.1%
Architecture and Urban Planning	5	-0.3%	0	0.0%	31	-0.9%	0	0.0%
Arts and Humanities	383	-22.0%	109	-28.4%	741	-21.5%	274	-27.7%
Business	376	-21.6%	9	-2.3%	792	-22.9%	17	-1.7%
Education	26	-1.5%	0	0.0%	38	-1.1%	0	0.0%
Engineering	107	-6.2%	21	-5.5%	238	-6.9%	66	-6.7%
Health Sciences	130	-7.5%	2	-0.5%	315	-9.1%	5	-0.5%
Journalism	13	-0.8%	0	0.0%	63	-1.8%	0	0.0%
Other	7	-0.4%	32	-8.3%	2	-0.1%	84	-8.5%
Science	163	-9.4%	77	-20.1%	252	-7.3%	273	-27.6%
Social Sciences	406	-23.3%	134	-34.9%	673	-19.5%	267	-27.0%
Undeclared	111	-6.4%	0	0.0%	286	-8.3%	0	0.0%
Grand Total	1,741		384		3,453		990	

Table 6.10

Destination UC or CSU Campus of 1993 FTF Cohort From Inland Empire and San Diego Regions,
Aggregated Between 1993 and 1998

	No. of Students	% of students
From Inland Empire:		
To CSU San Bernardino & Cal Poly Pomona	1,182	67.9%
To all other CSU campuses	559	32.1%
To UCR	228	59.4%
To all other UC campuses	156	40.6%
From San Diego County:		
To SDSU and CSU San Marcos	2,521	73.0%
To all other CSU campuses	932	27.0%
To UCSD	598	59.4%
To all other UC campuses	392	39.6%

50

7. RESEARCH IMPLICATIONS AND POLICY RECOMMENDATIONS

Clearly, our research suggests the need for some entity within the State of California, to do a much better job of gathering data on the varieties of institutions and programs addressing the science and technology education and training needs of the state. Our very preliminary data suggests that non-state funded programs represent a significant contribution to the manpower development activities of the state. Reports by organizations such as the American Society of Training and Development have indicated that corporate universities and corporate education have begun to overshadow all the publicly funded efforts of our colleges and universities across the United States. However, these publicly funded institutions, as our data reveal, also operate important self-funded education and training programs which amplify their role in their region many times more than their traditional degree program enrollments would suggest.

A second implication we would like to venture is that it is possible that the role of community colleges and the CSU system in workforce education and training has been somewhat overstated, while the role of the University of California in workforce education and training, especially in science and technology related skills and competencies, has been somewhat understated. The work of Darby and Zucker[44] on degrees awarded in science and technology fields underscores the leading role played by UC. In addition, the data reported in this study underscores the extent to which UC's Extension divisions are providing post baccalaureate skills and knowledge in engineering, biotechnology, computer design and programming, and the application of new information technologies to traditional industries. Both the State and the University of California have been doing themselves a disservice by not properly documenting the role these educational divisions play in their regional economies. The CSU and California Community College systems may wish to expand programs and activities in science and technology relevant fields based on the very encouraging data on tuition reimbursement provided by the UC system. In one year alone, the nine campuses of the University of California were able to generate more than $185 million dollars in private support for post-baccalaureate education and training through their Extension divisions. This represents private funding of education and training that has enormous public benefits and it's probable that more strategic public/private partnerships between community college and CSU campuses at the regional level could yield expanded services to regional employers.

Because most economic development and workforce development agencies only track government funded programs, we lack a truly comprehensive picture of what is going on in the state. We need to rebalance that picture. There needs to be some mechanism by which corporate universities, company based education and training, private not-for-profit education and training programs as well as the fee-based education and training programs within the publicly funded systems of higher education in the state, are documented and analyzed. In a knowledge-based economy, human capital development strategies are a critical component of economic competitiveness. It is impossible to plan for the future or leverage current resources without this kind of comprehensive data to describe both the public and private investment in education and training.

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44 Michael R. Darby and Lynne G. Zucker, "California's Science Base: Size, Quality and Productivity", A Report to the California Council on Science and Technology, Feb. 3, 1999.

Based on our findings, we are making the following policy recommendations:

1. We would recommend annual reports that document and analyze the following kinds of questions:

   a) What are the actual enrollments campus-by-campus and statewide post-secondary and post-baccalaureate continuing education and certificate programs in science and technology disciplines, in the UC, CSU and community college systems?

   b) What are the enrollments in independent and proprietary institutions?

   c) What is the extent of corporate university/corporate education activity in science and technology related fields?

2. There needs to be some state investment in dissemination of periodic reports on these types of education and training programs. This can be accomplished through consolidating the type of information from the surveys and enrollment data provided in this report.

3. Regional science and technology related continuing education enrollments should be analyzed in terms of how they track not only skill development in new and emerging fields of science and technology but, in terms of how they have been designed to help upgrade skills of citizens working in traditional industries (e.g. the incorporation of IT into the apparel industry).

4. Finally, it is important to evaluate the perceived value and impact of these programs. This means surveying Extension students and corporations directly about their evaluations of the quality of these continuing education programs and the relevance of these programs to workforce training needs.

In conclusion, it is clear we need to do a better job of developing data on California's valuable workforce and it's education and training resources. Important resources are available through a variety of private/public partnerships, quasi privatized and fully privatized providers of workforce education and training as well as the public sector.

UCSD Extension/California Council on Science and Technology
Confidential High Tech Industry Workforce Training Survey

The California Council on Science and Technology is undertaking this survey to better understand the role that UC Extension programs play in workforce training for California's high technology industries. On behalf of the Council, UCSD Extension would like to thank you for your participation in this survey. Individual responses will be held in confidence and results aggregated to preserve anonymity. If you have questions, please contact Carolyn Lee, UCSD Extension, 9500 Gilman Drive, MC 0176-O, La Jolla CA 92093-0176, or email cwlee@ucsd.edu.

*****PLEASE DARKEN CIRCLES COMPLETELY. Incompletely filled circles cannot be read by the scanner.*****

If you have already completed this survey once in another class, DO NOT SUBMIT THIS SURVEY AGAIN.

Course/Event Title:_____

Course No.: _____ **Section No. (if known):** _____

Student Profile: **Sex:** ❍Male ❍Female **Age:** ❍ <25 ❍ 25-34 ❍ 35-44 ❍ 45-54 ❍ >54 **Home Zip Code:**_____

Highest Educational Attainment: ❍ High School Diploma/GED ❍ Some college experience ❍ Associates' Degree
❍ Bachelor's Degree Please indicate field_____
❍ Masters' Degree Please indicate field_____
❍ Ph.D./M.D./J.D. Please indicate field_____

Occupational History: **Are you currently employed?** ❍ Yes ❍ No ❍ Retired **Work Zip Code:**_____

How many years have you been with current (or most recent) employer: ❍ 0-5 yr. ❍ 5-10 yr. ❍ 10-20 yr. ❍ >20 yr.

What is your current (or most recent) occupation or working title:_____

What is your current (or most recent) function within your organization?
❍ Scientific or Research Oriented   ❍ Engineering or Technical   ❍ Information Systems
❍ Business Administration   ❍ Manufacturing or Production   ❍ Other _____

What management responsibility do you hold (or did you hold) within your organization?
❍ None   ❍ Low-Level Supervisor   ❍ Mid-Level Management   ❍ Senior Executive

What is your current salary range? ❍ <$25,000 ❍ $25-50,000 ❍ $50-75,000 ❍ $75-100,000 ❍ >$100,000

Employer Characteristics: Name of Current (or Most Recent) Employer?_____

How many employees are there in your entire company (not local unit)? ❍ 0-50 ❍ 51-100 ❍ 101-500 ❍ >500

How would you categorize your employer? ❍ Private Industry ❍ Educational Institution ❍ Government (Military)
❍ Government (Non-Military)   ❍ Other Non-Profit (please specify)_____

If you work in the private sector, does your employer belong to any of the following industry clusters? *(choose one only)*

❍ Biomedical Products   ❍ Computer Software & Services   ❍ Fruits, Vegetables, Horticulture
❍ Biotechnology and Pharmaceuticals   ❍ Defense & Transportation   ❍ Manufacturing
❍ Business Services   ❍ Entertainment & Amusement   ❍ Medical Services
❍ Communications   ❍ Environmental Technology   ❍ Recreational Goods Manufacturing
❍ Computer & Electronics   ❍ Financial Services   ❍ Visitor Industry Services
  Manufacturing

Course Objectives: How many Extension courses are you taking this quarter?_____ **In the last 5 years?**_____

Are you currently enrolled in a certificate program? ❍ No ❍ Yes (Please specify)_____

Who paid the costs for this course? (Total cost = tuition + books + other course materials)

❍ I paid 100%   ❍ My employer paid 100%   ❍ My employer subsidized _____% of the cost

Please answer the following questions ONLY if your course cost was subsidized:

Is the cost subsidy tied to course completion? ……………………………………………………… ❍ Yes ❍ No
Is the cost subsidy tied to a course performance incentive (example: higher grade = larger subsidy)……❍ Yes ❍ No
Is your cost subsidy tied to completion of a certificate program? ………………………………… ❍ Yes ❍ No

Why are you taking this course? *(choose one only)* ❍ Career advancement ❍ Career Maintenance/Skills Upgrading
 ❍ Career Change ❍ Personal/Not Work Related

If you are taking this course as part of a career change, what field are you changing
from?_____to?_____

Figure A.1 -- Fall 2000 UCSD/UCR Extension Student Survey Instrument

Table A.1

Selected Sources of Funding for University of California Extension Divisions (FY 1999-2000), by Campus[45]

Campus	Student Fees	Local Govt. Grants	CA Govt. Grants	Federal Grants	Total Income
UCB	102.03%				$44,101,016
UCD	82.06%		13.58%	0.88%	$21,226,113
UCI	99.14%			0.13%	$15,226,298
UCLA	97.67%	0.16%	0.27%	0.02%	$41,335,136
UCR	93.42%		2.13%	0.57%	$11,329,895
UCSB	99.15%				$5,372,011
UCSC	93.93%		0.72%	3.37%	$22,459,297
UCSD	84.99%		5.95%	1.09%	$23,271,540
Total	94.76%	0.04%	2.59%	0.70%	$184,321,306

Table A.2

UC Extension and Statewide Program Enrollments, FY 1990-1991 through FY 1999-2000[46]

Fiscal Year	Extension Enrollment	Concurrent Enrollment	Total Enrollment
1990-1991	386,430	12,987	399,417
1991-1992	397,394	14,196	411,590
1992-1993	402,682	13,935	416,617
1993-1994	402,089	13,914	416,003
1994-1995	419,992	11,976	431,968
1995-1996	431,231	12,145	443,376
1996-1997	441,331	11,997	453,328
1997-1998	451,738	11,724	463,462
1998-1999	433,301	11,191	444,492
1999-2000	432,161	10,470	442,631

Table A.3

CSU College of Extended Studies System-wide Enrollments, FY 1995-1996 through FY 1999-2000[47]

Fiscal Year	Extension (credit)	Extension (non-credit)	Open University	Special Session	Total Enrollment
1995-1996	40,883	57,191	44,272	57,478	199,824
1996-1997	48,113	76,304	43,552	61,101	229,070
1997-1998	55,177	78,053	44,041	70,262	247,533
1998-1999	46,490	78,665	44,021	66,670	235,846
1999-2000	40,103	103,819	48,394	70,332	262,648

45 1999-2000 UCOP Annual Statistical and Financial Report on University of California Extension and Statewide Programs.

46 Ibid.

47 CSU Office of Extended Education, internal report, December, 2000.

Table A.4
UC Extension Enrollments, by Subject Areas (FY 1999-2000)

	1998	1999	2000
Agriculture	5,813	6,361	6,649
Arts & Humanities	61,691	71,286	77,521
Business & Management	63,815	62,696	62,276
Education	47,360	47,022	47,933
Entertainment Studies[48]	14,532	12,063	11,479
Envir. Management	15,331	13,732	13,947
Health Sciences	8,675	7,767	7,254
Human Services[49]	45,951	50,098	48,889
Information Technology	56,126	55,775	60,063
International Programs	37,219	32,378	31,356
Legal Programs[50]	3,420	3,205	3,025
Science & Engineering[51]	32,539	31,678	33,934
Total	392,472	394,061	404,326

Table A.5
UC Extension Enrollments, by Campus and Subject Areas (FY 1999-2000)

	UCB	UCD	UCI	UCLA	UCR	UCSB	UCSC	UCSD	Total
Agriculture	0	5,712	0	0	937	0	0	0	6,649
Arts & Humanities	20,014	13,920	4,221	21,986	2,411	2,363	10,779	1,827	77,521
Business & Management	11,095	3,501	7,816	18,395	3,711	1,887	8,751	7,120	62,276
Education	3,513	3,016	2,160	15,689	9,460	2,829	4,942	6,324	47,933
Entertainment Studies	0	0	0	11,479	0	0	0	0	11,479
Envir. Management	3,919	3,510	0	156	1,616	172	1,823	2,751	13,947
Health Sciences	0	0	0	1,397	193	629	3,045	1,990	7,254
Human Services	0	48,233	656	0	0	0	0	0	48,889
Information Technology	5,770	4,342	6,996	14,359	2,064	1,384	14,912	10,236	60,063
International Programs	4,120	1,182	7,007	7,576	3,885	965	680	5,941	31,356
Legal Programs	0	331	589	1,370	0	322	413	0	3,025
Science & Engineering	13,523	0	561	6,640	742	0	9,375	3,093	33,934
Total	61,954	83,747	30,006	99,047	25,019	10,551	54,720	39,282	404,326

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48 These enrollments are specific to UCLA.

49 These enrollments are specific to UC Davis.

50 This figure excludes UCSD Legal Program enrollments. UCSD aggregates these under Business and Management.

51 This figure includes UC Berkeley Engineering enrollments but excludes Science enrollments. UC Berkeley aggregates Science under a category called "Arts, Letters and Science." These enrollments have been aggregated under Arts and Humanities instead.

Table A.6
FY 1999-2000 UC Extension Enrollments in Science and Technology Subject Areas[52] (Total Enrollment = 404,326)

	Total S&T Enrollment	Business & Management Enrollment	% S&T Enrollment	% (S&T + Business & Management) Enrollment
UCB	23,212	11,095	37.5%	55.4%
UCD	7,852	3,501	9.4%	13.6%
UCI	7,557	7,816	25.2%	51.2%
UCLA	34,031	18,395	34.4%	52.9%
UCR	4,615	3,711	18.4%	33.3%
UCSB	2,185	1,887	20.7%	38.6%
UCSC	29,155	8,751	53.3%	69.3%
UCSD	18,070	7,120	46.0%	64.1%
Systemwide	*126,677*	*62,276*	*31.3%*	*46.7%*

Table A.7
UC Certificate Program Offerings, by Subject Area (FY 1999-2000)

Subject Areas	Total
Architecture	4
Arts & Humanities	11
Behavioral Sciences	18
Business & Management	162
Education	75
Engineering	37
Entertainment	13
Environmental Management	25
Health Sciences	22
Information Technology	135
Legal	17
Science	16
Other	27
Total No. of Programs	**562**

52 Science and Technology subject areas include: Environmental Management, Health Sciences, Information Technologies, Science and Engineering, and Entertainment Studies (UCLA only). UCLA's Entertainment Studies is a high-tech area because these program offerings are specifically geared to "behind the scenes" film industry trades such as cinematography, sound effects, visual effects, animation, world wide web and interactive media.

CSU Certificate Program Offerings, by Subject Area (FY 1999-2000)

Subject Areas	Total No. of Certificate Programs
Arts & Humanities	16
Business & Management	117
Education	24
Engineering	12
Environmental Management	8
Health Sciences	23
Information Technology	106
Legal	23
Science	6
Other	25
Total No. of Programs	**360**

Table A.9

Comparing Lifelong Learning Program Enrollments in San Diego and Riverside-San Bernardino Counties (FY 1999-2000)[53]

San Diego County	Regular (FT/PT) Enrollments	Extension Enrollments	Continuing Ed.[*] Enrollments
UCSD	18,054	40,242	41,418
SDSU	31,040	19,474	51,336
CSU San Marcos	5,758	2,979	7,854
Aggregated Community College Districts	163,453	NA	NA
Total	*218,305*	*62,695*	*100,608*
Riverside-San Bernardino Counties			
UCR	11,224	27,808	28,726
CSU San Bernardino	14,168	2,238	5,898
Aggregated Community College Districts	95,489	NA	NA
Total	*120,881*	*30,046*	*34,624*

* Continuing Education (UC) = Extension + Concurrent Enrollments
Continuing Education (CSU) = Extension + Open University + Special Session

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53 Data Sources:
    UCOP Annual Statistical Summary of Students
    CSU Annual Statistical Reports
    UC Extension and Statewide Programs, Annual Statistical and Financial Reports
    CSU Office of Extended Education internal report (converted from FTE data)
    CA Community Colleges Chancellor's Office, MIS Statistical Library

Table A.10
UCSD Division of Extended Studies, Enrollments by Subject, FY 1997-1998 through FY 1999-2000
(In Descending Size of Enrollments)

Subject Area	1998	1999	2000
Information Technology	7,179	8,000	10,236
Business & Management	5,578	6,776	7,120
Education & Behavior	4,910	5,964	6,324
International Programs	6,047	5,764	5,941
Science & Engineering	1,112	2,567	3,093
Environmental Management	3,570	2,723	2,751
Healthcare	2,574	1,773	1,990
Liberal Arts	1,349	1,367	1,827
Concurrent Enrollment	1,430	1,112	1,176
Total	33,749	36,046	40,458

Table A.11
SDSU's College of Extended Studies, Enrollments by Subject, FY 1997-1998 through Fy 1999-2000
(In Descending Size of Enrollments)

Subject Area[54]	1998	1999	2000
Business & Management	8,062	8,453	7,132
Arts & Humanities	4,071	7,128	6,034
Engineering & Science	2,222	2,891	4,517
Education	3,787	4,408	3,117
General Interest	4,718	3,149	1,968
IT	739	1,284	970
Health	742	935	666
Computer Graphics	541	425	359
Psychology	45	323	293
Social Work & Behavioral Science	100	151	166
Environmental Management	84	583	74
Law	163	22	30
Others	51		24
Total	25,325	29,752	25,350

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54 Extension, Open University and Special Session enrollments combined.

Table A.12

UCR Division of Extension, Enrollment by Subject, FY 1996-1997 through FY 1999-2000 (In Descending Size of Enrollments)

Subject Area	1996-1997	1997-1998	1998-1999	1999-2000
Education	6,892	8,547	9,506	9,460
International Programs	4,604	4,344	3,547	3,885
Business & Management	3,253	3,460	3,839	3,711
Liberal Arts	2,750	2,814	2,526	2,411
Environmental Management	2,230	1,682	1,295	1,616
Information Technology	1,013	1,255	1,571	1,541
Agriculture	558	829	1,014	937
Science & Engineering	518	668	658	742
Geographic Information Systems	735	517	642	523
Healthcare	58	58	160	193
Concurrent Enrollment	1,043	1,054	980	918
Total	23,654	25,228	25,738	25,937

Table A.13

CSU San Bernardino's College of Extended Studies, Enrollment by Subject, FY 1997-1998 through FY 1999-2000 (In Descending Size of Enrollments)

Subject Area	1997-1998	1998-1999	1999-2000
Education	5,960	5,865	6,681
Social Science	1,382	1,790	1,706
General Interest	1,503	1,084	1,048
Business & Management	1,166	1,370	1,045
IT	590	741	609
Science	370	437	415
Health	345	335	406
Arts & Humanities	297	418	317
Languages	28	30	8
Engineering[55]	8	14	
Total	11,649	12,084	12,235

Table A.14

Percentage Breakdown of SDSU College of Extended Studies Continuing Education and Extension Enrollments[56]

FY	% Continuing Education	% Extension (credit & non-credit)
1997-1998	31.3%	68.7%
1998-1999	35.3%	64.7%
1999-2000	49.5%	50.5%

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55 CSU San Bernardino does not have a College of Engineering. These enrollments refer to courses in AutoCAD and Mechanical Design that are of interest to an engineering/technical audience but have been internally labeled as 'Other." We have decided to break these enrollments out as "Engineering" so that they are directly comparable to other regional data.

56 Continuing Education = Open University and Special Session (regular university credit courses)
Extension courses = Non-credit courses or courses carrying continuing continuing education units (CEU's)

Table A.15

Percentage Breakdown of CSU San Bernardino College of Extended Studies' Continuing Education and Extension Enrollments[57]

Year	% Continuing Education	% Extension (credit & non-credit)
1998	19.2%	80.8%
1999	23.4%	76.6%
2000	21.6%	78.4%

Table A.16

Gender Ratio of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Sex	UCSD	UCR
Male	51%	55%
Female	42%	40%
Not Known	7%	5%

Table A.17

Age Breakdown of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Age	UCSD (N = 1,916)	UCR (N = 355)
<25	9%	12%
25-34	30%	23%
35-44	27%	24%
44-54	19%	25%
>55	5%	16%
Not Known	10%	0%

Table A.18

Age and Gender Breakdown of Fall 2000 UCSD Extension Student Survey Respondents

Age	Female	Male	Not Known	Grand Total
<25	100	70	--	170
>55	38	52	3	93
25-34	273	309	5	587
35-44	227	278	5	510
44-54	152	211	7	370
Not Known	19	55	112	186
Grand Total	809	975	132	1,916

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57 Same definitions as for footnote 56.

Table A.19
Age and Gender Breakdown of Fall 2000 UCR Extension Student Survey Respondents

Age	Female	Male	Not Known	Grand Total
<25	19	22		41
>54	12	26	18	56
25-34	32	50		82
35-44	35	50	1	86
45-54	43	47		90
Not Known	--	--	--	--
Grand Total	141	195	19	355

Table A.20
Highest Level of Educational Attainment of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Educational Background	UCSD	UCR
High School Diploma/GED	2%	6%
Some College	15%	22%
AA/AS	7%	14%
BA/BS	52%	40%
Masters	17%	12%
PhD/MD/JD	6%	4%
Not Stated	1%	2%

Table A.21
Employment Status of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Employment Status	UCSD	UCR
Employed	88%	83%
Not Employed	10%	16%
Retired	1%	1%
Not Stated	1%	1%

Table A.22
Employment History Profile for Fall 2000 UCSD/UCR Extension Student Survey Respondents
(Years with Current or Most Recent Employer)

Years Employed	UCSD	UCR
0-5	65%	47%
5-10	11%	15%
10-20	9%	16%
>20	3%	6%
Not Stated	12%	17%

Table A.23
Work Function of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Work Function	UCSD	UCR
Engineering/Technical	28%	14%
Information Systems	15%	13%
Business Administration	14%	15%
Scientific/Research	11%	4%
Manufacturing/Production	4%	11%
Other	*21%*	*23%*
Not Known	*7%*	*19%*

Table A.24
Management Responsibility Profile of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Management Responsibility	UCSD	UCR
None	44%	42%
Low-level Supervisor	23%	19%
Mid-level Supervisor	21%	19%
Senior Executive	4%	6%
Not Stated	*8%*	*13%*

Table A.25
Salary Profile of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Salary	UCSD	UCR
<$25,000	8%	15%
$25,000-50,000	36%	40%
$50,000-75,000	29%	21%
$75,000-100,000	12%	7%
>$100,000	4%	2%
Not Stated	12%	15%

Table A.26
Employment Sector for Fall 2000 UCSD/UCR Extension Student Survey Respondents

Employment Sector	UCSD	UCR
Private Industry	69%	46%
Non-Profit	20%	41%
Not Known	*11%*	*13%*

Employer Size Profile for Fall 2000 UCSD/UCR Extension Student Survey Respondents

Employee Count	UCSD	UCR
0-50	15%	19%
51-100	7%	7%
101-500	20%	20%
>500	47%	38%
Not Known	*11%*	*16%*

Table A.28
Employer Industry Profile for Fall 2000 UCSD/UCR Extension Student Survey Respondents[58]

Industry	UCSD	UCR
Computer Software and Services	24%	18%
Biotech/Pharmaceuticals	13%	0%
Communications	10%	2%
Computer and Electronics Manufacturing	9%	3%
Business Services	6%	8%
Medical Services	4%	6%
Financial Services	3%	5%
Defense and Transportation Manufacturing	3%	10%
Biomedical Products	3%	3%
Environmental Technology	2%	2%
Visitor Industry Services	1%	0%
Recreational Goods Manufacturing	1%	4%
Entertainment and Amusement	1%	1%
Fruits, Vegetables, and Horticulture	0%	4%
Not Stated	*21%*	*34%*

Table A.29
Fall 2000 UCSD/UCR Extension Student Survey Respondents Employed in High-tech Industry Clusters

Aggregated Industry Sector	UCSD	UCR
IT	33%	21%
Biotech/Biomed	16%	3%
Communications	10%	2%
All others	20%	40%
Not stated	*21%*	*34%*

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58 Industry cluster definitions as defined by San Diego Association of Government (SANDAG).

Table A.30
Motivation of Fall 2000 UCSD/UCR Student Survey Respondents for Taking Extension Course

Motivation for Course	UCSD	UCR
Career Maintenance/Skills Upgrading	42%	32%
Career Advancement	37%	32%
Career Change	14%	15%
Personal/Not Related to Work	4%	7%
Not Stated	*4%*	*14%*

Table A.31
Number of Classes Pursued by Fall 2000 UCSD/UCR Extension Student Survey Respondents
During Fall 2000 Quarter

No. of Classes	UCSD	UCR
1	63%	58%
2	19%	18%
3	6%	5%
4	3%	5%
5	2%	2%
>5	1%	2%
Not Stated	*6%*	*8%*

Table A.32
Number of Classes Taken by Fall 2000 UCSD/UCR Extension Student Survey Respondents in the
Past 5 Years

No. of Classes	UCSD	UCR
0	14%	13%
1	13%	10%
2	13%	9%
3	11%	11%
4	8%	7%
5	6%	7%
>5	15%	15%
Not Stated	*20%*	*28%*

Table A.33
Fall 2000 UCSD/UCR Extension Student Survey Respondents Enrolled in Certificate Programs

Enrolled in a Certificate Program?	UCSD	UCR
Yes	41%	55%
No	50%	32%
Not Stated	*9%*	*13%*

Table A.34
Who Paid for Course Fees (Tuition + Books) for Fall 2000 UCSD/UCR Extension Student Survey Respondents?

Who Paid	UCSD	UCR
Employer Subsidized	10%	7%
Employer paid 100%	54%	36%
I paid 100%	33%	50%
Not Stated	*3%*	*7%*

Table A.35
Is Employer Subsidy for Fall 2000 UCSD/UCR Extension Student Survey Respondents Tied to Extension Course Completion?

	UCSD	UCR
Yes	34%	29%
No	9%	9%
Not Stated	*57%*	*62%*

Table A.36
Is Employer Subsidy for Fall 2000 UCSD/UCR Extension Student Survey Respondents Tied to Extension Course Performance (i.e. higher grade = larger subsidy)?

	UCSD	UCR
Yes	19%	16%
No	24%	20%
Not Stated	*58%*	*63%*

Table A.37
Is Employer Subsidy for Fall 2000 UCSD/UCR Extension Student Survey Respondents Tied to Completion of Extension Certificate Program?

	UCSD	UCR
Yes	6%	6%
No	36%	28%
Not Stated	*58%*	*65%*

Table A.38
Employer Characteristics of Companies Subsidizing Extension Course Taking Activities of Fall 2000 UCSD/UCR Extension Student Survey Respondents

Company Size	% UCSD	% UCR
0-50	10%	10%
51-100	7%	7%
101-500	23%	26%
>500	54%	50%
Not Known	*6%*	*7%*

Table A.39
Employer Characteristics of Companies Not Subsidizing Extension Course Taking Activities of Fall
2000 UCSD/UCR Extension Student Survey Respondents

Company Size	% UCSD	% UCR
0-50	24%	26%
51-100	7%	8%
101-500	15%	16%
>500	35%	29%
Not Known	*19%*	*20%*

Table A.40
Is Extension Course Taking Congruent with Fall 2000 UCSD/UCR Extension Student Survey
Respondents' Educational Background?

	UCSD	UCR
Educational Background Matches Course(s)	18%	9%
Educational Background *Does Not* Match Course(s)	29%	24%
Can't Determine	*52%*	*66%*

Table A.41
Subject Areas Pursued by Fall 2000 UCSD/UCR Extension Student Survey Respondents With
Educational Backgrounds Not Congruent with Course Subject Area

Subject Area	UCSD	UCR
Information Technologies	56%	59%
Business and Management	21%	22%
Healthcare Delivery and Administration	9%	--
Environment and Safety	7%	6%
Engineering and Science	7%	6%
Public Safety and Scientific Investigation	6%	7%

Table A.42

Associate's Degrees and 0-2 Year Certificates Awarded at the California Community Colleges by Discipline Division, for Academic Years 1989-90 through 1998-99[59]

Discipline[60]	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
Agricultural Business & Production	347	354	377	555	451	454	627	784	811	1,142
Agricultural Sciences	159	144	85	96	77	71	59	85	75	81
Architecture & Related Programs	226	216	97	42	25	0	0	0	0	0
Area, Ethnic & Cultural Studies	15	11	27	22	30	37	51	44	45	58
Basic Skills	117	659	7	10	410	6	10	11	20	6
Business Management & Administrative Services	8,705	8,985	8,060	9,376	8,416	8,776	8,928	9,948	9,920	9,971
Communications	255	259	234	377	279	267	207	277	345	408
Communications Technologies	142	100	168	239	232	223	239	309	307	294
Computer and Information Sciences	1,041	1,180	950	1,170	1,071	1,282	1,358	1,580	2,004	2,492
Conservation and Renewable Natural Resources	120	65	124	108	106	97	61	83	124	130
Construction Trades	541	520	316	557	355	337	402	560	429	530
Education	1,257	821	1,901	1,166	1,367	1,266	1,148	1,521	1,731	2,156
Engineering	313	306	252	342	248	254	224	268	355	334
Engineering Related Technologies	2,317	2,429	2,159	2,258	2,345	1,533	1,435	1,481	2,122	1,750
English Literature & Literature/Letters	291	252	754	1,192	1,056	1,271	912	1,147	1,231	1,270
Foreign Languages and Literature	123	131	143	250	244	288	255	377	409	423
Health Professions and Related Sciences	6,914	7,667	6,949	8,286	8,363	8,744	9,108	9,769	10,697	11,220
Health-Related Knowledge and Skills	9	103	1	0	0	0	0	0	0	0
High School Secondary Diplomas & Certificates	0	0	0	0	1	2	1	0	0	0
Home Economics	122	91	162	62	30	85	63	106	99	128
Interpersonal and Social Skills	0	0	0	0	0	7	6	32	15	10
Law & Legal Studies	358	501	468	695	951	811	965	903	792	719
Leisure and Recreational Activities	59	69	10	4	0	0	0	0	0	0
Liberal Arts & Sci., General Studies & Humanities	16,489	18,876	17,101	20,902	20,304	22,321	24,978	27,096	27,710	31,247
Library Science Librarianship	78	73	69	70	79	55	73	81	88	128
Life Sciences/Biological Sciences	551	709	792	793	931	897	941	1,151	1,194	1,228
Marketing Operations/Marketing & Distribution	560	573	356	772	661	714	761	846	918	925
Mathematics	463	428	470	473	397	469	460	547	550	560
Mechanics & Repairers	1,977	1,847	1,581	2,060	2,048	2,696	3,271	3,427	3,362	3,496
Military Technologies	0	0	0	0	12	0	0	0	0	0
Mulit-Interdisciplinary Studies	661	606	192	827	687	549	419	658	1,389	1,512
Parks, Recreation, Leisure & Fitness Studies	29	36	134	251	226	288	225	316	335	254
Personal and Miscellaneous Services	668	623	457	537	604	810	817	1,000	1,008	1,067
Philosophy & Religion	19	28	19	33	33	37	25	35	37	31
Physical Sciences	290	280	302	407	543	562	635	678	726	761
Precision Production Trades	994	895	757	937	937	986	965	1,112	1,133	1,225
Protective Services	2,339	2,372	2,500	3,669	3,190	4,418	4,608	5,226	7,605	7,456
Psychology	344	336	391	443	429	503	431	528	568	629
Public Administration & Services	163	256	185	306	514	635	524	582	523	611
Science Technologies	128	131	33	9	14	17	65	50	44	77
Social Sciences & History	1,048	970	1,172	1,865	1,757	1,811	1,793	1,992	2,204	2,416
Technology Education/Industrial Arts	50	77	21	0	0	0	0	0	0	0
Transportation & Materials Moving Workers	208	222	207	178	138	141	152	158	153	173
Unknown	0	477	1,202	3,225	2,758	836	1,001	800	1,809	0
Visual & Performing Arts	923	923	1,217	1,601	1,697	1,348	1,419	1,581	1,535	1,651
Vocational Home Economics	1,408	1,662	1,861	2,483	2,747	2,643	3,425	3,826	4,249	5,159
TOTAL	52,821	57,263	54,263	68,648	66,763	68,547	73,047	80,975	88,671	93,728

59 Data Source: *Student Profiles, 2000.* California Post-Secondary Education Commission, November 2000.

60 Subject area breakdown available for 0-2 year certificates only. A small number of 2-4 year certificate program completers are missing from this table, hence the numbers will not add up to those listed in the main text.

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10 Most Popular Disciplines Pursued by California Community College Degree and Certificate
Graduates (1998-99)

Discipline	% of Graduates
Liberal Arts and Sciences, General Studies and Humanities	33.34%
Health Professions and Related Sciences	11.97%
Business Management and Administrative Services	10.64%
Protective Services	7.95%
Vocational Home Economics	5.50%
Mechanics and Repairers	3.73%
Computer and Information Sciences	2.66%
Social Sciences and History	2.58%
Education	2.30%
Engineering Related Technologies	1.87%
All Others	*17.46%*

Table A.44
1993 FTF Cohort Stated Educational Goals Upon Entering California Community Colleges

EDUCATIONAL GOAL	Uninformed Goal		Informed Goal (incl. Non-Responders)		Informed Goal (Survey Responders Only)	
	No. of Students	% of Students	No. of Students	% of Students	No. of Students	% of Students
Degree + Transfer	86,889	24.67%	48,824	13.86%	48,824	25.00%
Undecided	67,281	19.11%	45,395	12.89%	45,395	23.24%
Transfer, no degree	34,447	9.78%	19,616	5.57%	19,616	10.04%
Acquire job skills	29,730	8.44%	14,929	4.24%	14,929	7.64%
Update job skills	19,230	5.46%	7,069	2.01%	7,069	3.62%
Uncollected/unreported	18,604	5.28%	156,858	44.54%	--	--
Educational Development	17,735	5.04%	8,267	2.35%	8,267	4.23%
Associate's Degree, no transfer	17,634	5.01%	12,231	3.47%	12,231	6.26%
Formulate career interests	15,470	4.39%	8,146	2.31%	8,146	4.17%
Basic Skills	12,258	3.48%	8,497	2.41%	8,497	4.35%
Vocational Certificate, no transfer	11,541	3.28%	8,864	2.52%	8,864	4.54%
Vocational Degree, no transfer	9,621	2.73%	7,279	2.07%	7,279	3.73%
Maintain license	6,238	1.77%	3,074	0.87%	3,074	1.57%
Complete GED	5,472	1.55%	3,101	0.88%	3,101	1.59%
TOTAL	352,150	100.00%	352,150	100.00%	195,292	100.00%

Table A.45
1993 FTF Cohort's Progression Towards Educational Goal

Year	Transfers to UC	Transfers to CSU	Degrees and Certificates
1993	2,034	2,164	249
1994	1,521	3,772	1,682
1995	3,320	7,364	5,187
1996	4,200	12,973	11,178
1997	1,876	9,209	9,600
1998	969	6,090	6,652
1999		1,678	4,709
2000			3,528
TOTAL	13,920	43,250	42,785

Table A.46
Disciplines Pursued by California Community College Transfer Students to UC, 1993 FTF Cohort

Discipline	Matriculation Year					
	1993	1994	1995	1996	1997	1998
Agriculture and Natural Resources	79	23	66	76	34	35
Architecture and Environmental Design	9	5	26	77	18	18
Area Studies	17	10	24	27	27	17
Biological Sciences	316	155	470	650	342	75
Business and Management	23	32	128	157	41	23
Computer and Information Sciences	56	31	68	119	82	32
Dentistry			2	3	1	
Engineering	172	133	213	216	90	34
Fine and Applied Arts	30	23	72	121	60	48
Foreign Languages	10	5	38	91	19	17
General or Unclassified		1			2	
Interdisciplinary Studies	883	648	672	804	387	231
Journalism		1	4		2	
Law	3	1	12	14	8	2
Letters	123	184	593	817	235	120
Mathematics	26	16	42	70	22	13
Medicine	6	3	3	1		
Nursing			1		1	1
Optometry	1				1	2
Physical Education	15	6	11	17	8	2
Physical Studies	50	64	166	178	105	35
Psychology	108	52	207	245	131	80
Public Health	10	3	6	7	5	2
Social Sciences	94	114	493	502	253	174
Social Work and Helping Services	3	10	2	8	2	2
Unknown		1	1			6
TOTAL	2,034	1,521	3,320	4,200	1,876	969

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Disciplines Pursued by California Community College Transfer Students to CSU, 1993 FTF Cohort

CSU Subject Area	Matriculation Year						
	1993	1994	1995	1996	1997	1998	1999
Agriculture	25	33	96	138	107	51	9
Architecture and Urban Planning	13	39	99	113	45	40	2
Arts and Humanities	217	499	1,318	2,358	1,691	1,188	364
Business	453	924	1,782	3,384	2,292	1,339	445
Education	17	51	151	221	243	172	69
Engineering	310	388	601	1,066	874	701	156
Health Sciences	164	281	623	1,076	722	442	124
Journalism	29	59	136	254	196	85	19
Library Science	1	1				1	
Other	14	12	45	91	50	37	12
Science	168	356	625	1,042	740	421	89
Social Sciences	230	518	1,338	2,569	1,753	1,106	289
Undeclared	523	611	550	661	496	507	100
Total	2,164	3,772	7,364	12,973	9,209	6,090	1,678

Table A.48
Associate's Degrees and Certificates Awarded to the 1993 FTF Cohort

TOP2 Title	1993	1994	1995	1996	1997	1998	1999	2000	Total
Agriculture and Natural Resources	1	64	103	112	90	69	46	21	506
Architecture and Environmental Design	1	3	13	22	27	20	13	7	106
Biological Sciences		6	52	142	145	87	64	20	516
Business and Management	13	129	510	1,387	1,292	929	589	407	5,256
Commercial Services	1	75	251	132	92	35	24	17	627
Communications		13	38	67	63	43	52	17	293
Computer and Information Science	2	8	61	145	157	147	119	74	713
Consumer Education and Home Economics	16	24	308	483	463	346	319	252	2,211
Education	3	17	111	234	208	116	77	22	788
Engineering and Related Industrial Technology	20	228	526	872	720	570	356	286	3,578
Fine and Applied Arts	1	8	79	278	240	120	107	74	907
Foreign Language			11	38	49	26	18	10	152
Health	18	305	420	565	670	745	607	396	3,726
Humanities	1	4	82	194	163	86	54	9	593
Interdisciplinary Studies	130	504	2,025	4,943	3,906	2,382	1,503	1,443	16,836
Law		5	34	93	72	43	28	24	299
Library Science			1	5	5		2	4	17
Mathematics		1	33	108	65	32	36	12	287
Miscellaneous Courses	4	85	39	176	94	120	146	12	676
Physical Sciences		1	31	96	119	65	42	22	376
Psychology	1	2	34	105	72	29	34	13	290
Public Affairs and Services	37	182	302	662	619	467	328	263	2,860
Social Sciences		18	123	319	269	175	145	123	1,172
Grand Total	249	1,682	5,187	11,178	9,600	6,652	4,709	3,528	42,785

Table A.49
Uninformed Goals for 1993 FTF Cohort Entering Community Colleges in Riverside, San Bernardino and San Diego Counties

GOAL	Riverside	San Bernardino	San Diego	TOTAL	%Riverside	% San Bernardino	% San Diego	% Systemwide
Degree + Transfer	2,806	2,595	8,003	13,404	24%	27%	28%	24.67%
Undecided	1,996	2,005	5,305	9,306	17%	21%	19%	19.11%
Acquire job skills	1,225	1,057	2,227	4,509	10%	11%	8%	8.44%
Associate's Degree, no transfer	538	459	2,483	3,480	5%	5%	9%	5.01%
Transfer, no degree	578	402	2,430	3,410	5%	4%	9%	9.78%
Formulate career interests	708	525	1,683	2,916	6%	5%	6%	4.39%
Update job skills	867	397	1,458	2,722	7%	4%	5%	5.46%
Educational Development	337	605	1,181	2,123	3%	6%	4%	5.04%
Uncollected/unreported	742	440	611	1,793	6%	5%	2%	5.28%
Basic Skills	549	231	747	1,527	5%	2%	3%	3.48%
Vocational Certificate, no transfer	591	254	648	1,493	5%	3%	2%	3.28%
Vocational Degree, no transfer	471	234	549	1,254	4%	2%	2%	2.73%
Maintain license	256	212	545	1,013	2%	2%	2%	1.77%
Complete GED	233	153	309	695	2%	2%	1%	1.55%
TOTAL:	11,897	9,569	28,179	49,645	100%	100%	100%	100.00%

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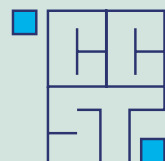
(916) 492-0996 (phone)
(916) 492-0999 (fax)

E-Mail: ccst@ccst.ucr.edu

INTERNET: http://www.ccst.ucr.edu