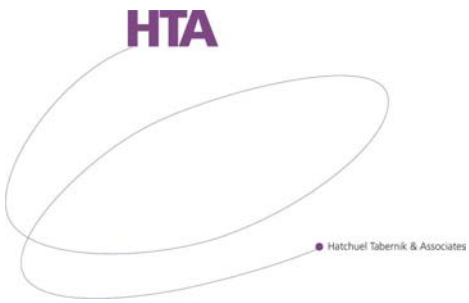
The Benefits of Work-Based Learning and Occupational Coursework in the California Community Colleges

A Study Prepared for the California Community College Chancellor's Advisory Committee on Work-Based Learning and Employment Services

May 3, 2004



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Executive Summary

Upon the request of the California Community College Chancellor's Advisory Committee on Work-Based Learning and Employment Services, this study examines the effect of work-based learning on outcomes for community college students. Work-based learning was defined, for the purposes of the study, as "Co-operative Work Experience" (Co-op). The study also examines the effect of occupational coursework on students' educational and employment outcomes. Analysis was narrowed to examine employment-related outcomes for students who were recently out of high school, and therefore had little previous work experience.

Participation Levels

Results showed significant differences in levels of participation in work-based learning and occupational education among students of diverse ethnicities. White students had the highest rates of participation in Co-op classes, whereas Asians had the lowest. With regard to occupational programs, Asian and African-American students exhibited the lowest rates of participation in high concentration occupational course loads, while Filipino/Pacific Islanders exhibited the highest rates of participation in high concentration occupational course loads.

Results

The results of this study indicate significant short-term benefits of **work-based learning** in California Community Colleges. Specifically, time-to-employment is shorter for Co-op students, and rate of entry into the workplace is also higher. First year earnings are also significantly higher for students who participate in Co-op classes. In addition, both first year and 3- to 4-year *average* earnings are significantly influenced by the level of student involvement in Co-op. Moreover, participation in Co-op courses adds benefits with each increment of additional coursework taken. Even in the presence of effects from occupational coursework, region, and demographic characteristics, participation in additional Co-op courses have significant benefits for students' first year and average earnings. Thus, it would appear that Co-op courses are not simply reducible to the benefits found in the occupational courses that the students might be taking, but stand alone as important components in the earnings benefits of young adults.

However, the short-term benefits of Co-op participation do not persist in the long run. Notably, the rate of entry into the labor force slows substantially. In addition, the earnings growth declines relative to earnings growth for Non-Co-op students. Finally, continuity in employment is not appreciably better for Co-op students compared to Non-Co-op students.

In all of these areas, however, there are significant and sustained gains for students with high levels of concentration in **occupational coursework**. Those taking a higher proportion of occupational courses receive their awards in significantly less time than students taking fewer occupational courses. Significant long-term benefits were seen for occupational training with regard to length of time to employment, rate of entry into employment, continuity of employment and short- and long-term earnings.

Introduction

Purpose of the Study

The primary purpose of this study was to assess the influence of work-based learning on the earnings and other educational outcomes of graduates from the California Community Colleges, with a focus on students coming to college straight after high school. Secondarily, we wanted to assess the influence of occupational education on these outcomes. This report explores the hypothesis, based on practitioner experience and previous evaluations, that work-based learning and career-related academic programs enhance student outcomes, particularly goal-setting, motivation, persistence, and employment-related outcomes.[1] Many previous studies have focused on K-12 education. In an effort to assess related outcomes at the community college level and verify practitioner experience, we present here a quantitative study of graduates from community colleges in four California Community College regions.

Overview of the California Community Colleges

A primary mission of the California Community Colleges is to offer academic and vocational education at the lower division level for both younger and older students, including individuals returning to school. Another primary mission is to advance California's economic growth and global competitiveness through education, training, and services that contribute to continuous work force improvement.

Through its system of 109 colleges in 72 districts, the California Community Colleges currently serve more than 2.9 million students with a wide variety of educational and career goals. The following is a brief profile of student characteristics:

[1] *California School-to-Career Case Studies Evaluation*, WestEd, 2002; *California School-to-Career Case Studies Evaluation: EASTBAY Learns*, Hatchuel Tabernik and Associates, March 2002; *School-to-Work: Making a Difference in Education*, Institute on Education and the Economy, Teachers College, Columbia University, 2001; National Conference of State Legislatures, *School-to-Work: A Guide for State Legislators*. www.ncsl.org; U.S. Department of Education, National Center for Education Statistics. *Vocational Education in the United States: Toward the Year 2000*, NCES 2000-029, by Karen Levesque et al. Washington, DC: 2000.

Gender

- 56% of students are female; 44% are male

Ethnicity

- 40% of students are white
- 27% of students are Hispanic
- 12% of students are Asian
- 7% of students are African-American
- 3% of students are Filipino

Age

- 47% are 24 years old or less; 53% are over 24 years old

Previous degrees

- 4% had a previous AA degree; 9% had a previous BA degree

Enrollment status

- 76% are taking classes not for credit or are enrolled in fewer than 12 credits

Degrees and certificates awarded in the 2002-03 school year

- 62% of graduating students obtained an Associate degree (AA and AS)
- 12% obtained a certificate requiring 30 or more units (1 or more years of full-time school)
- 18% obtained a certificate requiring fewer than 30 units
- 2% obtained a noncredit award
- 5% obtained another kind of credit award requiring less than 6 semester units

Methodology

Selection of Sample Students

The chief aim of this study is to examine the effect of work-based learning on the earnings and selected educational outcomes of California Community College (CCC) graduates,[2] as well as the effect of occupational coursework on these outcomes. However, as seen above, students attending community colleges come from extremely diverse backgrounds, attend community college for any number of personal and economic reasons, and start their studies with various goals, including completion of an occupational certificate program, completion of their basic education requirements for transfer to a four-year university, or enhancement of particular skills, among others. To look at earnings and other outcomes in a way that would eliminate as many complicating factors as possible, we narrowed our sample in the following ways:

a) We selected only those *who did not continue to a 4-year college or return to community college within 2 years*, since students continuing their education

[2] Rates of transfer to four-year institutions and academic success beyond community college were not examined, because transfer to a 4-year institution is not the goal for many students.

(attending school full-time or part-time) could have lower earnings in those years than those employed full time, and, conversely, because the completion of a four-year degree can result in further earnings gains.[3]

b) Only *students recently out of high school* were selected to eliminate the conflating problem of community college awardees with previous substantial job experience. One could expect that those with more job experience would have, all else being equal, higher earnings even with the same degree. We therefore wanted to diminish the possibility of contaminating the estimate of work-based learning effect with that of pre-community college work experience.

We further focused our analysis on *students who received CCC credit awards between 1997 and 1999*. In general, credit awards fall into three major categories: associate degrees (A.A. or A.S.), certificates, and 'other.' The years 1997-99 were chosen so that CCC awardees could be tracked for at least three years post-exit. This provides a relatively adequate earnings timeframe to smooth the effect of random economic "shocks" that may be present if just one graduating class were examined. At the same time, the exit timeframe is short enough to allow one to examine changes occurring for students who exited CCC at roughly similar times, thus limiting the influence of economic cycles that would have to be more readily controlled when looking at those who graduated within a much longer time frame.

Even with these three restrictions, however, the number of CCC awardees was very large. To facilitate data transmission and management, we limited the overall sample to *students in selected regions*. Specifically, four diverse regions were selected, out of nine. The Northern region consists of those graduates from CCCs in area spanned by Lassen, Mendocino, and Siskiyou counties. Bay Area CCCs include those from Marin, Contra Costa, Alameda, San Francisco and San Mateo counties. CCCs in the Central Valley include those in Merced, Fresno, Kern, San Luis Obispo, and Santa Barbara counties. Finally, the Los Angeles region is primarily composed of those CCCs in Los Angeles County.

In sum, students were selected using the following four criteria:

1. Students who did not reenroll at community college nor transfer to a 4 year college within two years after graduating from community college.
2. Students who entered community college within two years of completing or leaving high school.

[3] According to the March 2002 CPS, average earnings for an adult between the ages of 25-64 vary widely by level of education and degree obtained: with some college but no degree - $34,790; with an AA degree - $36,268; with a BA degree - $53,020.

3. Students who graduated from the community college with a credit award between 1997 and 1999.
4. Students attending community colleges in one of four regions: Northern (Region 1), Bay Area (Region 3), Central Valley (Region 5), and Los Angeles (Region 7).

Data meeting these initial selection criteria were supplied by the Chancellor's Office. In all, this initial sample contained 5,876 students. A few more adjustments were made to the data, however. First, most students received more than one (1) award. In most cases the certificates and associates degrees were all received at the same time. However, in a handful of cases (n=139) students who received awards in the 1997-99 period also received awards in later years. Although award receipt does not correspond directly with exit from the CCC (i.e., some students receive awards much later than when the actually exit), for clarity students receiving awards both during the 1997-99 period and after this period were excluded from the sample.[4] Second, we selected only those students with total credits of one (1) or more. Roughly 82 students had missing credit information for courses taken or had zero total credits for courses taken. The final sample size was 5,650.

While the sample in this report is not representative of all students entering community colleges, the results may be highly generalizable to young adults actively engaged in CCCs who have recently left high school and have little prior work experience.

Co-op and Occupational Groups Defined

As mentioned, we focused our study on the effects of work-based learning and occupational coursework. The definition of "Work-Based Learning" used for this study was "Cooperative Work Experience", simply known as "Co-op".[5] Cooperative Work Experience, also referred to as Cooperative Education, is defined as "programs that allow students to earn course credit for paid or unpaid employment that is related to a specific occupational program of study".[6] Note, however, that many Co-op courses are not restricted to students in occupational programs, but may be offered in association with non-occupational academic programs or to students at large, as a means to

[4] The data used in this study was assessed by the Chancellor's Office to make certain that those with awards in 1997-99 had left school reasonably close to receiving the award. For example, no one in the sample would have exited the CCC in 1990 and filed for the award 7-years later.

[5] Other experiences, such as internships, extended job shadows and apprenticeships are also considered to be "work-based learning". The Community Colleges have created a data element to flag such experiences, but it is still not widely used, nor has the practice of employing such strategies been widely adopted. Therefore, "Co-op" was the only designation available to the researchers to assess work-based learning.

[6] "In contrast, general work experience is not connected to a specific occupational program." National Center for Educational Statistics, Vocational Education in the United States: Toward the Year 2000.

integrate classroom study with planned and supervised experiences in the workplace.[7] *Co-op* courses were identified from the Chancellor's Office Management Information System (variable CB10).

Occupational courses are those that prepare students for work in specific fields, such as information technology, business services, fashion and auto mechanics. Occupational programs result in certificates or AA/AS degrees, the latter usually requiring the completion of additional general education courses. *Occupational courses* were defined as those that had SAM codes labeled "clearly occupational," "advanced occupational," and "apprenticeship." Courses considered *non-occupational* were those labeled "possibly occupational" or "non-occupational" according to SAM codes (variable CB09).

The Co-op groups consist of those who took no Co-op courses and those who had at least one (1) or more Co-op credits. Only 13.9% of the students in the sample had at least one (1) Co-op credit (n = 787). Therefore, two classes of groups were constructed for comparison: Some Co-op and No Co-op.

On the other hand, the distribution of occupational coursework was rather large. We therefore categorize students into even terciles of 1883 students each, by the percent of total credits that were occupationally related. The resulting ranges of "percent occupational courses" for each tercile are as follows: the bottom third have 0-7% occupational coursework; the middle third have 7.01-39%, and the top third range from 39.01-100% occupational coursework. Note that the total credits completed vary widely, from one (1) to 210.

Earnings Defined

To examine earnings, available unemployment insurance (UI) report data were provided from the Chancellor's Office for the students in the sample. These data include the student ID, the year, the quarter, and the wages received in that year and quarter. Data were summarized for each member of the sample over a three- to four-year period. The UI data were reconstructed to make the years comparable. In other words, for each person in the CCC sample above it is possible to identify the earnings in the first year and first quarter after receiving the award.

[7] According to Nancy Warren, Director of Workforce Training and to Michael Allen, NCWE Region 1 Director, in *Quality and Connections with Cooperative Education, National Council for Workforce Education*, "Co-op has gained widespread credibility and acceptance across instructional programs, making it an important and active component of the quality educational experience of many students."

All earnings results below are based on the UI quarterly data. Unfortunately, no earnings data were available for students from the Los Angeles region (n = 1793). These students are thus excluded from the analyses that specifically examine earnings.[8]From the remaining 3857 students, 962 had no earnings information in any quarter. There are many possible reasons for the lack of earnings data on these students: they could have moved out of California, pursued self-employment or joined the military, for example. Therefore, since we could not assume that they were unemployed, we have presented the analyses excluding these students. To ensure that we were not thereby biasing the responses, we looked at their levels of Co-op and Occupational Course participation and found no significant differences for this group of students. For reference, however, footnotes are provided with the alternate results, which include the 962 individuals with no earnings.

To test the robustness of the earnings findings we looked at earnings in various ways, using the following earnings constructs:

1. *Quarterly earnings.* The actual earnings in each quarter beginning with the quarter following receipt of award. Thus 'quarter 1' is the earnings (whether zero or greater) in the first quarter following award receipt. Similarly, 'quarter 5' refers to earnings in the quarter 12 months after receipt of award. This makes each 'quarter' comparable for all students regardless of which year they actually received the award.
2. *Earnings in year x*. For example, the quarterly earnings data in (1) were summarized for the first four quarters to yield the 'earnings in year 1.' Thus each year here refers to a period of 4 quarters whether or not it follows a calendar year. In this way each 'year' finding is comparable for each student.
3. *Total earnings.* The sum of all quarterly earnings over all years post-exit.
4. *Average earnings.* Total earnings averaged over the number of years tracked. For most awardees, earnings are tracked for four years. However, for those students who received awards in 1999 earnings were only followed for three years. Thus, the average earnings, rather than total earnings, permit comparison between the groups.
5. *Earnings in first year of earnings*. A number of students (n = 150) have earnings that started in the second year following attaining award rather than in the first year (n = 2597). For these students the total and average earnings ($30,943 and $7,905, respectively) are considerably less than for those who begin earning in the first year ($64,237 and $16,665, respectively). In addition, their 'earnings in year 1' equal zero and 'earnings in year 2' are lower than counterparts. To boost our sample size when looking at earnings gains and to further test our findings,

[8] Future analyses may wish to correct for this oversight, but as the results below indicate, a relatively limited number of Los Angeles students actively participated in Co-op programs.

we constructed an earnings variable designated as "earnings in first year of earnings." This combines 'earnings in year 1' for students with earnings starting in the first year after award with 'earnings in year 2' for students with earnings starting in the second year after receipt of award. This variable excludes those who had earnings starting in only the third or fourth year (n = 147).

6. *Earnings in last year of earnings.* Similar to (5) this is a measure of the earnings in year 3 or year 4 after gaining the award; depending on which constitutes the last recorded year of earnings.
7. *Growth in earnings.* Calculated as (6) – (5).
8. *Continuity* is defined as maintaining non-zero, positive earnings in every quarter of the following two years. Thus, if this is true, the student is said to have employment continuity.

Results

Enrollment

The mean total Co-op credits for the entire sample are .67 (Table 1). When Co-op is considered as a percent of total credits, only about one percent (1%) of all credits are devoted to Co-op courses. On the other hand, occupational courses comprise a significantly larger proportion of students' total coursework. The mean number of occupational credits taken is 17, and the average percent of credits devoted to occupational courses is 31%. The maximum reaches 100%.

Table 1. Means For Various Enrollment Outcomes

	Total Credits Overall	Total Co-op Credits	Percent Co-op	Total Occupational Credits	Percent Occupational
Mean	62.89	.67	1.1	16.74	31.2
(Std)	(25.51)	(2.03)	(3.4)	(17.47)	(32.4)
Minimum	1	.00	.00	0.00	.00
Median	65.00	.00	.00	10.00	18.9
Maximum	210	11	46	146	100
N	5650	5650	5650	5650	5650

The breakdown of enrollment for our sample of students is as follows:

Table 2. Distribution of Students by Enrollment in Co-op and Occupational Coursework

	Some Occupational Coursework	No Occupational Coursework	Totals
Some Co-op	**751** 13% of Total 17%% of Occ'l 97% of Co-op	**24** .4% of Total 2% of No-Occ'l 3% of Co-op	**775** **(14%)**
No Co-op	**3755** 67% of Total 83% of Occ'l 78% of No Co-op	**1083** 19% of Total 98% of No-Occ'l 22% of No Co-op	**4838** **(86%)**
Totals	**4506 (80%)**	**1107 (20%)**	**5613**

Fourteen percent (14%) of students had at least one (1) Co-op credit. Ninety-seven percent (97%) of these were also enrolled in at least one (1) unit of occupational coursework.

Eighty percent (80%) of students had at least one (1) unit of occupational coursework, and, of these, 17% had at least one (1) Co-op credit.

When we break occupational course load into terciles, we further see concentrations of Co-op students at higher levels of occupational course load. Table 3 highlights the distribution of these students within three terciles of occupational emphasis (bottom third, middle third, and top third). Although students with no Co-op are evenly distributed in the terciles of occupational emphasis, Co-op students demonstrate a marked concentration in the middle and upper terciles, as would be expected.[9]

Table 3. Distribution of Occupational Emphasis by Co-op Emphasis

	Occupational Tercile						Total
	Bottom 3rd (0-7%)		Middle 3rd (7.01-39%)		Top 3rd (39.01-100%)		
	n	%	n	%	n	%	N
No Co-op	1772	36.4	1549	31.9	1541	31.7	4862
Some Co-op	112	14.2	332	42.2	343	43.6	787

[9] According to a senior Community College staff member, of new programs approved, approximately half or more of the occupational programs include a cooperative work experience or internship course.

Student Characteristics

Figure 1 shows the relative distribution of racial and ethnic groups in the sample overall, among those with some Co-op credits, and those in the highest concentration of occupational coursework. This figure shows that Asians are relatively under-represented in Co-op and high-concentration occupational education programs, since they make up 17% of the sample, but just 9.7% of Co-op participants and 12.3% of top tercile occupational education students. Moreover, white students are over-represented among Co-op students.

Figure 1. Participation in Work-based Learning by Race/Ethnicity

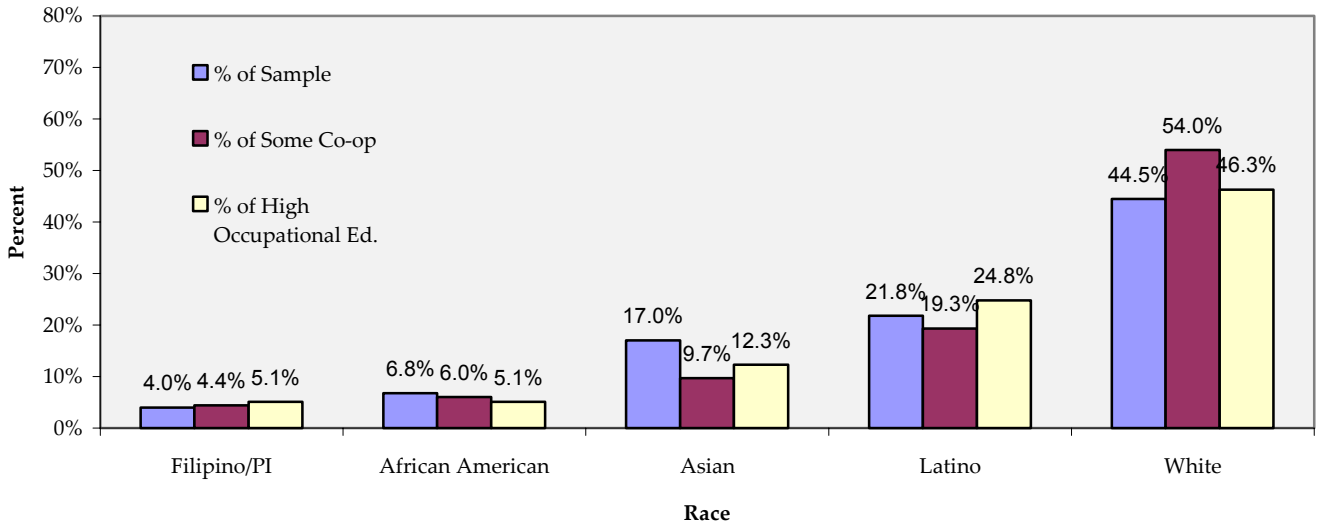


Table 4 describes Co-op and occupational coursework participation by various student characteristics. Gender does not have a strong significant association with Co-op participation. Both male and female students participate in work-based learning programs at roughly the same rate: 15% for women and 13% for men. Although these differences might seem large in absolute terms, they are not significantly different.

Significant differences were noted, however, for race/ethnicity, region, and, the type of degree obtained. Of the racial and ethnic groups, whites have the highest rate of participation in at least one (1) Co-op course (17%), whereas Asian students have participation rates that are considerably lower than their fellow students (8%).

Of the four regions analyzed, Los Angeles students participate at a relatively low rate of 5%. Available data does not provide insight into why this is so. Additional research would be required to determine whether this finding is due to systematic differences in course offerings in the Los Angeles region or to some other factor.

For all students in the sample, between 15% and 16% of students with at least one (1) associate or certificate award took at least one (1) Co-op course. This is significantly different from the 12-13% participation rate for students who did not earn such degrees.

Table 4. Distribution of Students by Co-op and Occupational Emphasis

	Percent Co-op		Percent Occupational		
	None	1% or More	Bottom 3rd 0-7%	Middle 3rd 7.01-39%	Top 3rd 39.01-100%
Gender					
Female	85.3	14.7	35.2	35.1	29.7
Male	87.0	13.0	31.0	31.0	38.0
Sig.		*0.08*			*0.00*
N	4855	787	1882	1879	1882
Race					
Asian	92.1	7.9	31.3	44.6	24.1
African-American	87.8	12.2	47.7	27.3	25.0
Filipino/ PI	84.6	15.3	28.9	28.9	42.1
Latino	87.7	12.3	28.8	33.3	37.9
Other	83.9	16.1	30.2	31.5	38.3
Unknown	84.4	15.6	35.2	29.6	35.2
White	83.1	16.9	34.6	30.7	34.7
Sig.		*0.00*			*0.00*
N	4862	787	1884	1882	1884
Region					
Northern	82.9	17.1	32.7	27.1	40.3
Bay Area	79.4	20.6	28.5	30.0	41.5
Central Valley	82.7	17.3	34.1	36.6	29.3
Los Angeles	95.1	4.9	35.8	35.7	28.5
Sig.		*0.00*			*0.00*
N	4862	787	1884	1882	1884
Associate Degree					
None	88.1	11.9	5.9	12.7	81.5
1 or more	85.4	14.6	42.4	40.1	17.5
Sig.		*0.01*			*0.00*
N	4862	787	1884	1882	1884
Certificate Degree					
None	86.9	13.1	46.6	39.3	14.0
1 or more	84.3	15.7	4.4	20.2	75.3
Sig.		*0.01*			*0.00*
N	4862	787	1884	1882	1884

With respect to occupational course load, a greater proportion of male students are concentrated in the top third compared to female students. Looking among African American and Asian students in the sample, we find that they have lower rates of participation in the high-proportion occupational course load tercile. Further, African American students show consistently decreasing participation with increased concentration of occupational coursework, while Asian students participate at greater rates in the middle tier.[10] By contrast, Filipino/Pacific Islander students have the highest rates of high-occupational participation, with participation levels increasing consistently with increasing occupational concentration.

Certificate degree recipients are over-represented in high-level occupational course load. By contrast, associate degree recipients tend to devote more of their educational coursework to non-occupational courses, due to the curricular requirements of these programs.

Educational Outcomes

Educational outcomes for Co-op and occupational course load are evaluated in Tables 5 and 6. Table 5 provides GPA and Years to Award for all students, regardless of programs in which they are enrolled. We see that average years to award for all students is nearly 3 years.

Table 5. Means For Select Education Outcomes

	GPA	Years to Award
Mean	2.72	2.99
(Std)	(.88)	(1.31)
Minimum	.00	1
Median	2.88	3
Maximum	4.01	11
N	5650	5338

[10] Holding all else equal, we would expect each group to have about 30% of its students in each occupational tercile, which is not the case here.

Table 6. Mean Educational Outcomes by Co-op and Occupational Course Load

	Percent Co-op		Percent Occupational		
	None	1% or More	Bottom 3rd 0-7%	Middle 3rd 7.01-39%	Top 3rd 39.01-100%
GPA	2.71	2.73	2.74	2.71	2.70
(Std)	(0.88)	(0.85)	(.82)	(.80)	(.99)
Sig.		.57			.42
Years To Award	3.50	3.23	3.81	3.89	2.69
(Std)	(7.35)	(3.30)	(7.83)	(7.28)	(5.36)
Sig.		.08			.00
Total Credits	61.73	70.09	64.4	71.6	52.7
(Std)	(25.59)	(23.79)	(21.1)	(23.2)	(28.1)
Sig.		.00			.00
N		5649			5650

In Table 6 we see GPA and length of time to award analyzed by Co-op enrollment and occupational course load. As the table shows, there are no significant differences in the GPA of Co-op and Non-Co-op participants or among students with varying Occupational course loads.

There is some difference between Co-op and Non-Co-op participants in length of time to award: Co-op participants on average spend 3.2 years from entrance to attaining their award and Non-Co-op students in the sample spend 3.5 years from entrance to earning an award. However, these differences are not statistically significant.[11]

By contrast, significant differences in years to award exist at different levels of occupational course load. Notably, those in the top third of occupational emphasis tend to spend significantly less time to receipt of award (2.7 years) than their low-concentration counterparts (3.8 years).

Finally, Co-op students on average take a total of roughly 8 more units of credits than Non-Co-op students. However, consistent with their lower "time to award", students in the top tercile of *occupational* emphasis display the lowest total credits taken.[12]

[11] Unfortunately, the data did not allow for an accurate assessment of years to *leaving* the community college. As noted above, receipt of award may differ from (in most cases be much later than) exit from community college. This may be an area for future investigation of the influence of Co-op.

[12] This is most likely due to the fact that some occupationally-focused programs – where, by definition, students' proportion of occupational coursework is high – can be completed in 30 units or less, whereas AA and AS degrees, which consist in large part of general education courses, resulting in a reduced percentage of the occupational courses for these programs, require at least 60 units of coursework.

Time to Employment & Employment Continuity

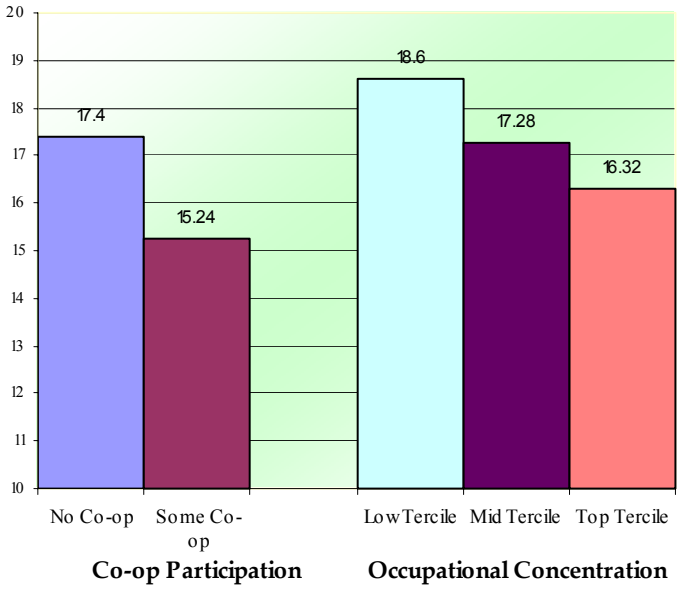
Time to Employment

A key measure of students' post-graduation success is how long it takes community college graduates to find a job. To that end, we examined the length of time it took students to find employment, as measured by the average number of weeks to first employment.

As noted above, the 962 graduates with no reported post-graduation earnings (approximately 25% of the sample) are excluded from this analysis. Additional research would be required to determine why these individuals had no reported earnings. As mentioned, possible explanations for lack of earnings data besides unemployment include enlistment in the military, leaving the state, and self-employment.

Figure 2 shows the average number of weeks until first employment for students in the sample. Students with some Co-op experience appear to find jobs sooner than their Non-Co-op colleagues: Co-op students record first earnings at about 15 weeks after receiving an award, while Non-Co-op students find work after about 17 weeks. This may be due in part to the fact that Co-op students, by definition, are working while enrolled in their Co-op course(s) and may stay in these positions after graduation; similarly, Co-op placements that are unpaid may convert to paid employment.

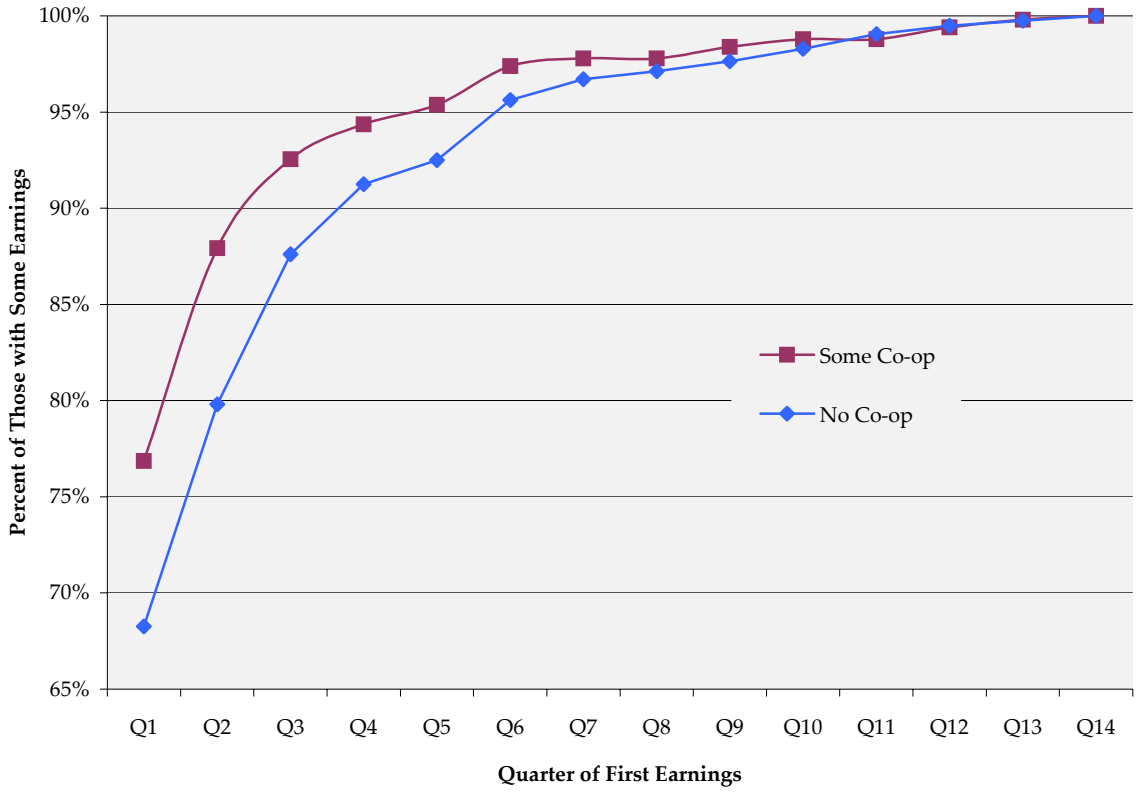
Figure 2. Average Weeks Until First Earnings



Students with higher concentrations of occupational coursework tend to find jobs more quickly than other students, as well. Students in the top tercile of occupational course load are employed, on average, within about 16 weeks, while students in the lowest tercile have jobs after almost 19 weeks.

We also examine the cumulative employment rate for the students with some earnings. In examining Co-op for graduates with some earnings, (Figure 3) we see that, in the first quarter, 77% of Co-op students and only 68% of Non-Co-op students have entered the workforce; by the 5th quarter, over 95% of Co-op and 93% of Non-Co-op students are employed. By quarter 11, the rate of entry for Non-Co-op students meets that of Co-op students.[13]

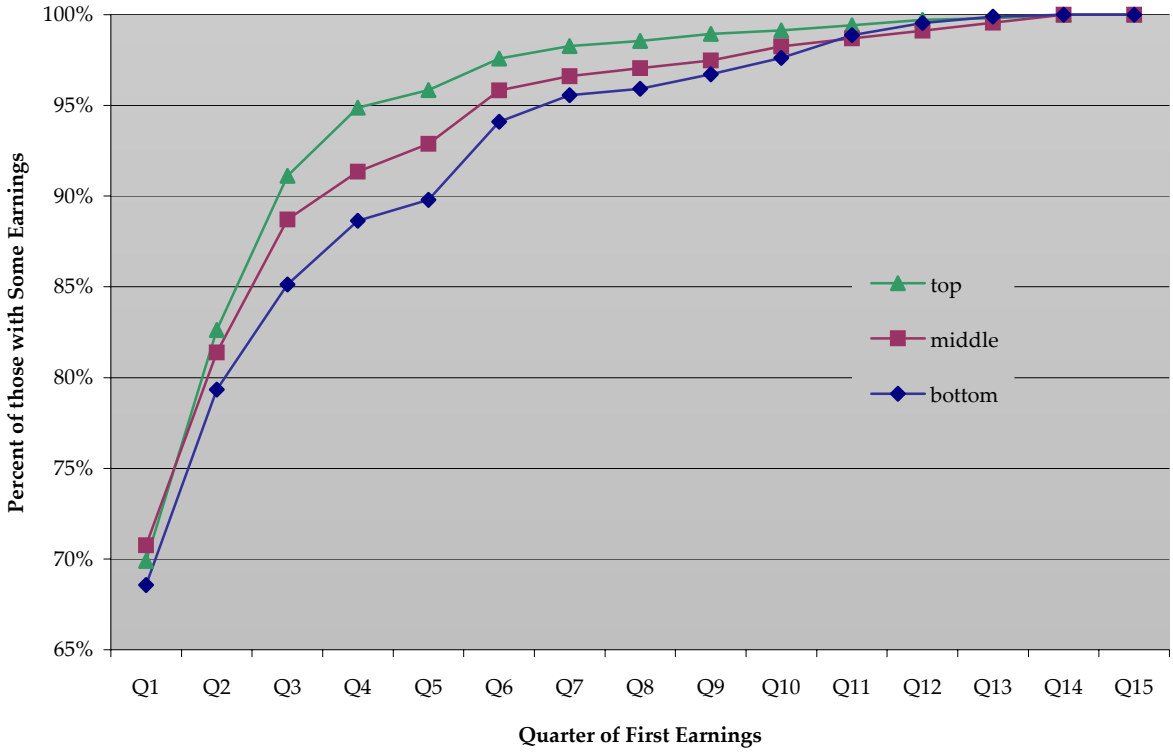
Figure 3. Cumulative Percent of Earners Over 15 Quarters
Some Co-op vs. No Co-op



[13] When results for all students are considered, including the 962 with no reported post-graduation earnings, we find that students with some Co-op have a slightly faster rate of entry into the labor market at first. However, from quarters 2 through 7, the rate of entry is faster for Non-Co-op students. After the eighth quarter the rate of entry is similar for both groups.

In looking at rate of entry into the workplace by occupational course load (Figure 4), we see that in the first quarter following receipt of award, 70% of students in the top tercile of occupational emphasis have some earnings, whereas 68% of those in the bottom tercile have earnings. The spread grows rapidly, with those in the top tercile entering the labor force at a faster rate than those in lower terciles. By the fifth quarter, 96% of the top and 90% of the bottom tercile have had earnings.[14]

Figure 4. Cumulative Percent of Earners Over 15 Quarters by Occupational Emphasis



[14] Results are similar when results for all students are considered, including the 962 with no reported post-graduation earnings. In the first quarter following receipt of award 52% of students in the top tercile of occupational emphasis have some earnings, whereas 49% of those in the bottom tercile have earnings. The spread grows rapidly, with those in the top tercile entering the labor force at a faster rate than those in lower terciles. Seventy-two percent (72%) of the top and 62% of the bottom tercile have had earnings by the fifth quarter. Rates tend to steady and remain similar by the eighth quarter.

Employment Continuity

Finally, we examine the effect of Co-op and occupational course load on the likelihood that one will *continue* to be gainfully employed. This was measured by constructing a "continuity" indicator: for a given person with positive earnings in any quarter of the first year following receipt of an award, the continuity indicator takes on a value of one (1) if that person also has positive earnings in *all* of the following quarters in years 2 and 3, and a value of zero (0) if not. Those with no earnings in year 1 are excluded from the analysis.

Logistic regression was used to see to what extent (what the "odds" were that) various factors contributed to employment continuity. Simply put, the odds ratio indicates the likelihood that a person having the specified characteristic will have continuous 3-year employment *relative to a person in the reference category*. Male students are the reference group for gender. White students make up reference for the race and ethnic groups. The regional reference group is the Bay Area. Students with certificate degrees, 7 or less occupational credits, and no Co-op credits comprise the reference groups for Degree, occupational credits and coop credits, respectively.

Putting this together we can say that the 'constant' represents the likelihood that a white male who takes relatively few occupational credits, no coop credits, and graduates with a certificate degree from a Bay Area CCC will maintain constant 3-year earnings. The reported odds for this constant is 1.046, which is non-significant and therefore indicates that such a student has about a 50-50 chance of maintaining continuous earnings over 3 years. With respect to the other factors listed in Table 7, one should keep in mind that a value greater than one (1) indicates an increased likelihood to maintain continuity *relative to this reference group*, whereas a value lower than one (1) represents a decreased likelihood of this outcome.

Odds ratios for this analysis are included in Table 7.[15] There is no significant gender difference in employment continuity, all else considered. However, some significant racial and ethnic differences were found. The results indicate, for example, that Asian students are .64 times less likely to have continuous employment as white students. Latino students, on the other hand, are 1.3 times more likely to maintain continuous employment compared to their white counterparts.

Occupational course load again demonstrates a significant positive effect. Compared to those with little or no occupational credits, those with 7.01-39% of total credits devoted to occupational courses are 1.8 times more likely to maintain consistent employment for

[15] Odds ratios are included rather than the coefficient estimates for ease of interpretation. All results are available upon request.

3 years. Those with 40% or more of their course load devoted to occupational courses are 2.6 times as likely to maintain continuous employment. Participation in work-based learning (Co-op) does not, however, demonstrate significant effects on the continuity of employment compared to those who have not participated, once these various other factors are taken into account.

Table 7. Odds of Continuous Employment

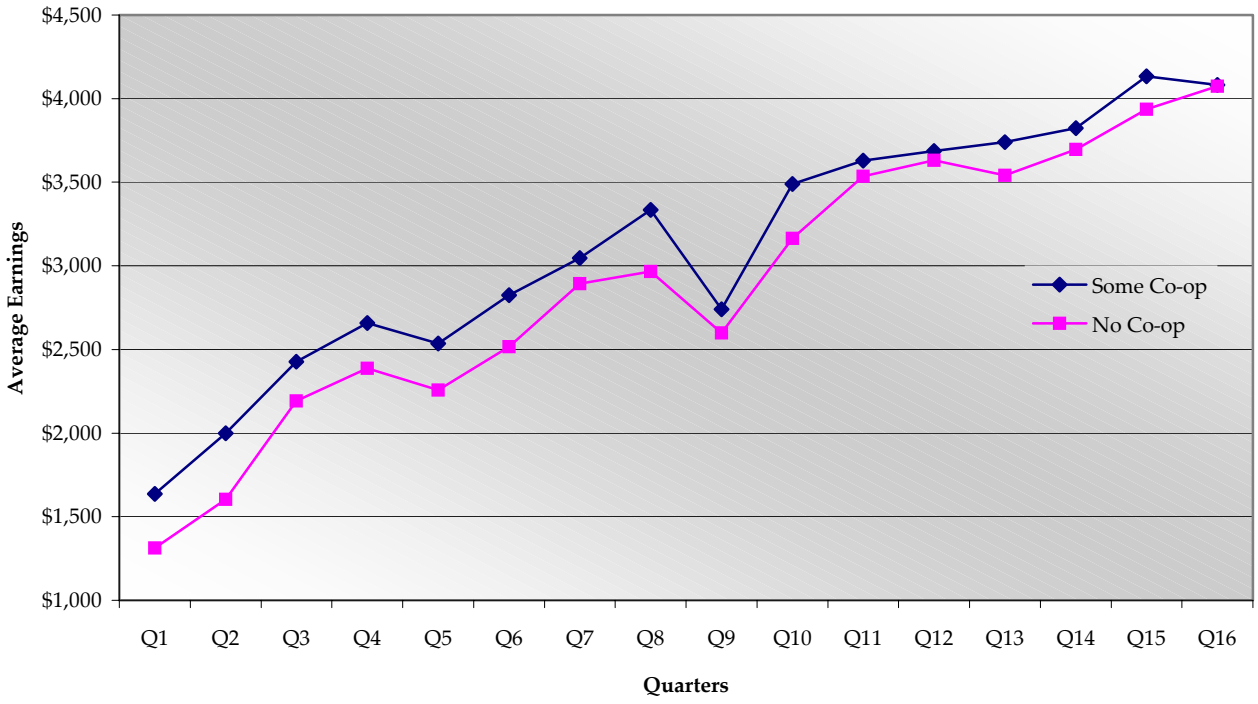
	Odds Ratio
Gender	
Female	1.044
Race/Ethnicity	
Asian	.644**
African American	.575**
Filipino/PI	.700
Latino	1.261*
Other	.978
Unknown	.511**
Region	
Northern	.570**
Central Valley	.799*
Degree Earned	
Associate Degree	1.256*
Occupational Concentration	
7.1-39% Occupational	1.811**
39.1-100% Occupational	2.634**
Co-op Participation	
At least 1 Co-op Course	1.024
Constant	1.046
N	2592
-2 Log Likelihood	3340.81

* Significant at p<.05
** Significant at p<.01

Quarterly Earnings: Co-op Emphasis

Figure 5 presents the average quarterly earnings for students after attaining an award.[16] Co-op students have a much stronger lead in earnings directly out of school. In the first quarter, Co-op students have average quarterly earnings of $1,636, whereas Non-Co-op students earn an average of $1,313. This difference was found to be statistically significant, and the lead maintains significance for the first three quarters. After this lead, however, the benefits of Co-op to earnings appears to taper off, both with respect to absolute differences in earnings and with respect to statistical significance. As the figure demonstrates, the two groups converge in quarterly earnings by the end of the fourth year. Interestingly, in our sample, both groups take a sharp dip in earnings in the third year (quarter 9) post-exit which mathematically "flattens" the earnings trend for both groups from what it was prior to year 3. We do not know why this occurs.[17]

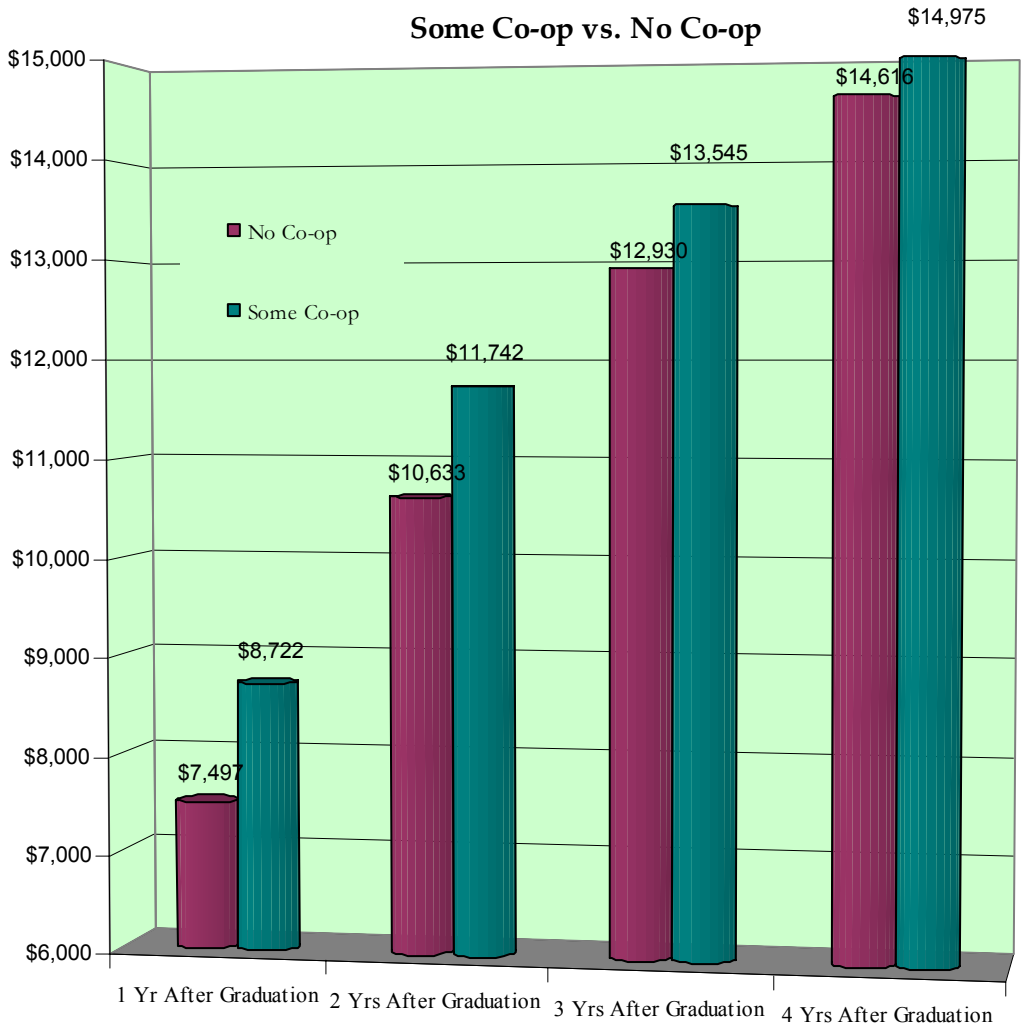
Figure 5. Average Earnings in Each Quarter After Graduation
Some Co-op vs. No Co-op



[16] That sample size (n=3,856) is smaller for all earnings analyses than in the student characteristics analyses because of the elimination of students from the Los Angeles region (see Methodology section).
[17] Since these calculations are based on quarters of employment for students from their time of award, not on calendar years, the dip cannot be attributed to economic conditions during this period.

In Figure 6, student earnings data are aggregated into the first, second, third and fourth year after receipt of award. The figure clearly demonstrates greater overall earnings for Co-op participants no matter what point in time one examines the data. The differences in earnings are statistically significant in years 1 and 2. In years 3 and 4, while we continue to find differences, they are not statistically significant.

Figure 6. Earnings in Each Year After Graduation
Some Co-op vs. No Co-op



The above differences in the first year between Co-op and Non-Co-op earnings may be the result of either lower earnings in the Non-Co-op group, or that they may take longer to find a job and hence have *no* earnings in the first year. To assess this question we next examined the earnings in the first year of earnings (whether that is year 1 following receipt of the award or year 2). We also looked at the total earnings in the final year of earnings (year 3 or year 4), and the change in these earnings (Figure 7). The results support the previous findings that Co-op students have much higher average earnings in the first year of earning as compared to Non-Co-op students. Nonetheless, this lead is not retained over the following 2 to 3 years and the growth in earnings is greater for Non-Co-op students than for Co-op students, although this difference is not statistically significant. Consequently, neither total nor average earnings differ between the two groups (Table 8).

Figure 7. Change in Earnings
Some Co-op vs. No Co-op

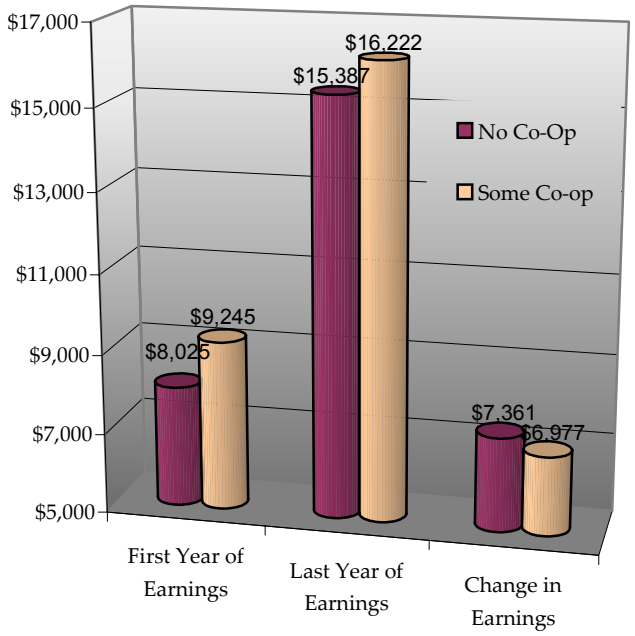


Table 8. Total and Average Earnings for Co-op and Occupational Emphases

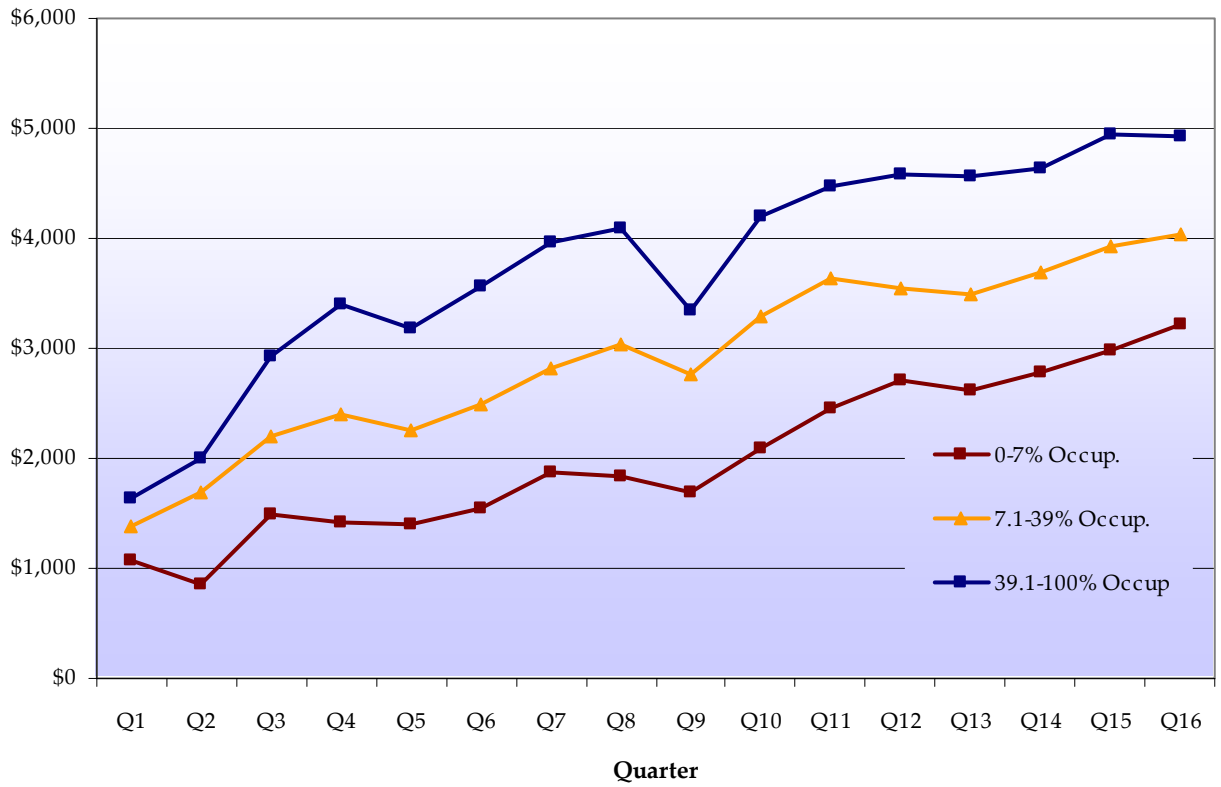
		Total Earnings ($)		Average Earnings ($)	
	n	M	SD	M	SD
Co-op					
None	3157	44,370.45	50,575.85	11,489.88	13,099.51
Some	699	47,505.59	53,922.94	12,375.98	14,160.89
Sig.			*.160*		*.130*
Occupational					
Bottom 3rd	1242	31,143.87	41,417.66	8,010.39	10,590.69
Middle 3rd	1242	44,895.28	48,501.49	11,622.77	12,663.47
Top 3rd	1373	57,475.01	57,955.38	14,972.67	15,084.75
Sig.			*.000*		*.000*

In sum, although the lead appears to diminish over the long term, Co-op students have a strong and statistically significant lead in the earnings market compared to Non-Co-op students.

Quarterly Earnings: Occupational Emphasis

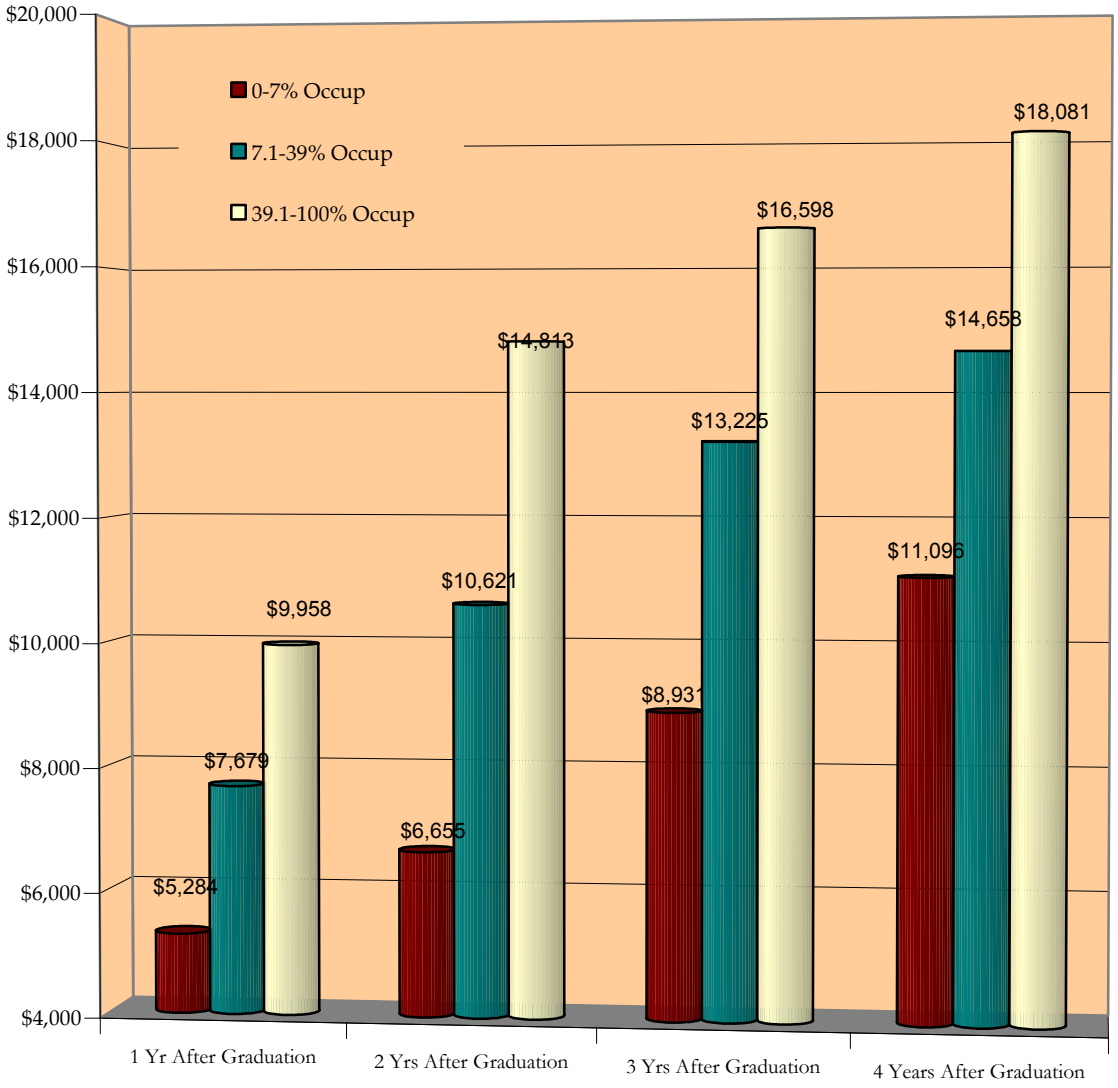
An examination of employment outcomes by the level of student concentration in occupational coursework also demonstrates higher earnings for those with the greatest percent of occupational course load, but demonstrates an even more pronounced sustained effect of the coursework than we saw with Co-op course load. Students with a moderate occupational course load (7.01- 39% of total credits) maintain average earnings well above those with little or no occupational coursework (Figure 8). More notable, however, is the large and significant *increase* in average earnings achieved by those with considerable emphasis in occupational courses.

Figure 8. Mean Quarterly Earnings by Occupational Concentration



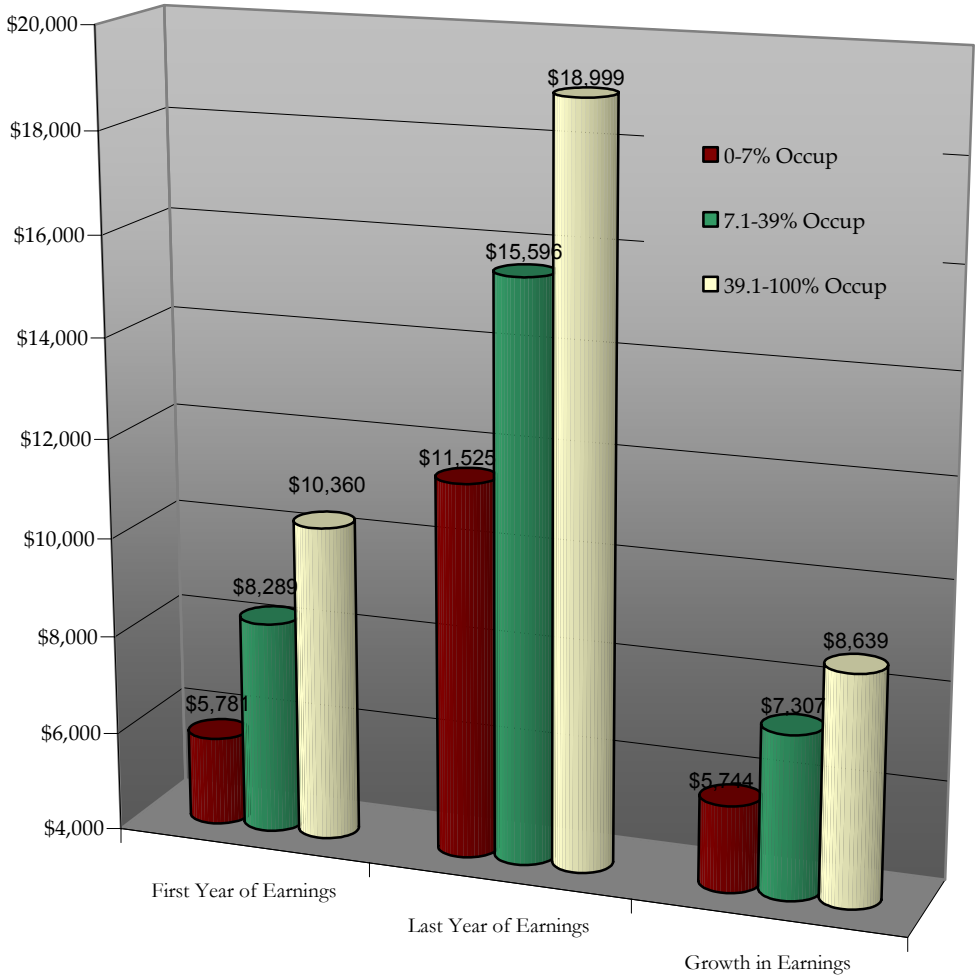
The results hold upon aggregating the data, as demonstrated in Figure 9. All differences are statistically significant, and suggest that, compared to students in the bottom third of occupational coursework, students in the middle third of occupational concentration receive an average of over $2,300 more in the first year after receipt of award. This figure doubles for those in the top tercile of occupational emphasis. Moreover, the difference in the earnings increases over time such that the middle third earn $3,560 more than the bottom third in year four, and the top third earn nearly $7,000 more. Both total and average earnings are also significantly different for the three terciles (see Table 8 above).

Figure 9. Earnings Each Year After Award by Occupational Concentration



These results are supported by examination of differences in earnings *growth* between the first and last year of earnings (Figure 10). The mean growth in earnings differs for the groups. Between the first and last years of earnings, mean growth for those with moderate occupational emphasis is over $1,500 greater than for those with low occupational emphasis. Earnings growth for those with the highest occupational emphasis is over $1,300 greater than moderate-emphasis students, and almost $3,000 greater than low-emphasis students. In other words, compared to low-emphasis students, growth is 1.5 times greater for high-emphasis students.

Figure 10. Change in Earnings by Occupational Concentration

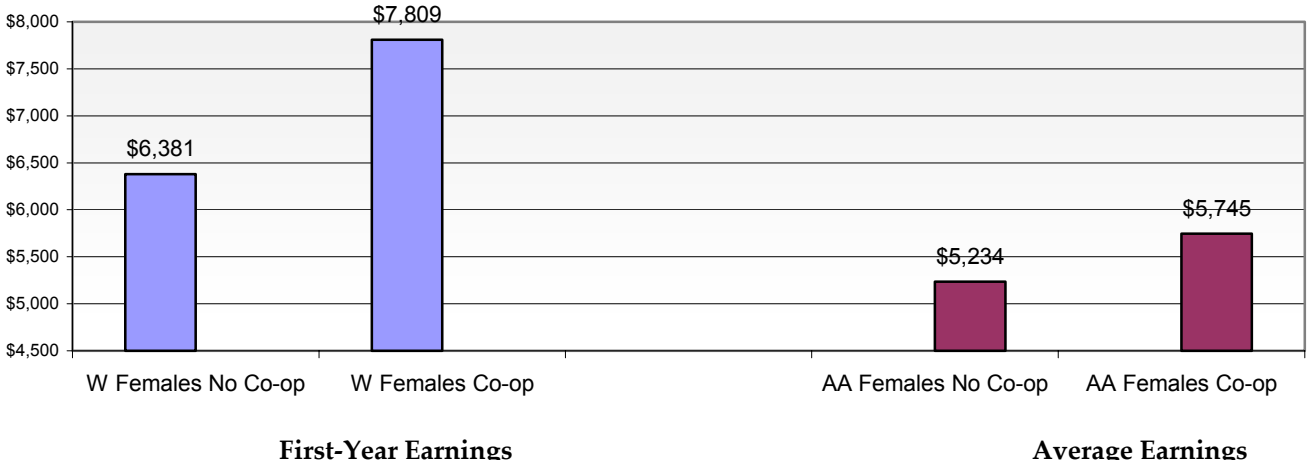


Earnings gains for Co-op and Occupational Emphases by Ethnicity and Gender

Finally, we examined how occupational and Co-op emphasis influences earnings for students with different racial backgrounds, by gender.

The effect of Co-op participation proved statistically significant in two cases: first year earnings of white females and average earnings of African American females.[18] In both cases, Co-op participation increased earnings for these students. In the example below, we use the results of the regression analysis presented later in this report to estimate first year earnings for white females with one (1) 3-unit Co-op course and average earnings for African American females with one (1) 3-unit Co-op course.

Figure 11. Co-Op Earnings Effects for African American and White Females



A much more significant result was evident when ***occupational emphasis*** was examined. As demonstrated in Table 9, in nearly every case increased involvement in occupational coursework significantly improved average earnings. For example, average earnings for Latinas increase from just over $8,000 per year for graduates with few occupational education courses to more than $12,000 for students in the upper terciles. Similarly, Asian men's average earnings rise rapidly from $4,789 to $12,360 at successively higher levels of occupational education course load. The only exception is found for Latino males, for whom no statistically significant difference in average

[18] Further research would be required to ascertain why this is the case, but it may be possible that this phenomenon is related to the participation of women in the Community Colleges' CalWORKS programs that provide additional support, such as child care subsidies and counseling, to women who are moving off of welfare.

earnings is evident. Filipinos and Pacific Islanders of both genders in the top occupational tercile exhibit both the highest gains in earnings and the highest absolute earnings. As shown earlier, Pacific Islander and Filipino students have much higher rates of participation in the highest level of occupational concentration.

Table 9. Average Earnings by Race and Gender ($)

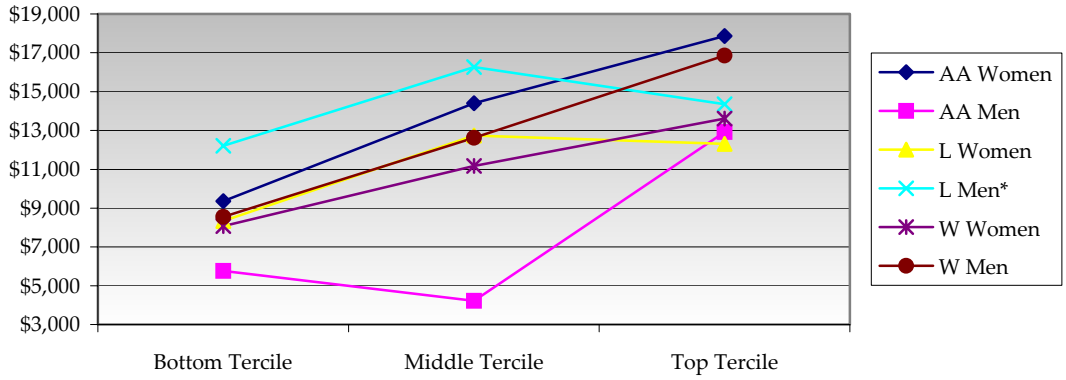
	Occupational Tercile						
	Bottom		Middle		Top		
Race/Ethnicity (n)	Mean	*SD*	Mean	*SD*	Mean	*SD*	*Sig.*
Asian							
M (176)	4,789.63	*7,905.56*	10,599.97	*12,756.12*	12,360.10	*13,147.01*	*.002*
F (277)	5,201.99	*8,755.97*	8,241.23	*10,487.66*	11,138.22	*10,731.83*	*.002*
African American							
M (116)	5,733.53	*10,763.04*	4,217.32	*8,053.85*	12,924.44	*14,819.16*	*.042*
F (80)	9,360.78	*9,539.71*	14,396.67	*15,420.77*	17,861.36	*13,444.86*	*.048*
Filipino/Pacific Islander							
M (50)	11,954.35	*12,350.82*	14,848.95	*11,750.54*	25,246.97	*19,669.96*	*.034*
F (107)	8,801.44	*9,133.54*	12,506.44	*12,041.44*	24,153.25	*18,668.49*	*.000*
Latino							
M (279)	12,215.87	*12,394.35*	16,271.11	*15,194.52*	14,349.43	*17,806.27*	*.282*[+]
F (409)	8,335.36	*8,353.22*	12,745.61	*12,261.64*	12,304.45	*16,633.76*	*.008*
White							
M (979)	8,551.58	*14,172.30*	12,626.76	*14,217.42*	16,865.71	*15,376.20*	*.000*
F (1121)	8,072.44	*8,396.09*	11,174.33	*11,302.85*	13,612.98	*12,798.81*	*.000*

[+] *Not a statistically significant finding.*

Figure 12 presents an additional analysis of results for the African American, Latino and white students in the sample. A number of interesting patterns emerge. First, African Americans are the only racial group that defies the general gender disparity pattern found among other ethnic groups. Instead of maintaining lower earnings than their male counterparts, African American females actually have much higher earnings regardless of occupational concentration. These results hold for first year earnings and earnings growth, as well.[19] Both Latino men and women with mid-range occupational education concentrations have higher earnings than Latinos in the top tercile.

[19] They also hold for the Co-op findings.

Figure 12. Average Earnings for African American, Latino and White Students



** Results for Latino men are not statistically significant.*

Further, African American men in the middle tercile appear to have substantially lower earnings then other African American men in the sample, but then show a large increase in the highest tercile. It is unclear why this is the case, but may be due to a small number of individuals in that group. (As mentioned above, African American and Asian students have the lowest level of participation in the top occupational group.) On the other hand, the white students in the sample tend to increase their earnings consistently as their occupational education concentration increases, though the earnings gap widens between men and women in the top tercile.

Marginal Effects of Co-op & Occupational Courses

In the previous bivariate analyses, the benefits of Co-op and occupational coursework on earnings may be masked by lumping all students together (i.e. those with few Co-op classes are treated as similar to those with more Co-op classes). Moreover, it is possible that the benefits of Co-op are also masked by differences in race, gender, and other demographic or educational characteristics that may have a profound effect on earnings in the marketplace. To control for these factors, as well as assess the importance of incremental changes, we ran a regression on:

- earnings in the first year of earnings
- growth in earnings, and
- average earnings.

Results for this analysis are included in Table 10.

Table 10. Regression Results for All Students [a.]

	First Year	Growth	Average
Female	-7.91E-02	-.111*	-.129*
	(.083)	(.054)	(.051)
Asian	-.262**	-.229*	-.255**
	(.079)	(.097)	(.088)
African American	-.463**	-.205	-.388**
	(.108)	(.133)	(.120)
Filipino/PI	4.140E-02	7.937E-02	5.088E-02
	(.110)	(.129)	(.122)
Latino	.104	-3.95E-02	.144*
	(.062)	(.071)	(.069)
Other	.162	--7.66E-02	6.73E-03
	(.127)	(.153)	(.141)
Unknown	-.181	--2.31E02	-.285
	(.134)	(.165)	(.149)
Northern	-.411**	-8.691E-03	-.485**
	(.060)	(.072)	(.067)
Central Valley	-.257**	-4.927E-02	-.222**
	(.057)	(.067)	(.063)
Time to Award	1.265E-02	4.201E-03	2.033E-02**
	(.008)	(.008)	(.009)
%Occupational	.638**	-6.24E02	.860**
	(.067)	(.079)	(.075)
Co-op	.202**	-.148*	9.300E-02
	(.059)	(.070)	(.065)
Constant	8.831**	.877**	9.080**
	(.070)	(.082)	(.078)

* Significant at p<.05

** Significant at p<.01

[a.] Dependent variables are expressed as natural logs of earnings.

First, a note about the regression methods used in this section. Standard analysis practice requires that we transform earnings variables in order to improve the fit of the model. In this model, the coefficients above are expressed in terms of log earnings. This method generates accurate long-term estimates for earnings, but tends to underestimate growth in earnings in the short- and medium-term. Therefore, the earnings estimates presented here are quite conservative.

To interpret the regression coefficients in a meaningful way, we exponentiate each coefficient to express the effect of each variable in terms of a percent change in earnings. So, for example, a coefficient of -.262 (Asian first year earnings) means that Asian graduates earn 77% of white graduates' first-year salaries, since $e^{-.262}$=.77.

Before turning to a specific discussion of these results with respect to Co-op participation, we note some rather interesting findings. First, gender is important. All else being equal, women have average earnings that are 11% lower than their male counterparts. Women's earnings also grow at a much slower rate: men's earnings rise about 10% faster than women's earnings between the first and last years. Asian and African American students also earn significantly less than their white counterparts, both in the first year, and in average earnings, and these groups see relatively fewer earnings gains. (Again, perhaps coincidentally, these are the two groups with the lowest levels of participation in the high-occupational course load tercile.) Finally, there is strong evidence of regional differences in earnings. All else considered, students from the Northern and Central Valley regions earn $1,500 to $2,000 less in the first year of earnings, and $1,700 to $3,400 less in average yearly earnings when compared to students from Bay Area CCCs. In addition to lower starting and average earnings these regions also demonstrate significantly lower growth in earnings over time compared Bay Area awardees.

Nevertheless, even after these important characteristics are accounted for, the coursework profile still exhibits significant effects on earnings. Specifically, a 3% increase in the proportion of courses that are occupationally related is predicted to increase first year earnings by $132 and average earnings by $229. Further, even in the presence of effects from occupational coursework, region, and demographic characteristics, participation in additional Co-op courses benefits students' first year and average earnings. Co-op course participation is associated with a 22% increase in first-year earnings.

Conclusion

The results of this study indicate significant short-term benefits of work-based learning and sustained benefits of occupational training in California Community Colleges. Specifically, time to employment is shorter for both Co-op students and for students with the highest concentrations of occupational course work, and rate of entry into the workplace is also higher for both groups. Students taking a high proportion of occupational courses also have more continuous employment.

First year earnings are significantly higher for students who participate in Co-op classes and for those who are heavily involved in occupational coursework. In addition, both first year and 3- to 4-year *average* earnings are significantly influenced by the level of student involvement in Co-op and occupational courses. Moreover, participation in Co-op courses as well as occupational courses adds benefits with each increment of additional coursework taken. Thus, it would appear that Co-op courses are not simply

reducible to the benefits found in occupational courses that the students might be taking, but stand alone as important components in the earnings benefits of young adults.

Unfortunately, while high levels of occupational coursework provided students with both short and long-term gains in all areas, the short-term benefits for Co-op do not persist in the long run. Notably, the rate of entry into the labor force slows substantially. In addition, the earnings growth declines relative to earnings growth for Non-Co-op students. Finally, continuity in employment is not appreciably better for Co-op students compared to Non-Co-op students.

It may be important for work-based learning programs to begin to address ways to make the obvious immediate benefits of Co-op available to more students, while exploring ways to promote sustained benefit over the long-run, perhaps through increased intensity, rigor and connection to curriculum – whether occupational or strictly academic. In so doing, the benefits of work-based learning may even surpass the long-term benefits that accrue to students who are heavily involved in occupational coursework.

Finally, given the differential rates of participation among ethnic groups in both Co-op and Occupational Education, it may be important to examine recruitment practices, counseling services and other support systems to ensure that all students have equal access to the benefits of these programs.

Appendix A

The ROI from the CCC student's perspective

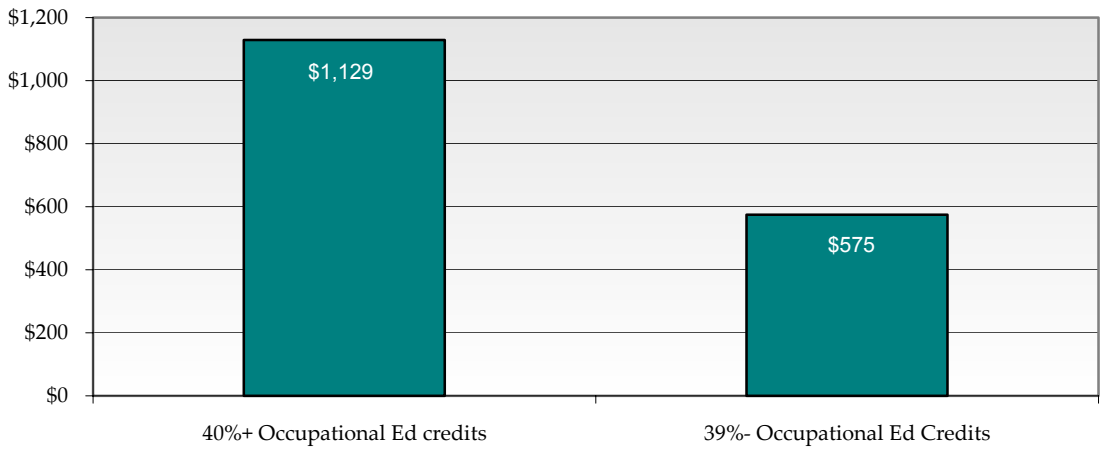
Impact of Taking More Occupational Education Classes On 4-Year Earnings

This return on investment analysis examines the per-unit return on investment (measured by total earnings 4 years after graduation) for students with relatively high concentrations of occupational education courses compared to all other students. In other words, it examines the payoff in earnings for students with different types of course loads.

Students who take more occupational education classes are likely to benefit from a substantial return on their investment. Our analysis shows that students who take 40% or more of their total course load (about 21 units out of 53) complete community college earlier than other students, and earn $20,405 more during their first 4 years after college.[20] Then, comparing students' four-year earnings to average credit units earned provides a measure of the benefits of different course loads. The results are striking: students with a high proportion of occupational education courses earn about $1,129 *per credit unit* over the first four years after graduation, while students with a lower proportion of occupational courses earn about $575. In other words, those taking high proportions of occupational courses earn about $550 more per credit unit over the first four years than other CCC students.[21]

Return on Investment for CCC Students

4-year Earnings Per Credit Earned



[20] Calculations based on information provided in Figure 8.

[21] Please note that this is an *estimated* benefit; earnings were not discounted to account for the length of time between course-taking and earnings. For 40%+ occupational education students, findings were calculated by dividing the four-year earnings of these students ($59,480) by the average number of credits earned (52.7). The same procedure was followed for all other students, four-year earnings were $39,075.

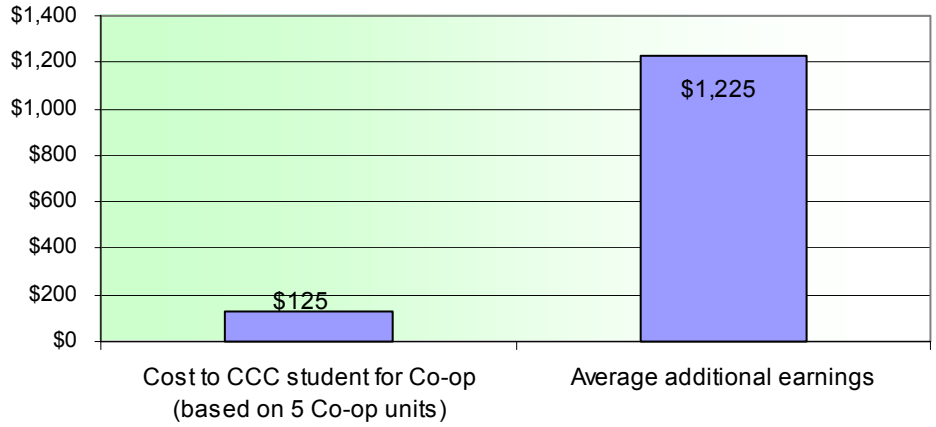
Impact of Enrolling In Co-Op Courses On First Year Earnings

Participation in the Co-op program has similarly positive earnings results for CCC students, particularly in their first year of work following graduation. As shown in Figure 6, students with Co-op experience earn $1,225 more than their classmates in their first year of earnings. Given the reasonable cost of taking classes in the community colleges, students can therefore earn back their investment in course fees and materials up to ten times over in just one year.[22]

This additional income also generates benefits to communities, as well as higher tax revenues to the State.

Return on Investment for Co-op Students

Co-op course cost compared to additional first year earnings



ROI from the California Community Colleges' Perspective

Another way to assess the potential benefit of taking relatively more occupational education courses is to assess the ratio of the California Community College's cost to relative earnings of graduates. Comparing CCC's cost to educate students[23] with graduates' 4-year earnings demonstrates that students with a high concentration of

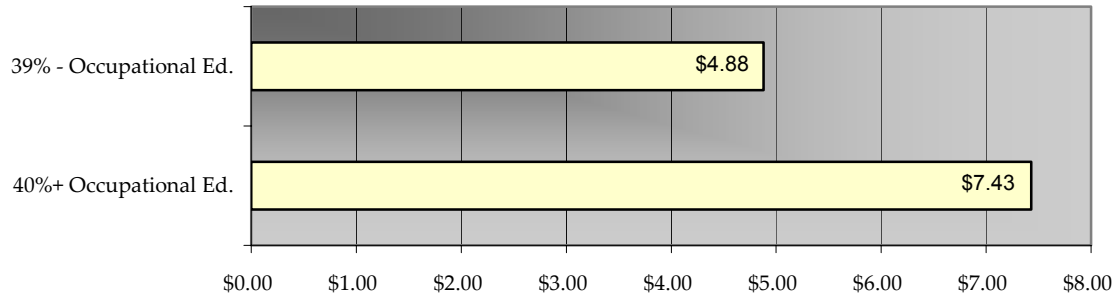
[22] The mean number of Co-op credits for students who took these courses is 4.84. At $18 per unit plus modest direct expenses, we estimate average course costs for Co-op to be $25 per unit or $125 for 5 units.

[23] Estimated at $8,000 based on data presented in *Financing California's Community Colleges*, Public Policy Institute of California, 2004.

occupational education courses earn $7.43 for each dollar invested, whereas their classmates earn $4.88 for each dollar invested.[24]

Return on Investment for California Community Colleges

Ratio of Dollars Invested by CCCs to Total 4-year Earnings



Effect Of Increasing the Number Of Students Who Take Occupational Education Courses

Based on the estimates presented in this report, increasing the number of students who complete a degree or certificate that includes 40% or more of occupational education units would have unmistakable benefits for both students and for the state of California.

For purposes of this model, we assume that 600 additional CCC students graduate with 40% or more of their total units in occupational education courses, and that they achieve average earnings for four years after graduation.

CCC graduates with more occupational education units can expect combined earnings of $12.2 million more than their classmates over four years. Moreover, the higher average earnings of this group will account for an additional $283,200 in state income tax revenue over four years.[25]

[24] Calculated as the ratio of four-year earnings to estimated CCC cost. For 40%+ students, ratio was $59,450/$8,000 = $7.43; for all other students, ratio was $39,076/$8,000 = $4.88.

[25] Earnings gain based on additional $20,374 in earnings for high concentration students: $20,374 * 600= $12,224,400. Additional taxes estimated on 2003 CA income tax tables for individuals with earnings of $14,862.30 and $9,769.