Research in Higher Education, Vol. 40, No. 1, 1999

POSTCOLLEGE EARNINGS OF FORMER STUDENTS OF CALIFORNIA COMMUNITY COLLEGES: Methods, Analysis, and Implications

Jorge R. Sanchez, Frankie Santos Laanan, and W. Charles Wiseley

In the wake of new federal and state mandates, community colleges are faced with demands to provide accountability reports on student outcomes. With the use of the Employment Development Department Unemployment Insurance (EDD-UI) wage record data, along with the California Community Colleges Chancellor's Office Management Information System administrative database, this study sought to investigate the extent to which completing an associate degree and vocational certificate impacts the postcollege earnings of students. Based on information from 700,564 students from California community colleges during the 1992–93 academic year, the findings suggest that students' gains from first year out of college to third year out will differ by age group. Among economically disadvantaged students, a strong positive relationship exists between educational attainment and postcollege gains. An important finding among vocational students is that as women complete more education, the earnings gap closes between men and women. Finally, this study raises several policy implications and presents suggestions for future research.

There are many reasons why individuals attend college. One popular argument found in the literature is the notion that obtaining an education beyond high school will yield not only higher-paying salaries but higher-level jobs (Elam, 1983; Grubb, 1996; Pascarella and Terenzini, 1991). Numerous studies suggest that individuals are motivated to attend college because of the economic returns, and that there is a strong positive relationship between formal

Jorge R. Sanchez, Director, and Frankie Santos Laanan, Senior Research Analyst, Vocational Education and Institutional Research, Coast Community College District; W. Charles Wiseley, Information Systems Specialist, California Community Colleges Chancellor's Office.

Paper presented at the 38th Annual Forum of the Association for Institutional Research, Minneapolis, MN, May 20, 1998.

Address correspondence to: Jorge R. Sanchez, Director, Vocational Education and Institutional Research, Coast Community College District, 1370 Adams Avenue, Costa Mesa, CA 92626; e-mail: jsanchez@cccd.edu

0361-0365/99/0200-0087$16.00/0

education and earnings (Grubb, 1996; Pascarella and Terenzini, 1991). In other words, workers who have the most education have the highest average annual earnings and the lowest unemployment rates (*Occupational Outlook Quarterly*, 1992).

Although most of the research has focused on the comparison between high school graduates and four-year college graduates in relation to earnings (Adams and Jaffe, 1971; Haller, 1982; Henderson and Ottinger, 1985; Pace, 1979), very little is known about the economic value of an associate degree or vocational certificate from community colleges. In fact, most reports and studies show what the economic payoffs are if you obtain a baccalaureate degree on an individual's average earnings. Data provided by federal agencies such as the U.S. Bureau of the Census tend to aggregate educational attainment level from the spectrum of not a high school graduate, high school graduate, some college, baccalaureate, master, doctorate, to professional. The "some college" category usually includes associate degree completers and as a result remains ambiguous and vague. Attributing the ultimate contribution to community colleges in terms of the economic benefit to individuals' postcollege earnings is difficult and often impossible.

For community colleges, a popular outcome measure is assessing the economic impact of the community college on the local economy (Head, 1994; Katsinas, 1994; McIntyre, 1996; Stout, 1996; Weitzman, 1991; Winter and Fadale, 1991). Many studies in this area specifically examine the direct impact of the college in terms of the total expenditures in supplies and services, college budgetary expenditures, employee expenditures, employee training, and new business development in their respective communities. These studies focus on the college or system, its resources (e.g., fiscal and facilities), and its economic impact on the local community. Although these studies are important, the economic impact on students as measured by individual earnings is rarely discussed. In studying the economic benefit of a community college education on students' earnings, the unit of analysis moves from the college as an institution to the student as the unit. That is, investigating multiple outcomes by examining students provides the opportunity to attribute the impact of a community college education on an individual's economic worth in the world of work.

PURPOSE

This study examines data from California Community Colleges and the Employment Development Department's Unemployment Insurance (EDD-UI) wage record data. Specifically, a cohort of *leavers* and *completers*, which is comprised of over 700,000 students during the 1992–93 academic year, is examined. The purpose of this study is to address the questions: What is the economic value of obtaining a vocational certificate or an associate degree from California community colleges? How do students' postcollege earnings from

last year in college, first year out of college, and third year out of college differ by educational attainment for all students and vocational students? What is the relationship between educational attainment and earnings for students under 25 and for students 25 and over? Are there differences by racial/ethnic background, economic status, gender, and age group among vocational students? Finally, this study raises policy implications and offers suggestions for future research in this area.

REVIEW OF RELATED RESEARCH

In researching the economic benefits of a college education, a generalization is made that formal education has a strong positive association with earnings (Blaug, 1970, 1972; Grubb, 1996; Psacharopoulos, 1973, 1985) even when factors such as age, gender, and occupational category are held constant. Much of the research examining the net effects of college on students' earnings has focused primarily on the influence of different levels of formal education. According to Jencks et al. (1979), when you control for work experience, measures of intelligence, and socioeconomic background, a high school diploma provides a 15% to 25% earnings advantage over an eighth-grade education. Although most of the comparisons tend to focus on differences between high school graduates and baccalaureate-degree recipients, little is known about the value of an associate degree or vocational certificate from community colleges in relation to earnings advantage over a high school diploma.

Theoretical and Conceptual Perspectives

Several theoretical and conceptual perspectives are synonymous in studying the economic benefits of postsecondary education. The human capital theory (Becker, 1964, 1975, 1992, 1993), which derives from the economics paradigm, is one of the most popular frameworks scholars have employed. Becker defined human capital as the economic effects of investment in education on employment and earnings. The concept of human capital is in all respects analogous to the economist's traditional concept of physical capital. In the lexicon of economists, physical capital includes all useful physical assets (e.g., currency, property, precious metals, jewelry). In education that would be analogous to acquiring energy, motivation, skills, and knowledge possessed by human beings, which can be harnessed over a period of time to the task of producing goods and services. In essence, the human capital theory measures the return on investment in oneself.

The aim of Becker's work was to convey to the public the importance and magnitude of investment in human capital. He postulated that the major factor influencing the level of human capital is the degree of investment in education and training. By referring to a simple model, he assessed the costs and benefits

of such investment. He cautioned that care must be taken to distinguish between the social rate of return and the private rate of return.

Becker postulated that the skills and knowledge embodied in an individual could be defined as human capital. All individuals attain a certain stock of human capital and this level is primarily influenced by education and training. Further, that investment in human capital increases productivity. He analyzed this investment in human capital by comparing the costs and benefits of an educational investment. He was able to arrive at some conclusions as to the profitability of investing in education.

The human capital model has been criticized by some economists on a number of points. For example, the model assumes that all expenditures on education are investments. Blaug (1972) refutes this by saying that "a year's schooling for someone, invariably shares both consumption and investment aspects." By ignoring these consumption aspects, Becker's (1964) research underestimated the rate of return on educational investments.

Another conceptual framework used in the literature to explain the effects of formal education on earnings is the socialization hypothesis (Pascarella and Terenzini, 1991). Most of these studies have applied these perspectives to individuals who have completed a four-year college education. According to the hypothesis, those with baccalaureate degrees earn more than high school graduates because students who obtain a four-year education develop the cognitive skills and/or personal traits that make them more productive employees (Pascarella and Terenzini, 1991). For students who attend a two-year institution, the socialization perspective could also be applicable. That is, students who complete formal programs and complete the certificate or associate degree are likely to be socialized in the respective environments of their discipline. Therefore, students completing extensive programs in a vocational area will be required to develop the skills, knowledge, and abilities to be an employable candidate in the workforce.

Another hypothesis advanced in the literature is the notion of certification or screening. That is, employers can use college education as a way to screen the applicant pool or can require a bachelor's degree as a way of certifying prospective employees (Jencks et al., 1979). That is, by virtue of possessing the bachelor's degree, individuals are perceived as meeting a certification, which distinguishes them from nondegree recipients, and they are thus awarded with higher-paying jobs or career paths.

Net Effects of Community College Education

The between-college effects of two-year and four-year institutions on economic benefits have been examined. Specifically, there is a small body of literature that has addressed the net impact of initially attending a two-year rather

than a four-year institution on earnings. The evidence suggests that when controlling for background traits and educational attainment, any direct earnings penalties for attending a two-year college are quite small early in the career but may increase slightly with longer work experience (Pascarella and Terenzini, 1991). However, students who begin at a two-year institution may experience a negative impact on earnings since they are less likely to complete a bachelor's degree than their four-year counterparts (Astin, 1985).

Recently, Grubb (1996) reported the latest findings using the Survey of Income and Program Participation (SIPP) in his book entitled *Working in the Middle*. According to Grubb, while individuals with baccalaureate degrees dominate managerial and professional jobs, those who earn an associate degree double their chances of becoming a professional or manager compared to the chances for someone with a high school diploma. Further, he maintains that the chances of obtaining a job, which requires technical skills, are highly increased with an associate degree or vocational certificate, and the likelihood of becoming a laborer or having an unskilled position is reduced. That is, having a subbaccalaureate credential as well as postsecondary coursework without credentials helps individuals move from the bottom levels of the labor force into mid-skilled positions.

State Efforts Using Unemployment Insurance Wage Records

Questions of the contributions that community colleges make to an individual's economic worth have been quantified in terms of income enhancement. States including California, Florida, North Carolina, Texas, and Washington and a few others have conducted statewide studies using the Unemployment Insurance (UI) wage record data to develop a methodology to measure students' postcollege earnings. Most of the studies have followed program completers or graduates into the workplace to estimate average annual earnings or placement. Collaborative efforts with the Department of Labor unemployment records offices have yielded information from the quarterly wage/earnings files for those students identified as program completers or graduates. Since matching with the student's social security number is required in order to access not only earnings but also educational data, the concern surrounding confidentiality and privacy issues has been in the forefront of researchers, policymakers, and state agencies.

Florida is considered to be the pioneer in developing a follow-up strategy using the UI Wage Record data. As a result of a legislative directive and a joint agreement between the State Department of Education and the Department of Labor and Employment, the Florida Education and Training Placement Information Program (FETPIP) was developed. In a recent study (Pfeiffer, 1990), 200,000 vocational education graduates during the 1988–89 academic year

were tracked. Of these students, 64% of program completers were found employed in Florida businesses, an additional 20% continued their education within the state's higher education system, and 2% were federal employees or in the military.

In the state of Washington, over 12,269 postsecondary vocational education program completers during the 1990–91 academic year were tracked (Seppanen, 1993, 1994). The Washington State Board for Community and Technical Colleges (WSBCTC) compiles data on educational and job-related outcomes for students leaving vocational preparation programs. Using an automated data matching procedure, this method examines state unemployment insurance and benefit records, public postsecondary enrollments, U.S. Armed Forces enlistments, and state community college enrollments. Specifically, data are compiled on employment status, estimated annual wages, hours worked per week, the relation of employment to training, postsecondary or military status, and a host of others. Based on a nine-month analysis for the 12,269 graduates of vocational programs, the study revealed the overall job placement rate of 85%, with 27% of the graduates going into health-related fields, 23% going into trades, 13% entering the service industry, and 12% in administrative support. To account for out-of-state employment of Washington program completers, efforts were made to collaborate with neighboring states such as Alaska, California, Idaho, and Oregon.

During the spring of 1990, the Indiana Commission on Vocational and Technical Education completed a pilot study of 1,497 student program completers from the 1988–89 school year. Other than social security identification, no student demographic information was analyzed. Overall, 71% of the completers were found in either the state's unemployment insurance, the Department of Defense military personnel, or the Indiana Commission for Higher Education databases. Specifically, 66% were found in state wage records, 16% were in higher education, and 3% were in the military (Piper, 1990).

In Illinois (Merano, 1990), a pilot study was conducted of the 1988–89 cohort of students who completed an occupational program. Of the 15,485 occupational education program completers, 70% matched in the subsequent quarter following their education/training. Of these students, 84% were still employed for one year. Average quarterly earnings increased from $4,207 to $4,621 for the first two quarters following program completion; no student demographic data were analyzed.

In 1993, the adoption of a new legislation and goals statement for the North Carolina Community College System reemphasized the efforts by community colleges on workforce preparedness (Vanderheyden, 1994). In response to this policy, efforts were put forth to account for two outcome measures of successful workforce training: employment rates and median salary of program completers. In a study examining 15,817 who completed a program during 1990–

91, the findings revealed that 92% of students were employed during the third quarter of 1991 and their median earnings were $3,830. One year later, 97% of former students were employed and had an increase in their median earnings of $4,279.

More recently, Yang and Brown (1998) investigated the employment status and earnings of North Carolina Community College System curriculum students. These students specifically were enrolled in credit programs that either grant associate degrees, certificates, or diplomas (e.g., college transfer, general education, technical and vocational programs). Specifically, the study compared students' employment status and mean quarterly and annual earnings among completers who did not reenroll in any of the colleges in the following year (i.e., exit completers), completers who did reenroll in the following year (i.e., comeback completers), noncompleters who did not reenroll in the following year (i.e., exit noncompleters), and noncompleters who did reenroll in the following year (i.e., comeback noncompleters). The merging of three separate databases was conducted to answer the research questions: the Common Follow-Up System (CFS), the community college system curriculum registration file, and the community college system Curriculum Student Progress Information System (CSPIS). Based on this study, the authors highlighted several findings. First, exit noncompleters had the highest annual earnings. However, the mean quarterly earnings of exit completers increased at a faster rate from quarter 1 to quarter 4 than the other groups. Second, older students had higher annual earnings than younger students for all groups. Third, completers who had earned an AAS degree, certificate, or diploma had higher annual earnings than those who had earned an associate degree. Finally, the mean annual and quarterly earnings for exit noncompleters were not necessarily increased by simply completing more credit hours.

In Texas, Froeschle (1991) examined 8,162 completers and nonreturning postsecondary vocational-technical education students from four institutions. Approximately 85% of the former students were found in the UI wage records file during the five quarters subsequent to the graduation. In Colorado, Smith (1989) reviewed 3,797 associate-degree and certificate completers in 1985–86. The longitudinal student tracking system contained data from three sources: (1) Colorado Commission of Higher Education, (2) Colorado Department of Labor and Employment, and (3) Colorado Community College and Occupational Education System. Of the award and program completers, 20% were enrolled in higher education, 58% were in the UI wage records file one year after graduation, and 12% of those found in the UI wage records were also enrolled in higher education.

Alaska, Florida, Indiana, and Washington have accessed additional employment-related databases (i.e., federal personnel records, postal service employment, and military/defense records) in order to account for a greater proportion of their students. Only Alaska and Washington have arranged to retrieve em-

ployment earnings from neighboring states. Conversely, California and Texas have examined students who did not complete their program and left training, compared with students who completed their program. Generally, the results for California and Texas reveal that students who do not complete a certificate or degree have substantially lower quarterly earnings compared with program completers. This information suggests that in order to maximize quarterly earnings, students would be best served by completing their program. Although a few of the studies have addressed the need to account for those students who entered the ranks of the self-employed, efforts to examine earnings of those students have not been undertaken by these states. Estimates of how much of the workforce is self-employed vary greatly from as little as 3% to 5% (Stevens et al., 1992) to a high of 10% to 15% and rising (U.S. Department of Commerce, 1996).

California's Efforts Using UI Wage Record Data

Jack Friedlander (1993a, 1993b, 1996) has been credited with being the pioneer in examining the postcollege employment rates and wages of California community college students. A pilot study was conducted in 1992–93 in coordination with the California Community Colleges Chancellor's Office (CCCCO), California Economic Development Department (EDD), Santa Barbara City College, and Grossmont College. This feasibility study was used to develop the Post-Education Employment Tracking System (PEETS) to track the postcollege employment rates and earnings of community college program completers and leavers over an extended period of time. The methodology used social security numbers to match EDD quarterly wage data with student records maintained by the State Chancellor's Office. The study confirmed that PEETS can be used to answer questions regarding employment patterns of former students, employment rates by major and type of degree, comparative earnings of associate-degree graduates and those who did not complete the degree, and earnings and employment rates in different student population groups (Friedlander, 1993a). Friedlander concluded that PEETS is an inexpensive method for tracking the success of former students, and can be used to meet accreditation requirements and respond to consumer inquiries.

Another study by Friedlander (1993b) examined students who attended Santa Barbara City College (SBCC) from 1986–87 to 1989–90 to determine the earnings made by students while they were enrolled and the first and third years after leaving SBCC. Using the same methodology of matching students' social security numbers with income data collected from employers by the California EDD, the study compared employment status and earnings by occupational field, and outcomes for associate-degree completers and those earning 12 or more credits at SBCC. In general, Friedlander found that students who com-

pleted associate degrees experienced an increase in annual wages of 41% compared with students completing only 12 units or more (28%). Among students who completed an associate degree, postcollege earnings were highest among nursing graduates.

To refine the use of PEETS, Friedlander (1996) conducted a follow-up study that included a sample of 173,523 students from 18 California community colleges who either completed a certificate or degree or stopped attending in 1991 or 1992. The study found that UI records were available for the majority of the sample and that wages of students who received a certificate or degree from an occupational program were higher than both those who left occupational programs without a degree or certificate and those who completed nonoccupational programs. Moreover, occupational students with a degree or certificate made a 47% gain in wages from the last year in college to the third year out of college.

DATA SOURCES AND METHODOLOGY

There are three main sources that were used to derive a data set to respond to questions about the postcollege earnings of students. The process involves electronically matching the social security number in the UI wage record data files maintained by EDD and the California State University (CSU) Chancellor's Office with the student record files stored in the Chancellor's Office MIS. Specifically, the three sources are: (1) the Unemployment Insurance (UI) wage record data collected by the California Employment Development Department (EDD); (2) the student records maintained by the CSU Chancellor's Office; and (3) the demographic and educational data for all California community college students maintained by the Chancellor's Office Management Information System (MIS).

The California EDD collects and maintains UI wage records, which are used to determine employment and earnings of individuals in the labor market. Employers are required to comply with the state's UI compensation law by submitting UI quarterly reports of earnings for their employees. For each employee covered, an employer is required to report the employee's social security number and the total amount of earnings received during the quarter. Additional information about the employer is also reported, such as the unique employer identification number, the county in which the business is located, and the industry affiliation of the business.

The Chancellor's Office MIS database contains demographic and educational data of all students who attended California community colleges since fall 1990. As the state's official repository of community college student data, the MIS contains demographic data such as age, gender, ethnicity, financial aid status, English-language proficiency, and disability status. Furthermore, educa-

tional data maintained include precollegiate basic skills courses, occupational and nonoccupational courses completed, grades, and degrees and certificates awarded.

For this analysis, the target population includes students who were either *completers* or *leavers* during the 1992–93 academic year. A *completer* is defined as a student who received a certificate or degree, whereas a *leaver* is defined as a student who did not receive a certificate or degree but may have completed some units. The data analyses conducted for this study are based on information from 700,564 students enrolled in 103 of the 106 California community colleges. The reporting domain of the cohort included students with a social security number, students who met the Full-Term Reporting Criteria (FTR) and were enrolled in a least one-half unit or eight hours of positive attendance during the academic year. Excluded from the reporting domain were students enrolled in K–12 during the cohort year, students enrolled in any California state university during the two years following the cohort year, and students enrolled in one year following the end of the cohort year at any college in the California community colleges system. Individuals who were employed by the military or federal government, self-employed, unemployed, or not in the workforce were also not part of the data set.

Analytic Approach

In order to make comparisons of earnings from the last year in college to the third year out of college and the first year out to the third year out, the California Consumer Price Index for Urban (CPI-U) Consumers was used to adjust earnings for changes in inflation. Thus, all earnings were adjusted to 1996 dollars. For this study, only students who worked all four quarters were examined. These students were found in the labor market beginning July 1 during their last year in college and third year out of college. Further, the median annual earnings were used instead of the mean earnings because this is how the data were made available to colleges from the Chancellor's Office. The median annual earnings represent the middle value in the distribution of the annual income. The annual income is derived by summing earnings for those working all four quarters. The purpose of using the median annual earnings is to have a more stable statistic. Compared to the mean, the median is more robust and less likely to be influenced by extreme outliers.

RESULTS

Figure 1 illustrates the different typology of students from California community colleges in 1992–93 by enrollment concentration. The data produced by the Chancellor's Office have been disaggregated into five concentrations: (1) all students (no vocational courses); (2) vocationally exposed; (3) skills upgrade;

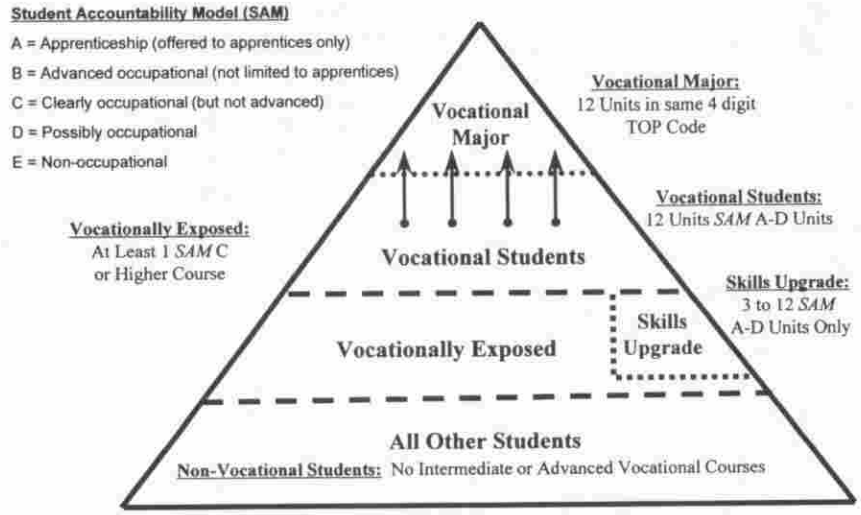

FIG. 1. Typology of California community college students by enrollment concentration (1992–93 cohort).

(4) vocational students; and (5) vocational students' major. Each typology is defined by the number of vocational courses and the Student Accountability Model (SAM) codes found in the *Chancellor's Office Data Element Dictionary*. The SAM coding scheme (i.e., A, B, C, D, and E)[1] is used to indicate the degree to which a course is occupational and to assist in identifying course sequence in occupational programs. It is important to note that the "vocational major" category is not based on student declaration but rather based on degrees and certificates received or course-taking patterns as assessed by the MIS office.

For this study, the focus of the analysis is on all students and vocational majors. Students identified as vocational majors have taken 12 or more units in the same four-digit Taxonomy of Program (TOP) code or program area (e.g., accounting, nursing, engineering technology).

All Students

Table 1 shows the median annual earnings of all students (N = 700,564) from California community colleges in the 1992–93 academic year by educational attainment. The table presents descriptive information such as educational attainment level, total students, median annual earnings of students' first year out and third year out of college, and percent change. The educational attainment spectrum ranges from .01 to 11.99 units to associate-degree completers. The results show that gains are evident across all levels; however, the

TABLE 1. Percent Change in Median Annual Earnings of *All Students* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters		Percent Change (%)
		First Year Out of College[a]	Third Year Out of College	
All Students	700,564*	$23,539	$25,341	7.7
.01–11.99 Units	265,266	$26,255	$27,847	6.1
12–23.99 Units	80,225	$22,722	$24,970	9.9
24 + Units	124,060	$23,320	$25,584	9.7
Certificate	6,674	$25,033	$28,403	13.5
A.A. or A.S. Degree	13,745	$23,824	$26,790	12.5

*Excluded from this table is the 0 units or noncredit category (n = 210,594).

[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.

Source: California Community Colleges Chancellor's Office Management Information System.

largest gains are among certificate and associate-degree completers. Although positive gains are evident among .01–11.99 to 24+ unit completers, they are not substantial. Certificate completers experienced a 14% gain from first year out to third year out; associate-degree completers experienced a 13% gain, respectively. For the other educational attainment levels, the percent gain from first to third year out ranged from 6% to 10%.

In examining the data by age (see Table 2), students under 25 (n = 222,818) experienced substantial gains across educational attainment levels from their first year out to third year out of college. Students who completed 24 or more units experienced a 29% gain from first year out to third year out of college, a 29% gain among certificate holders, and a 33% gain among associate-degree recipients. Students who completed the certificate had higher median annual earnings during their first year out and third year out of college compared with the others. For students under 25, their third-year median earnings ranged from $18,000 to $22,000. Figure 2 illustrates the data for students under 25 for the three time periods (i.e., last year in college, first year out of college, and third year out of college).

Table 3 presents the findings for students 25 and over (n = 473,171). The results and patterns are very different compared with younger students. As a group, younger students had a 26% gain compared to 5% for older students from first year to third year out of college. For this group, the percent gains are very small across the educational attainment levels. However, if students completed a certificate (+9%) or associate degree (+9%), they were more likely to

TABLE 2. Percent Change in Median Annual Earnings of *All Students Under 25* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters		Percent Change (%)
		First Year Out of College[a]	Third Year Out of College	
All Students	222,818*	$14,303	$18,075	26.4
.01–11.99 Units	77,670	$14,659	$18,468	26.0
12–23.99 Units	27,711	$14,408	$18,198	26.3
24 + Units	40,738	$14,810	$19,157	29.4
Certificate	1,487	$17,531	$22,539	28.6
A.A. or A.S. Degree	5,428	$15,101	$20,007	32.5

*Excluded from this table is the 0 units or noncredit category (n = 69,784).
[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.
Source: California Community Colleges Chancellor's Office Management Information System.

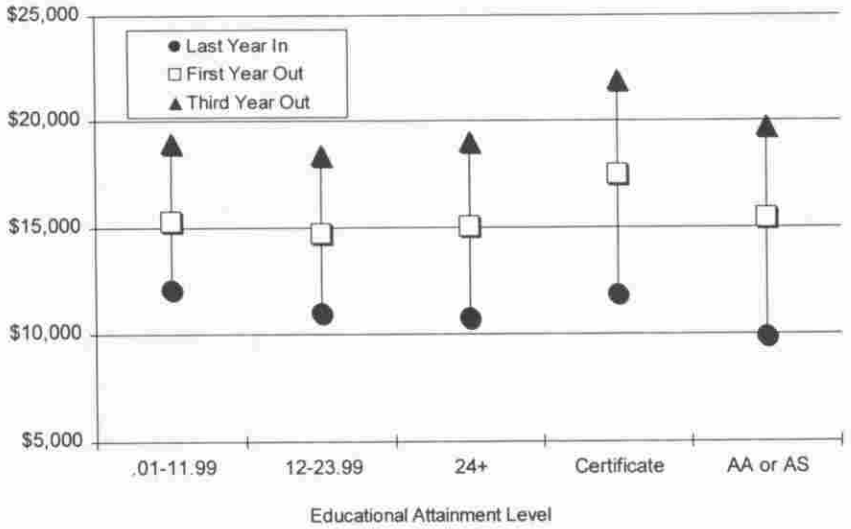

FIG. 2. Median earnings of students under 25 from California community colleges by educational attainment (n = 222,818).

TABLE 3. Percent Change in Median Annual Earnings of *All Students 25 and Over* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters		Percent Change (%)
		First Year Out of College[a]	Third Year Out of College	
All Students	473,171*	$29,122	$30,505	4.7
.01–11.99 Units	186,816	$31,728	$33,227	4.7
12–23.99 Units	52,389	$28,999	$30,483	5.1
24 + Units	83,157	$28,361	$30,118	6.2
Certificate	5,163	$28,087	$30,684	9.2
A.A. or A.S. Degree	8,299	$29,709	$32,408	9.1

*Excluded from this table is the 0 units or noncredit category (n = 137,297).
[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.
Source: California Community Colleges Chancellor's Office Management Information System.

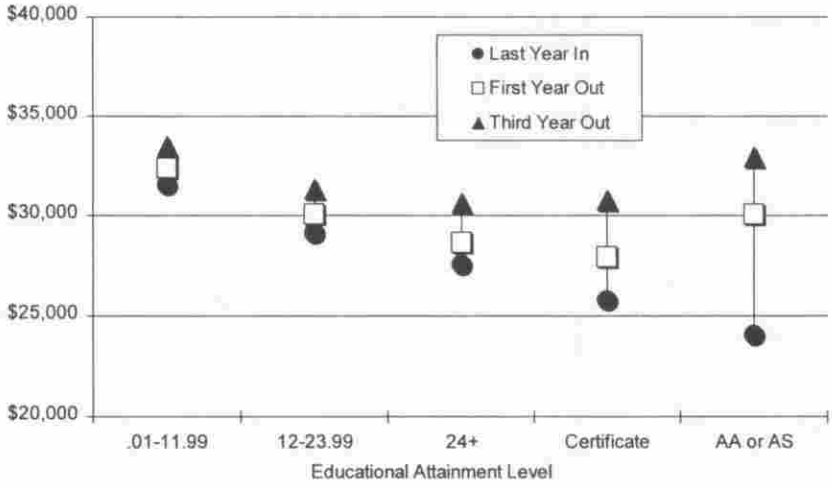

FIG. 3. Median earnings of students 25 and over from California community colleges by educational attainment (n = 473,171).

experience slightly higher gains three years out. Older students had higher earnings for both time periods (first year out of college and third year out of college). In other words, students 25 and over were already making more money and were likely to be in the workforce much longer compared with their counterparts. Compared with younger students, students 25 and over had median third-year earnings that ranged from $30,000 to $33,000, which is substantially higher than their counterparts. Figure 3 illustrates the data for students 25 and over for the three time periods (i.e., last year in college, first year out of college, and third year out of college).

Vocational Students' Major

For students who comprised the vocational students major category (see Table 4), they were identified to have had a "major" because they completed at least 12 units in the same program area or four-digit TOP code. Overall, the 37,434 vocational majors experienced a 16% gain from first year out to third year out in terms of postcollege earnings. An interesting pattern is evident among vocational majors. In terms of first-year-out to third-year-out earnings, students who completed 24 or more units experienced a 17% gain, while certificate holders had slightly lower gains (+14%) and 15% for associate-degree completers. Three years out, students with certificates or associate degrees had

TABLE 4. Percent Change in Median Annual Earnings of *Vocational Students* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters		Percent Change (%)
		First Year Out of College[a]	Third Year Out of College	
All Students	37,434*	$23,835	$27,533	15.5
.01–11.99 Units	631	$20,492	$25,188	22.9
12–23.99 Units	7,451	$22,378	$25,937	15.9
24 + Units	14,169	$20,785	$24,284	16.8
Certificate	6,368	$24,563	$28,069	14.3
A.A. or A.S. Degree	7,225	$26,550	$30,420	14.6

*Excluded from this table is the 0 units or noncredit category (n = 1,590).

[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.

Source: California Community Colleges Chancellor's Office Management Information System.

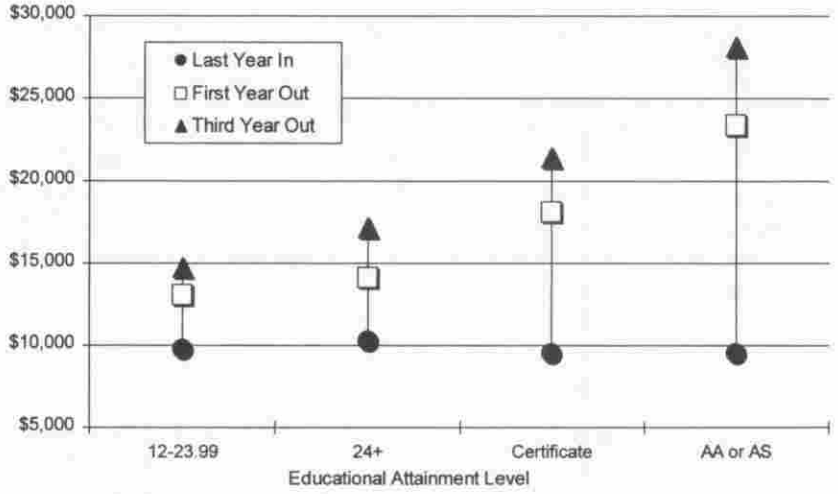

FIG. 4. Median earnings of economically disadvantaged students (1992–93 cohort) from California community colleges by educational attainment (n = 4,925).

higher earnings that ranged between $28,000 and $30,000 compared with the other groups.

About 13% of vocational majors were identified as economically disadvantaged students. To be identified as economically disadvantaged (see Figure 4), a student had to meet one of the following criteria: (1) awarded a Board of Governor's grant; (2) awarded a Pell grant; (3) identified as a GAIN participant; or (4) identified as a participant in the Job Training Partnership Program. According to Figure 4, there is a positive relationship between earnings and level of education. This trend is evident for students' first year out and third year out of college earnings. Overall, economically disadvantaged students experienced a 29% gain from first year to third year out. As students complete more education, they experience higher earnings. For students' gains from last year to third year, certificate completers experienced a 147% gain, while associate-degree completers experienced a 145% gain, respectively. In examining their first year out to third year out, certificate holders had a 33% gain and 25% gain for A.A. or A.S. degree completers.

Figure 5 depicts the median annual earnings of vocational students who earned an associate degree by racial/ethnic background. All students experienced positive gains in their postcollege earnings. In terms of students' first-year-out to third-year-out gains, African-Americans (n = 424) experienced +13%, Hispanic/Latinos (n = 757) +10%, and Asian/Pacific Islanders (n = 688) +15%. White (n = 4,715) students had a 15% gain in their postcollege earnings from first to third year out. In terms of actual earnings, students in the

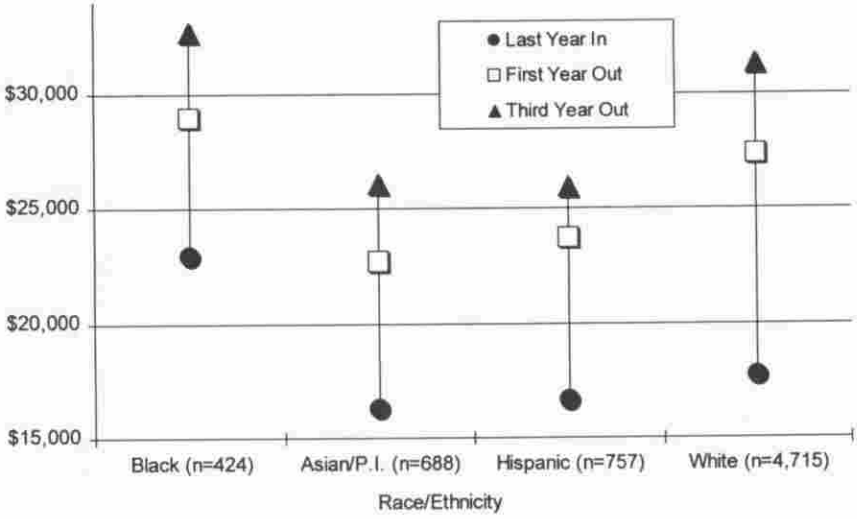

FIG. 5. Median earnings of vocational students from California community colleges with associate degree by racial/ethnic background (n = 6,584).

African-American (or black) category had the highest third-year earnings ($32,700) followed by white students ($31,321).

Figure 6 depicts the median annual earnings of vocational students who earned a certificate by racial/ethnic background. Across all groups, students experienced positive gains in their postcollege earnings. In terms of students' first-year-out to third-year-out gains, African-Americans (n = 385) experienced −3%, Hispanic/Latinos (n = 862) +14%, and Asian/Pacific Islanders (n = 601) +24%. White (n = 3,871) students had a 14% gain in their postcollege earnings from first year out to third year out. In terms of actual earnings, white students had the highest third-year median earnings ($28,613) followed by Asian/Pacific Islanders ($29,906).

For the 1992–93 cohort, female vocational students (major) included 19,128 students, compared to 18,257 of men. In examining within the group, female students (see Table 5) experienced substantial gains as they completed more education. Further, female students were more likely to have higher actual median annual earnings if they completed the certificate or associate degree. This is evident when examining female students' last year in college to third year out. A 41% gain among certificates and 87% among A.A. or A.S. degree completers was realized. The third-year median earnings among female vocational students ranged from $20,000 to $30,000. Conversely, male vocational students (see Table 6) had slightly higher gains from first year out to third year out compared to women. Certificate holders had a 14% gain while the A.A. or A.S. degree recipients among men experienced a 15% gain.

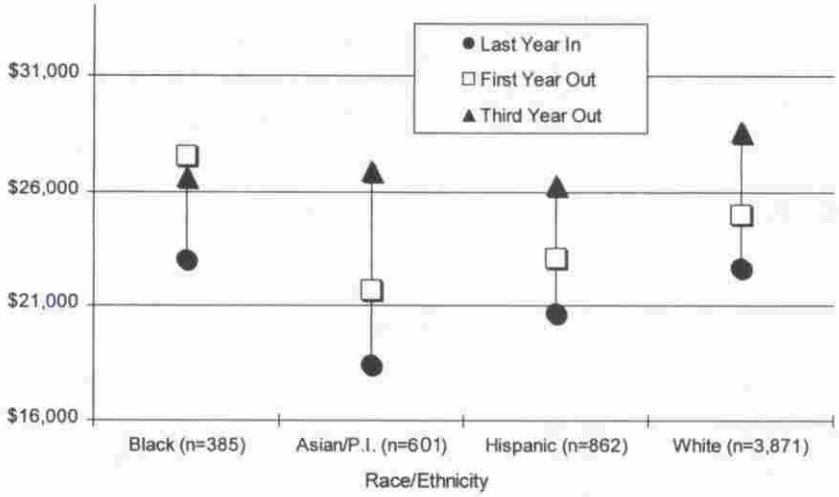

FIG. 6. Median earnings of vocational students from California community colleges with certificate by racial/ethnic background (n = 5,806).

TABLE 5. Percent Change in Median Annual Earnings of *Female Vocational Students* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters: First Year Out of College[a]	Median Annual Earnings Worked Four Quarters: Third Year Out of College	Percent Change (%)
All Female	19,128*	$21,473	$24,086	12.2
.01–11.99 Units	318	$16,554	$21,716	31.2
12–23.99 Units	3,261	$18,415	$20,004	8.6
24 + Units	6,894	$18,569	$21,015	13.2
Certificate	3,465	$22,323	$25,288	13.3
A.A. or A.S. Degree	4,685	$26,063	$29,694	13.9

*Excluded from this table is the 0 units or noncredit category (n = 505).

[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.

Source: California Community Colleges Chancellor's Office Management Information System.

TABLE 6. Percent Change in Median Annual Earnings of *Male Vocational Students* from California Community Colleges in the 1992–1993 Academic Year by Educational Attainment Level (1996 Dollars)

Education Attainment Level	Total Students	Median Annual Earnings Worked Four Quarters		Percent Change (%)
		First Year Out of College[a]	Third Year Out of College	
All Male	18,257	$26,792	$31,148	16.3
.01–11.99 Units	309	$23,937	$28,439	18.8
12–23.99 Units	4,182	$25,985	$30,127	15.9
24 + Units	7,261	$23,257	$27,579	18.6
Certificate	2,884	$27,761	$31,506	13.5
A.A. or A.S. Degree	2,538	$28,203	$32,509	15.3

*Excluded from this table is the 0 units or noncredit category (n = 1,083).

[a]In order to make comparisons of earnings from First Year Out of College to Third Year Out of College, the California Consumer Price Index for Urban Consumers was used to adjust earnings for changes in inflation. For the purpose of this study, all earnings were adjusted to 1996.

Source: California Community Colleges Chancellor's Office Management Information System.

Figure 7 presents the third-year-out median earnings for male and female vocational students (major). These are students who either completed a vocational program or earned 12 or more units in the same program area and were coded as vocational by the Chancellor's Office MIS. Figure 3 shows the closing of the earnings gap between men and women. The results reveal that as women complete more education, the gap closes. That is, completing the certificate or associate degree positively impacts the earnings among women and thus closes the gap. Although men tend to have higher third-year earnings across all levels, women catch up and close the gap when they complete a formalized program, namely the certificate or associate degree.

The aggregate data were also made available for vocational students (major) by age group. The three age-group categories were 18 to 25 years old, 25+ to 35, and 35 and over. In analyzing the data by age group (who are these students), among associate-degree completers students in the 18- to 24-year-old category had the highest percent gain (+27%) from first year out of college to third year, followed by students 25 to 34 years old (+10%), and 35 years old and over (+9%). Although 18- to 24-year-olds experienced the highest change, they had substantially lower third-year earnings ($23,000 versus $33,000). There is over a $10,000 gap between younger students (under 25) and nontraditional students (over 25).

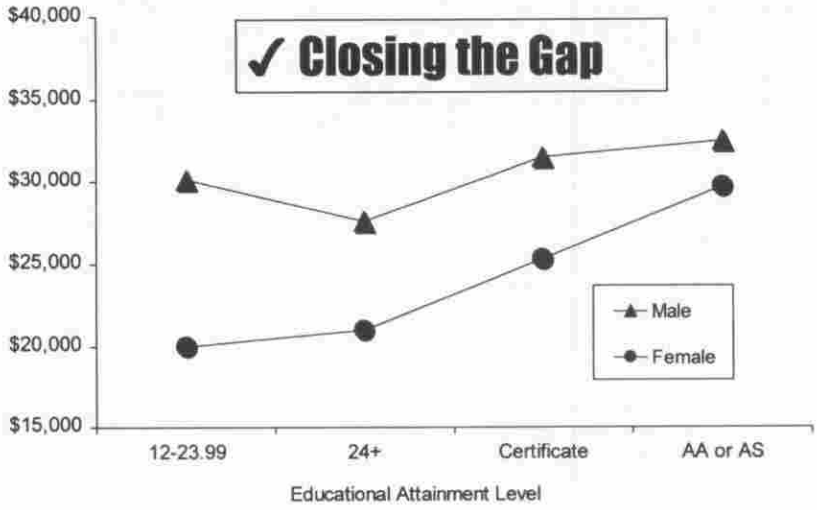

FIG. 7. (third year out). Median earnings of vocational students from California community colleges by sex and educational attainment.

LIMITATIONS

Although there are advantages in utilizing the EDD-UI and MIS student data files, there are some methodological concerns with respect to studying California community college students. The accuracy of the data is dependent on the reliability and uniformity of data submitted to the Chancellor's Office by individual colleges and districts for the 1992–93 academic year. Although UI wage records are tagged with students' educational data, the data set is strictly an administrative data set, not a research data set.

The data only report students who had UI wage record matches with their MIS student files and do not control for students' educational experience and their place of employment in the workforce. As a result, the link between type of program completed at the community college and the extent to which the student is employed in the field studied is currently not possible. Although collaborative efforts have been formalized between CCC and CSU, which have resulted in identifying and removing students who transferred to one of the 23 campuses, students who transferred to the University of California or private four-year institutions in California are currently included in these reports. Students who transferred to out-of-state institutions are also included. As a result, the data still include a proportion of students who transferred to a four-year institution.

The percent matched is strictly a match rate for social security numbers found in the UI wage data files and thus is not an employment rate. Students

not found in the wage records are not accounted for. Individuals who were employed by the military or federal government, self-employed, unemployed, or not in the workforce were not part of the data set. In California, there are several colleges that are located near military installations. Students who previously attended these institutions and who were later employed by the military are excluded in the UI wage data. As a result, the data do not accurately reflect the postcollege earnings of these students because a successful match does not occur. Furthermore, it is estimated that individuals who are self-employed range from as little as 3% to 5% (Stevens et al., 1992) to a high of 10% to 15% (U.S. Department of Commerce, 1996).

The analysis for this study was restricted to students who worked all four quarters in the three time periods (i.e., last year in college, first year out of college, and third year out of college). These students were more likely to be employed in the labor force for a full year. The rationale for employing this methodology (i.e., worked four quarters) extends from the limitation that employers are not required to report the number of hours worked per quarter to EDD. As a result, it is impossible to calculate hourly wages and part-time or full-time status.

Finally, the data are descriptive in nature. That is, the data can only be used to answer the "what" and "how" questions relating to students' earnings during the last year and third year out of college. The aggregate data currently available to districts and individual colleges do not allow the researcher to conduct statistical analysis beyond descriptive statistics. In order to conduct parametric statistics (i.e., statistical test of significance, multivariate analyses, etc.), unitary records must be obtained.

DISCUSSION AND CONCLUSION

Similar to Friedlander's (1993a, 1996) earlier studies, analysis of the 1992–93 cohort confirms that the matching process between EDD and the Chancellor's Office MIS student data is a cost-effective mechanism in beginning to understand former California community college students' progress in the workforce. Of the 700,564 students in the study, UI wage record data were available for 64% of students in their last year in college; of those, 61% matched first year out of college, and over 56% of former students were in the UI wage data three years out of college. The decline in match rates is consistent with declines in match rates from other studies utilizing the UI files, usually around 3% per year.

The results in this study support the notion that there is a positive relationship between formal education and earnings. Thus, as students complete more education, they increase the likelihood of experiencing greater gains in their

postcollege earnings. However, completing a vocational certificate or associate degree greatly increases students' postcollege earnings compared with taking a handful of units.

For all students, the greatest gains were among certificate completers (+14%), followed by A.A. or A.S. degree holders (+13%). Completing a formalized educational program such as the certificate or associate degree positively impacts not only an individual's future earnings but also the marketability of professional skills and technical abilities. Given the competitive economy and job market, employers are now becoming very demanding in terms of the type and quality of workers most suited for highly technical positions.

When examining the data by age (under 25 or 25 and over), younger students who completed a certificate experienced a 29% gain compared with students over 25 (9%). This finding suggests that for younger students, pursuing higher education impacts their postcollege earnings. Because younger students would not have any work experience under their belt, possessing educational credentials to some extent serves as a proxy for work experience. Although the data in this study show that younger students make substantially lower earnings compared with older students, there are substantial positive gains from last year in college, first year out of college, and third year out when more education is attained. Although the finding that older students (25 and over) have smaller gains is not surprising, these students were already making substantially higher wages in the workforce. In other words, given their age and time spent in the work arena, completing a formalized education program, such as the certificate or associate degree, has positive affects on their postcollege earnings. However, when older students return to the community college to take a handful of units, their gains are small. Figure 3 illustrates that students in the .01–11.99 category have slightly higher earnings across all three time periods. A possible explanation for their higher wages is that these students are most likely individuals who are returning to the two-year college for skills upgrade or retraining. Also, they may be returning to the college for a career change and are thus pursuing other technical careers that require completion of a handful of courses.

When the data were analyzed by age group among vocational students, younger students (18 to 24) were more likely to have higher percent gains from first year out of college to third year out (+30%), compared with older students. Students between 25 and 34 years old had a 14% gain compared with 9% for students 35 and older three years out. This finding suggests that younger students will more likely experience the long-term economic benefit for completing the associate degree upon making the transition from education to work. In other words, having credentials at the start of a new job will give the young professional a jump-start in terms of salary and position level compared with non-subbaccalaureate-degree recipients.

For students who were identified as vocational students (i.e., completed 12

units or more in the same program area), positive gains were evident across educational attainment levels. The gains from first year out to third year out range from 14% to 17%. Students who completed a certificate had a 14% gain while associate-degree completers had a 15% gain. The results show that although students who completed 24+ or 12–23.99 units had slightly higher gains three years out, the actual earnings among completers (associate and certificate) in their first year out of college and third year out of college were substantially higher. An important finding is that during their last year in college, certificate and associate-degree completers had lower earnings compared with leavers. Given this finding, the results suggest that vocational students identified as completers increased their earnings the first year out and three years out. This finding suggests that students who complete a vocational program area and earn a certificate have an edge in the workforce. By possessing the credentials that provide a basis for employers to evaluate prospective employees, these individuals will likely start at higher levels in their positions and in salary schedules. This finding supports Grubb's (1996) assertion that the chance of obtaining a job that requires technical skills is highly increased with an associate degree or vocational certificate and the likelihood of becoming a laborer or having an unskilled position is reduced.

With the recent legislation both at the federal and state levels, the initiative to assist individuals to move from welfare to work has become a major policy issue in California. Education has always been used as a way to explain the relationship between the level of education attained and earnings. The results from this study provide empirical evidence that for students who are economically disadvantaged, completing more education is positively related to higher percent gains and actual earnings. Specifically, completing the associate degree or certificate will impact their long-term sustainable economic worth. Thus, as economically disadvantaged students complete more education, they will not only have substantial gains in their postcollege earnings but will also have higher earnings. Moreover, when these students complete a certificate they experience a 33% gain and 25% among A.A. and A.S. degree completers, respectively. This finding is important for policymakers, higher education leaders, and faculty in terms of not only acknowledging the contribution of a community college education but also as a tool to inform students about the value of attending and completing a program of study at a community college in California.

When examining the effects of a community college education by gender, interesting patterns arise. Female vocational students who completed the certificate ($25,288) or associate degree ($29,694) had higher third year out of college earnings compared with students completing some units ($20,000 to $21,000). Conversely, male vocational students who completed the certificate ($31,506) or associate degree ($32,509) experienced substantial gains from first year to third year postcollege earnings. The findings show that men were more

likely to have higher earnings across the three time periods. Although not surprising, this is in support of what is found in the literature about the disparity between the earnings of men and women in the workforce. However, a significant finding is that the earnings gap is narrowed when women complete the certificate or associate degree. In other words, completing some units will not have a substantial effect on their marketability in the labor market. However, when they complete the certificate or A.A. or A.S. degree, not only will they possess a credential or meet the certification hypothesis, but they will also experience higher earnings. This finding suggests that women are most likely going to benefit in terms of future earnings if they are encouraged to complete formalized programs and obtain the academic awards.

POLICY IMPLICATIONS AND FUTURE RESEARCH

Because community colleges in California are now required to utilize the EDD-UI wage data for final performance reports and program evaluation, there is a need to establish standard procedures to assess, understand, analyze, and interpret the data. Specifically, the data can be analyzed to assess colleges' program-level enrollment, completion, and follow-up employment of students. Given the availability of the data, colleges and districts can use the data for local programming, evaluation, and student advising. Individuals responsible for the data management, analysis, interpretation, and reporting must be acutely aware of specific "contextual information" required to adequately interpret the raw data displayed in these reports. Having an informed background of the local economy as well as the regional economy will assist in providing a framework to interpret the data to achieve meaningful results. California's efforts in developing a follow-up strategy using the UI wage records are considered to be comprehensive in nature. Given the size of the cohort and the different classification of enrollment concentrations, the results have significant policy implications. Further, unlike the other states' efforts, California examines all students served by the colleges who left in any given year since 1990–91 to the current academic year.

On January 1996, Senate Bill (SB) 645 became law in California. Referred to as "performance-based accountability," the mandate gives the State Job Training Coordinating Council (SJTCC) the responsibility for designing and implementing a system to evaluate the performance of publicly funded workforce preparation programs in California. Accountability will be assessed with the use of a "report card," which will be issued to workforce preparation programs. Since one of the functions of California's 107 community colleges is to provide vocational education and/or workforce preparation, this system will be held accountable to several measures of performance. In the wake of the new Report Card bill, colleges will be required to utilize the data to provide various student

outcomes, namely earnings of their graduates and placement in the workforce. Future research studies should consider utilizing unitary records to design a methodology beyond descriptive statistics. Studies that consider the background characteristics and institutional environmental factors should be explored to better explain the relationship between earnings and education attainment.

In conclusion, the descriptive data reveal that obtaining an associate degree or vocational certificate positively affects students' postcollege earnings three years out. The data from this study provide evidence of the economic value of completing a subbaccalaureate credential awarded by community colleges. It is important for higher education administrators, policymakers, and society at large to acknowledge that a community college education positively contributes to an individual's long-term sustainable economic benefit. Moreover, completing formalized programs enables graduates to meet the certification or screening requirements maintained by employers upon embarking into the world of work. Further, by investing in their education, these students not only develop certain skills and abilities but also foster their human capital—intellectually, professionally, and personally.

NOTE

1. The definition of each SAM code is as follows: A = apprenticeship (offered to apprentices only); B = advanced occupational (not limited to apprentices); C = clearly occupational (but not advanced); D = possibly occupational; and E = nonoccupational.

REFERENCES

Adams, W., and Jaffee, A. (1971). Economic returns on the college investment. *Change* 3: 8.

Astin, A. W. (1985). *Achieving Educational Excellence.* San Francisco: Jossey-Bass.

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* New York: Columbia University Press.

Becker, G. S. (1975). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education,* 2nd ed. New York: Columbia University Press.

Becker, G. S. (1992). Why go to college? The value of an investment in higher education. In W. E. Becker and D. R. Lewis (eds.), *The Economics of American Higher Education* (pp. 21–120). Boston: Kluwer Academic Publishers.

Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education,* 3rd ed. Chicago, IL: The University of Chicago Press.

Blaug, M. (1970). *An Introduction to the Economics of Education.* London: Allen Lane, Penguin Press.

Blaug, M. (1972). The correlation between education and earnings: What does it signify? *Higher Education* 1: 53–76.

Elam, S. (1983). The Gallup education surveys: Impressions of a pool watcher. *Phi Delta Kappan* 64: 14–22.

Friedlander, J. (1993a). *Using Wage Record Data to Track the Post-College Employment and Earnings of Community College Students* (ERIC Document Reproduction Service No. 360007).

Friedlander, J. (1993b). *Post-College Employment Rates and Earnings of Students Who Participated in SBCC Occupational Education Programs* (ERIC Document Reproduction Service No. 361022).

Friedlander, J. (1996). *Using Wage Record Data to Track the Post-College Employment Rates and Wages of California Community College Students* (ERIC Document Reproduction Service No. 390507).

Froeschle, R. (1991). *Pilot Study Findings of the Use of the Texas Employment Commission Unemployment Insurance Wage Records to Document Outcomes of Technical-Vocational Education and Training.* Austin, TX: Texas Higher Education Coordinating Board.

Grubb, W. N. (1996). *Working in the Middle. Strengthening Education and Training for the Mid-Skilled Labor Force.* San Francisco: Jossey-Bass.

Haller, A. (1982). Reflections on the social psychology of status attainment. In R. Hauser, D. Mechanic, A. Haller, and T. Hauser (eds.), *Social Structure and Behavior.* New York: Academic Press.

Head, R. B. (1994). *The Economic Impact of Piedmont Virginia Community College Upon Its Service Region.* Research Report Number 2–94. Charlottesville: Piedmont Virginia Community College (ERIC Document Reproduction Service No. 368437).

Henderson, C., and Ottinger, C. (1985). College degrees—still a ladder to success? *Journal of College Placement* 45: 35.

Jencks, C., Bartlett, S., Corcoran, M., Crouse, J., Eaglesfield, D., Jackson, G., McClelland, K. I., Mueser, P., Olneck, M., Schwarts, J., Ward, S., and Williams, J. (1979). *Who Gets Ahead? The Determinants of Economic Success in America.* New York: Basic Books.

Katsinas, S. G. (1994). A review of the literature to economic development and community colleges. *Community College Review* 21(4): 67–80.

McIntyre, C. (1996). *Trends of Importance to California Community Colleges.* Sacramento: Office of the Chancellor, California Community Colleges (ERIC Document Reproduction Service No. 401956).

Merano, M. A. (1990). *On-the-Job-Training-Programs in JTPA: A Quality of Service Report to the Illinois Job Training Coordinating Council.* Illinois Department of Commerce and Community Affairs.

Occupational Outlook Quarterly (1992). Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics. Spring 1992, p. 40.

Pace, C. (1979). *Measuring Outcomes of College: Fifty years of Findings and Recommendations for the Future.* San Francisco: Jossey-Bass.

Pascarella, E., and Terenzini, P. (1991). *How College Affects Students.* San Francisco: Jossey-Bass.

Pfeiffer, J. J. (1990). *Florida Education and Training Placement Program. Annual Report.* Tallahassee, FL: Florida Department of Education.

Piper, L. S. (1990). *Feasibility Study Using Employer Wage Records to Determine Vocational Completer Labor Market Outcomes.* Indianapolis, IN: Indiana Commission on Vocational and Technical Education.

Psacharopoulos, G. (1973). *Returns to Education.* San Francisco: Jossey-Bass.

Psacharopoulos, G. (1985). Returns to education: A further international update and implications. *Journal of Human Resources,* 20: 538–604.

Seppanen, L. J. (1993). *Using Administrative Data Matches for Follow-up.* Technical Report No. 93–5. Olympia: Washington State Board for Community and Technical Colleges (ERIC Document Reproduction Service No. 382250).

Seppanen, L. J. (1994). *Job Placement Rates for Graduates of Washington Community and Technical College Vocational Programs*. Research Report No. 94–7. Olympia: Washington State Board for Community and Technical Colleges (ERIC Document Reproduction Service No. 382255).

Smith, G. P. (1989). *A Longitudinal Tracking Study of Short-Term Education and Employment Outcomes of Colorado Community College Graduates*. Colorado Community College and Occupational Education System.

Stevens, D. W., Richmond, P. A., Haenn, J. F., and Michie, J. S. (1992). *Measuring Employment Outcomes Using Unemployment Insurance Wage Records*. Washington, DC: Research and Evaluation Associates, Inc.

Stout, R. J. (1996). *Community Attitudes About Economic Impacts of Colleges: A Case Study*. Paper presented at the 1996 Association for Institutional Research Annual Forum, Albuquerque, NM (ERIC Document Reproduction Service No. 397737).

U.S. Department of Commerce, Bureau of the Census (1996). *Current Population Survey: Historical Income Tables—Persons*. Washington, DC.

Vanderheyden, B. (1994). *Employment of Community College Completers*. Research Brief No. 1994–01. North Carolina: North Carolina State Department of Community Colleges (ERIC Document Reproduction Service No. 375896).

Weitzman, S. M. (1991). *The Economic Impact of the Community College System on the State of Florida*. Gainesville: Florida University, Interinstitutional Research Council (ERIC Document Reproduction Service No. 336145).

Winter, G. M., and Fadale, L. M. (1991). *The Economic Impact of SUNY's Community Colleges on the State of New York. Spring 1991—Update*. Albany: State University of New York, Two Year College Development Center (ERIC Document Reproduction Service No. 337239).

Yang, X., and Brown, J. K. (1998). Using unemployment insurance data and job record data to track the employment and earnings of community college students. Paper presented at the annual forum of the Association for Institutional Research. Minneapolis, MN, May.