

**BEYOND ACCOUNTABILITY: USING ADMINISTRATIVE  
DATABASES TO CONDUCT DISCRETIONARY MANAGEMENT DIAGNOSTICS<sup>1</sup>**

**Presented at the 2nd Annual Colorado  
Assessment in Higher Education Conference  
Fort Collins, Colorado  
March 11, 1994**

**Presented by**

**David W. Stevens  
Executive Director  
The Jacob France Center  
Merrick School of Business  
University of Baltimore  
1420 North Charles Street  
Baltimore, MD 21201-5799  
(410) 837-4729**

**and**

**Gregory P. Smith  
Vice President for Information Resources and Planning  
Community College of Denver  
Campus Box 285, P.O. Box 173363  
Denver, CO 80217-3363  
(303) 556-3813  
Internet: CD\_GREG@Mash.Colorado.Edu**

---

<sup>1</sup> The vast majority of the work reported herein was conducted by the first author (Stevens) and supported by the National Assessment of Vocational Education under the Education and Development Center Program, agreement number R117Q00011-91, CFDA 84.117Q, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this document do not reflect the position or policies of the Office of Educational Research and Improvement or the U.S. Department of Education.



## **BEYOND ACCOUNTABILITY: USING ADMINISTRATIVE DATABASES TO CONDUCT DISCRETIONARY MANAGEMENT DIAGNOSTICS**

### **Abstract**

Vocational education's accountability has been on the Nation's agenda for more than a century and on Colorado's agenda for a quarter of a century. This paper seeks to advance understanding of one aspect of accountability -- early employment and earnings outcomes for graduates of Colorado's community college postsecondary vocational education programs.

This presentation provides Colorado examples of "second-generation" uses of administrative records to advance postsecondary vocational educators' understanding of the complex relationships among school enrollment, employment, and earnings. The presentation documents important management information that emerges from the use of longitudinal administrative databases, which would not be known otherwise. Examples include the consequences of selecting different point-in-time snapshots of employment and earnings outcomes; the importance of relatedness measures as predictors of earnings growth paths; and how to design proxies for full-time versus part-time employment measures.

In this presentation, vocational/nonvocational graduate comparisons are provided. The administrative records used to document graduates' employment and earnings are often referred to as wage-records, or unemployment insurance (UI) records. These records were supplied by the Colorado Department of Labor and Employment via formal agreement with the Colorado Community College and Occupational Education System. Illustrative examples are drawn from Colorado-specific longitudinal databases created through the auspices of the U.S. Department of Education's National Assessment of Vocational Education, the University of Pennsylvania's National Center on the Educational Quality of the Workforce, and the University of California Berkeley's National Center for Research in Vocational Education.



**BEYOND ACCOUNTABILITY: USING ADMINISTRATIVE  
DATABASES TO CONDUCT DISCRETIONARY MANAGEMENT DIAGNOSTICS**

**INTRODUCTION**

**Background**

In 1985 the Colorado General Assembly passed House Bill No. 1187 into law. Article 13, statute 23-13-101 of H.B. 1187 describes the intentions of the General Assembly in regard to Higher Education Accountability. Governing Boards and institutions are required to carry out the direction of Article 13 under the policy direction of the Colorado Commission on Higher Education as described in CCHE's "Policy and General Procedures for the Development of Accountability Programs by State Supported Institutions of Higher Education as Required by 23-13-101." CCHE policy required that governing board proposals be submitted by December 1, 1988 and that accountability implementation (progress) reports be submitted by October 1, 1989 and each October 1 thereafter (since changed to November 1). Thus, the last reports submitted (November, 1993) represent the fourth year in which Colorado postsecondary institutions must report actual data.

Concurrently, for Colorado community colleges, provisions in federal legislation such as the Carl D. Perkins Vocational Education Act require the coordination and consolidation of information resources. Other legislation, such as the Federal Paperwork Reduction Act, calls for minimizing paperwork burdens while maximizing the potential of existing information resources. At the same time, decisions attendant to the Graham - Rudman - Hollings Budget Balancing Act have reduced the amount of funding available for information development, production, and dissemination. This created a situation of "doing more for less" with respect to information systems (Florida Occupational Identifier Project Legislative Report, 1988).

In Colorado, as in many states, institutions of higher education are faced with meeting the requirements of legislative accountability mandates and federal law with limited human and fiscal resources. This is especially true in Colorado community colleges where only a handful of the schools have a Director of Institutional Research (or equivalent position) and none of the institutions have a separately identified budget for accountability activities. In response to this situation the Colorado Community College and Occupational Education System (CCCOES) began in 1988 to explore ways to generate accountability data at the System (State) level and pass it back down to individual community colleges. In these endeavors, a primary premise was that institutions should attempt to use existing data systems before investing in new data collection efforts.

In Colorado one accountability reporting requirement is "evidence of after-graduation performance" in such areas as employment and continuing education. By combining data provided by Colorado public postsecondary institutions with data available from the Colorado Department of Labor and Employment, the Colorado Community College System with much assistance from The Jacob France Center, Merrick School of Business, University of Baltimore, has developed a longitudinal data base which monitors students' post-graduation employment and continuing education behavior in a cost efficient manner. This information is available to individual community colleges for planning and accountability purposes and is also aggregated at the state level.

This particular paper seeks to advance understanding of one important aspect of education's accountability -- early employment and earnings outcomes for community college graduates. Three questions are addressed.

- (1) What relationships exist among concurrent work and schooling, the ease of transition from school to work, and the stability of a former student's affiliation with her/his first employer after leaving school?
- (2) What patterns of repeated employer-to-employer mobility are revealed?
- (3) How are these combinations of concurrent and initial post-school employment related to the level and growth-path of a former student's earnings?
- (4) How important is knowledge of the relationship between a former student's vocational education program and subsequent occupational classification as a predictor of post-school earnings?

Vocational/non-vocational comparisons are provided whenever possible, given the available administrative data sources. While many previous studies have investigated similar questions, this study complements and refines previous contributions in two ways.

- (1) Employment and earnings profiles through the end of 1992 are documented for graduates of community colleges who completed their studies during the 1989-90 and 1990-91 school years.
- (2) Interstate differences in data element definitions are documented, and the importance of these differences from a research perspective is emphasized.<sup>2</sup>

---

<sup>2</sup> These differences are not the focus of this particular presentation but are fully discussed in Stevens' National Assessment report, The School to Work of High School and Community College Vocational Program Completers: 1990-1992 (11/30/93 draft).

## **METHODOLOGY**

### **An Overview**

Two state-level sources of administrative records comprise the consolidated database that was used to derive the findings that appear in this presentation.

- (1) **Data from state education entities: Colorado Community College and Occupational Education System and Colorado Commission on Higher Education.**
- (2) **Administrative records received from the state employment security agency, the Colorado Department of Labor and Employment.**

Each of the next four sections covers a different aspect of the early school-to-work transition period. The first focuses on the actual transition, or bridge, year that includes the last few months of a student's enrollment in community college and the months immediately following each former student's graduation. The second section concentrates on the stability of immediate post-graduation employer affiliation. Third, we explore the graduates' earnings growth paths, and how these are related to continuity of employment. The fourth section investigates the training relatedness issue, and the importance of this relationship as a predictor of earnings level and growth. A final section briefly summarizes the findings that have emerged; draws conclusions based on this new evidence; and describes refinements of these findings that are already underway.

### **Data Sources**

The approach that produced the findings reported here can be refined and replicated for other populations of former students. Use-specific strengths and weaknesses of the administrative records should be balanced before attempting to undertake a research activity of this type.

- \* **Student records and employment earnings records are confidential. Each type of record is subject to state-specific and federal laws that affect their**

availability.<sup>3</sup> These laws prohibit release to the public of any information that identifies a former student or a former student's employer. Assurance that neither will be identified directly is inadequate. Indirect identification (e.g., revealing the earnings of one African-American female graduate of an engineering program) must be avoided as well.

- \* The common identifier on student records and on employment and earnings records is a former student's social security number.
- \* Each of these types of administrative record has been designed for other purposes. This means that definitions frequently differ among educational programs, levels, and states.
- \* The employment and earnings records cover most, but not all<sup>4</sup>, paid employees in Colorado. Currently, detection of out-of-state employment requires either duplication of a within-state crossmatching procedure with each state that is of interest, or some other follow-up approach (e.g., a telephone or mail survey).
- \* Each administrative record of employment and earnings<sup>5</sup> includes a quarterly earnings amount, an employer identification code, and an industrial classification code. The reported earnings figure is defined as *total wages paid to the employee in all pay periods within the reference quarter*.<sup>6</sup> Colorado (like

---

<sup>3</sup> For a comprehensive treatment of the confidentiality issue, see National Research Council, November, 1993. *Private Lives and Public Policies: Confidentiality and Accessibility of Government Statistics*. Washington, DC: National Academy Press.

<sup>4</sup> Major *excluded* groups include federal government civilian and military personnel, U.S. Postal Service employees, railroad employees, employees affiliated with religious and philanthropic organizations, self-employed individuals, individuals who receive *only* commissions (i.e., they receive ~~no salary~~), and some agricultural workers.

<sup>5</sup> Reference to "an administrative record" here is imprecise. The Colorado Department of Labor and Employment maintains a database, which requires linkage of multiple data sources to include all of the data elements described herein. See the appendix to Chapter 1 in Stevens' full report for elaboration on this point.

<sup>6</sup> Most states require reporting of wages when paid, not when earned. This results in uneven quarter-to-quarter patterns, which reflect payment of lump-sum amounts such as seasonal and year-end bonuses. States differ in coverage and enforcement of employer reporting of non-wage forms of compensation (e.g., meals and lodging). The federal government has contracted with the MITRE Corporation to conduct a feasibility study of a wage simplification process, which might result in a more uniform definition and reporting of earnings in the future. Consideration is also being given to requiring federal government agencies to file quarterly employment and earnings reports with State Employment Security Agencies. These two examples typify the dynamic nature of



most states) does not require the reporting of an employee's hours or weeks of work that can be associated with this quarterly earnings amount.

- \* The quarterly records of employer-specific employee affiliation and earnings do not contain any occupational information.

## **THE BRIDGE YEAR**

### **Introduction**

This section focuses on the one-year period that includes the final months of a student's enrollment and the first months following completion of this program. The message here is direct: Knowledge about a former student's employment status both before and after leaving college is required to properly interpret employment and earnings data that are often identified as education outcomes alone.

A principal finding that emerges is that concurrent school enrollment and work is often followed by continued affiliation with the same employer after leaving school. A second important finding is that the former students who exhibit the pre-post continuity of employer affiliation have significantly higher average earnings at the end of this bridge year than their classmates who established new employment ties after graduation.

Answers to the following questions appear in this section.

- (1) What percentage of graduates were already employed before *leaving* school?
- (2) What percentage of those who were employed before leaving school *continue with the same employer* for more than three months after leaving school?
- (3) What percentage of those who did not work during the final months of school enrollment experience at least a three month delay in starting work in the state where they went to school?
- (4) How are differences in employment status before leaving school, and pre-post continuity of affiliation with the same employer, related to differences in earnings levels at the end of the bridge year?

The display labeled **Figure 5** shows the transition from school to work for the universe of 1,983 AAS degree (i.e., vocational) completers in Colorado's 15 public community colleges in academic year 1990-91. Nearly half (47%) of these former students remained with the same employer after leaving school. And those graduates who did so exhibit substantially higher average earnings (\$5,483) nine months after leaving school than do others who began work with a new employer after leaving school. This finding documents the importance of controlling for previous/concurrent employment and earnings before attempting to estimate the impact of attaining a community college degree on subsequent employment and earnings.

The Display labeled **Figure 6** traces the transition of Colorado's 1990-91 public community college non-vocational (AA/AS/AGS) degree recipients. Important differences appear in comparison with **Figure 5**. First, a substantially smaller percentage (31%) of non-vocational graduates sustained a previously established employer affiliation. This bolsters the caution already expressed about the importance of accounting for pre-existing employer affiliations when comparisons of alleged educational outcomes are made. And second, a comparison of reported average earnings levels three quarters after the former students left school reveals a significant advantage for vocational degree recipients over their non-vocational degree recipient classmates.

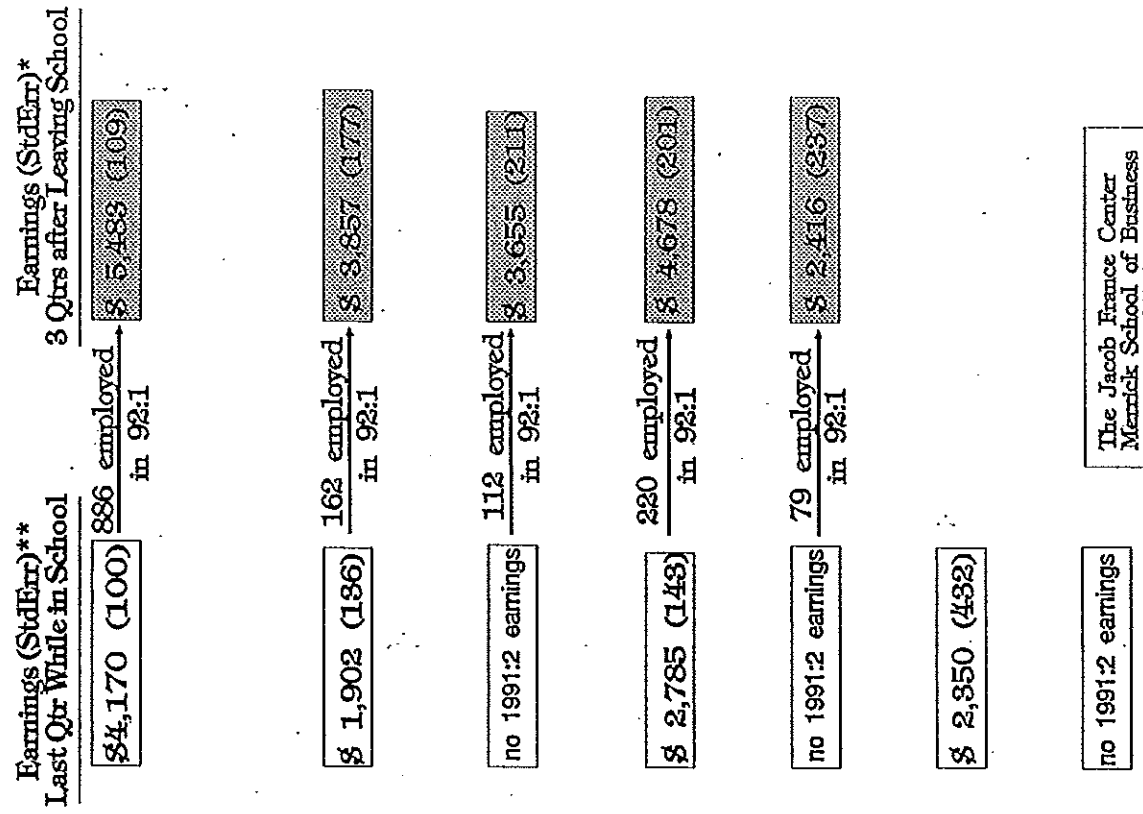
### **LABOR MARKET CHURNING**

The principal theme in the last section was that many community college graduates traverse the bridge from school to work with the same employer they had worked for while still in school; and that this continuity is reflected in higher average earnings relative to the earnings of those who established new employer ties after graduation. This section shifts the focus of attention by lengthening the post-graduation reference period and targeting measures of labor market churning.

The section begins with a single table (i.e., **Table 1**) that reveals the extent of labor market churning (i.e., change of employer) that occurred within each of 10 state/level/year/type groups over the first year and one-half of the former students' exposure to labor market opportunities between mid-1990 and the end of 1992. The *kept pre-job* column in **Table 1** offers compelling evidence of the number of community college completers who maintain a preexisting employer affiliation after leaving school. Readers are encouraged to wait until this evidence has been combined with the earnings findings presented in the next section, and with the relevance findings in the section after that, before concluding that this pattern is an indication of strength or weakness in the transition phenomenon.

FIGUR.

COLORADO  
COMMUNITY COLLEGES  
1990-1991  
VOCATIONAL PROGRAM COMPLETERS  
(DEGREE RECIPIENTS ONLY)



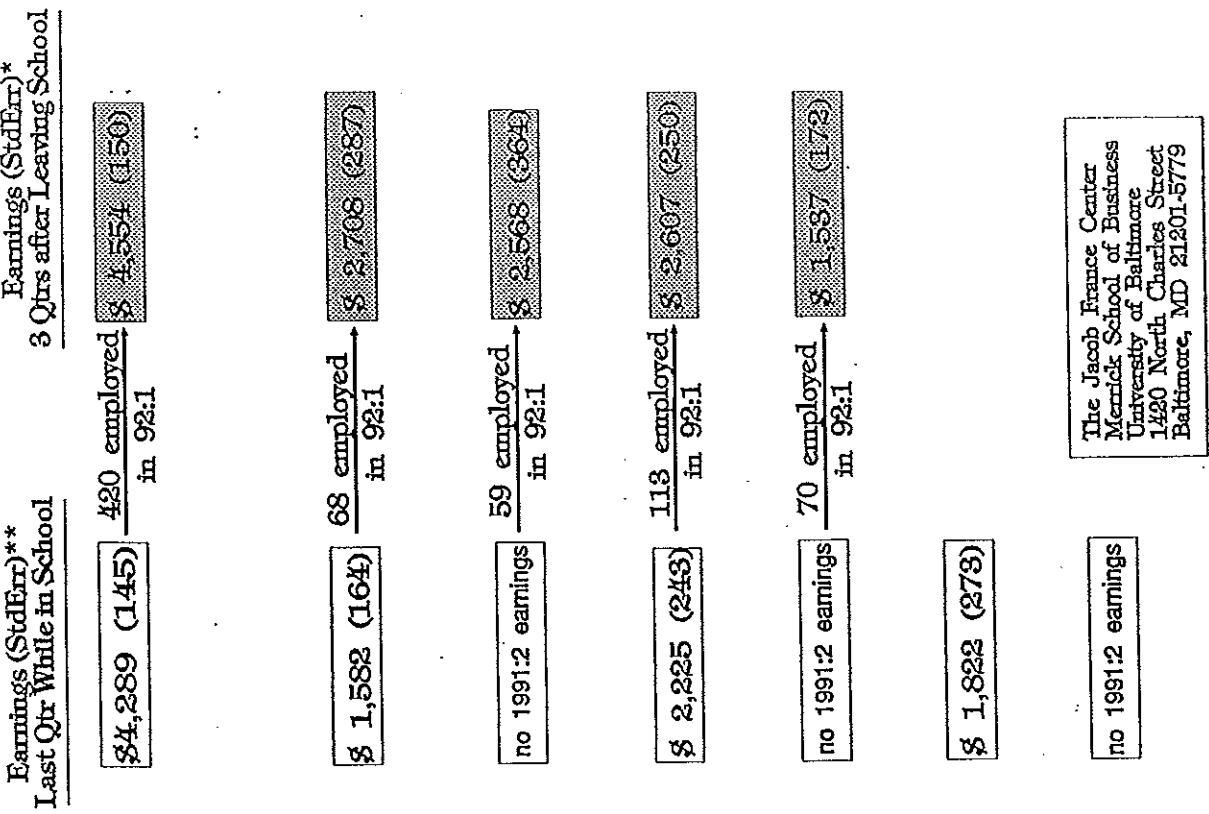
Earnings (StdErr)** Last Qtr. While in School	886 employed in 92:1	Earnings (StdErr)* 3 Qtrs after Leaving School
\$ 4,170 (100)		\$ 5,483 (109)
\$ 1,902 (186)	162 employed in 92:1	\$ 3,857 (177)
no 1991:2 earnings	112 employed in 92:1	\$ 3,655 (211)
\$ 2,785 (143)	220 employed in 92:1	\$ 4,678 (201)
no 1991:2 earnings	79 employed in 92:1	\$ 2,416 (237)
\$ 2,350 (432)		
no 1991:2 earnings		

The Jacob France Center  
Merrick School of Business  
University of Baltimore  
1420 North Charles Street  
Baltimore, MD 21201-5779

\* End-quarter earnings deflated to 1991:2 base using GDP Implicit Deflator Series value of 1.0196.  
\*\* See text.

**COLORADO  
COMMUNITY COLLEGES  
1990-1991  
NON-VOCATIONAL DEGREE RECIPIENTS**

FIGURE 6



Earnings (StdErr)** Last Qtr While in School	Employment Status	Earnings (StdErr)* 3 Qtrs after Leaving School
\$4,289 (145)	420 employed in 92:1	\$ 4,554 (150)
\$ 1,582 (164)	68 employed in 92:1	\$ 2,708 (287)
no 1991:2 earnings	59 employed in 92:1	\$ 2,568 (364)
\$ 2,225 (243)	113 employed in 92:1	\$ 2,607 (250)
no 1991:2 earnings	70 employed in 92:1	\$ 1,587 (173)
\$ 1,822 (273)		
no 1991:2 earnings		

The Jacob France Center  
Merrick School of Business  
University of Baltimore  
1420 North Charles Street  
Baltimore, MD 21201-5779

\* End-quarter earnings deflated to 1991:2 base using GDP Implicit Deflator Series value of 1.0196.  
\*\* See text.

TABLE 1

## Employment Churning Overview : Four States

	Pre-Grad.	N	Kept-Pre-Job	First Post-School Job Length			% of Total Emp Length	
	Job (?)		%	N	Mean (Qtrs)	Stderr	Mean (Qtrs)	Stderr
<b>High School</b>								
Colorado (90-91 Cohort)								
Vocational	Yes	4,897	0.30	4,475	3.23	0.03	0.72	0.00
	No	5,968		2,804	2.37	0.03	0.73	0.01
Non-vocational	Yes	6,539	0.23	5,824	2.84	0.02	0.73	0.00
	No	8,127		5,625	2.18	0.02	0.74	0.01
Florida (90-91 Cohort)								
Vocational	Yes	9,643	0.40	8,831	3.66	0.02	0.76	0.00
	No	6,141		4,221	2.74	0.03	0.77	0.00
Non-vocational	Yes	6,935	0.34	6,127	3.45	0.02	0.76	0.00
	No	7,234		4,675	2.55	0.02	0.77	0.00
<b>Comm. College</b>								
Colorado (90-91 Cohort)								
Vocational	Yes	1,443	0.64	1,362	4.45	0.05	0.84	0.01
	No	540		286	2.93	0.10	0.78	0.02
Non-vocational	Yes	767	0.59	704	4.21	0.07	0.84	0.01
	No	697		237	2.36	0.10	0.79	0.02
Florida (89-90 Cohort)								
Vocational	Yes	10,528	0.79	10,091	4.87	0.02	0.87	0.00
	No	2,890		1,470	3.23	0.05	0.82	0.01
Missouri (89-90 Cohort)								
Vocational	Yes	2,651	0.61	2,367	4.39	0.04	0.83	0.01
	No	1,342		631	3.40	0.08	0.79	0.01
Non-vocational	Yes	2,259	0.50	1,945	4.01	0.04	0.81	0.01
	No	1,242		482	3.17	0.09	0.83	0.01
Washington (89-90 Cohort)								
Vocational	Yes	3,738	0.53	3,496	4.52	0.03	0.83	0.00
	No	2,753		1,922	3.71	0.04	0.80	0.01

## Notes:

- (1) Pre-Grad. Job is defined to be the job held in 1991:1 for high school program completers and CO community college completers; in 1990:2 for community college program completers in FL, and MO; and in the quarter prior to the graduation year/quarter for community college program completers in WA (where graduation year/quarter is available).
- (2) N is the total population in that category.
- (3) Kept-pre job indicates the rate for those who continued in the pre-job at least into the second quarter after completion as a percent of all who held a pre-job.
- (4) First Post-Sch Job Length is the length in quarters of the first job after program completion, or the pre-job held at least to the second quarter after completion (only the post-completion period is counted in the length).
- (5) % of Total Emp Length is the length, in quarters, of the first post-sch job as a percent of the total observed (i.e., known) employment length after completion.
- (6) The reference period for calculating the first post-school job length and % of total Employment length is 1991:3-1992:4, for high school in CO, FL and community college in CO; 1990:3 - 1991:4 for community college in FL, MO; and six quarters after graduation year/quarter for year/quarter for community college in WA. The maximum is six quarters.
- (7) Those without a post-school job are not counted in the calculation of "First Post-School Job Length" and "% of Total Emp Length".

Source:	The Jacob France Center Merrick School of Business University of Baltimore 1420 N. Charles Street Baltimore, MD 21201-5779
---------	--

The *first post-school job length* column, which presents average length of the employer-specific affiliation in quarters, shows that former non-vocational Colorado community college graduates who were not reported as employed while they were in school have the shortest average length of the first job held (2.36 quarters) (including only the post-school part of this tenure for those who continued a pre-completion employer affiliation). And, those who were not reported as employed while still in school exhibit a uniformly shorter employer-specific tenure than their classmates who had combined education and work activities (comparing within each state/level/program category).

The observed range of percentage values in the *first job length/total job length* column is narrow -- from a low value of .78 to a high value of .84 for Colorado community college graduates. The interpretation of these figures, considered together, is straightforward: Over the first 18 months of post-school exposure to labor market opportunities, most of the time spent working is committed to the first job held.<sup>7</sup>

Table 2 presents a two and one-half year (1990:3-1992:4) analysis of labor market churning for 1989-90 Colorado and Florida community college degree and certificate recipients. This table introduces Classification of Instructional Programs (CIP) categories for the first time. These illustrate a finer level of detail than was covered in the previous section; the particular vocational programs were chosen on the basis of large numbers of graduates appearing in each one.

In Table 2 the maximum value of any post-school status in this table is 10 quarters. No vocational/non-vocational difference in average *first post-school job length* is found for Colorado's 1989-90 community college graduates. The *right truncation* column in Table 2 shows the percentage of the graduates who had reported post-school employment and were still employed in this first job in 1992:4.

The five columns on the right side of Table 2 provide a descriptive summary of the churning phenomenon for these groups of 1989-90 community college graduates. The *churn-91* column shows the percentage of post-school job holders who moved between, or among, employers within Colorado at some time during 1991 (i.e., the year after they left school). The Colorado program-specific average percentage of graduates who changed employers at least once during 1991 ranges from a low of 29 percent in engineering technology programs to a high of 36 percent in allied health programs.

---

<sup>7</sup> Some readers might conclude that the high level and narrow range of the *first job length/total job length* ratio is simply an artifact of the short six-quarter observation period. Others may discourage use of this finding without complementary information about the *number of quarters employed/six quarters* ratio.

TABLE 2

Colorado and Florida Community College Program Completers, 1989-90 Cohort  
Two and One-Half Year Employment Churning: 1990:3 - 1992:4

	Pre-Comp Job (?)	N	First Post-School Job Length			% of Total Emp Length			Churn-91		Churn-92		# Employers		No-Churn	
			Size	Mean	Stderr	Mean	Stderr	Mean	Mean	Mean	Stderr	Mean	Stderr	Mean	Stderr	
<b>Colorado</b>																
Vocational ALL		4,007	3,415	4.65	0.06	0.30	0.01	0.64	0.01	0.34	0.38	2.78	0.03	0.39		
Office Occupation		642	547	4.64	0.14	0.33	0.02	0.64	0.02	0.34	0.37	2.55	0.07	0.37		
Engineering Tech.		486	418	5.53	0.17	0.39	0.02	0.70	0.02	0.29	0.29	2.24	0.08	0.47		
Allied Health		626	565	4.53	0.13	0.26	0.01	0.61	0.01	0.36	0.40	3.31	0.09	0.36		
Health & medical		464	441	4.78	0.15	0.32	0.02	0.62	0.02	0.31	0.39	2.85	0.09	0.37		
Child Care/Food		94	82	4.39	0.38	0.26	0.04	0.68	0.04	0.33	0.35	2.66	0.18	0.40		
Protective Services		311	276	4.94	0.22	0.34	0.02	0.62	0.02	0.32	0.32	2.87	0.12	0.42		
Non-vocational ALL		1,715	1,240	4.61	0.10	0.32	0.01	0.68	0.01	0.28	0.36	2.48	0.05	0.45		
<b>Florida</b>																
Vocational ALL		10,528	10,168	7.07	0.03	0.51	0.00	0.78	0.00	0.23	0.23	2.45	0.02	0.62		
Office Occupation	Yes	2,890	1,641	4.36	0.08	0.33	0.01	0.72	0.01	0.30	0.32	2.34	0.04	0.48		
Engineering Tech.	No	679	650	6.88	0.13	0.47	0.01	0.78	0.01	0.24	0.26	2.19	0.06	0.59		
Allied Health	Yes	314	185	3.71	0.22	0.28	0.02	0.69	0.02	0.32	0.31	2.11	0.10	0.44		
Health & medical	No	569	557	7.22	0.14	0.53	0.01	0.80	0.01	0.22	0.21	2.00	0.06	0.64		
Child Care/Food	Yes	182	77	4.05	0.37	0.29	0.04	0.67	0.04	0.39	0.25	2.00	0.13	0.45		
Protective Services	No	2,526	2,426	6.33	0.07	0.41	0.01	0.72	0.01	0.28	0.27	2.96	0.04	0.54		
ALL	Yes	720	468	4.78	0.16	0.33	0.02	0.71	0.02	0.31	0.30	2.67	0.10	0.48		
Office Occupation	No	1,860	1,804	7.46	0.07	0.52	0.01	0.80	0.01	0.20	0.23	2.55	0.04	0.64		
Engineering Tech.	Yes	193	111	6.02	0.32	0.50	0.03	0.76	0.03	0.31	0.28	2.13	0.15	0.56		
Allied Health	No	100	91	6.32	0.37	0.43	0.03	0.73	0.03	0.31	0.41	2.74	0.19	0.48		
Health & medical	Yes	53	29	3.72	0.55	0.28	0.06	0.71	0.06	0.28	0.34	2.10	0.28	0.45		
Child Care/Food	No	2,855	2,313	7.97	0.06	0.66	0.01	0.85	0.01	0.16	0.16	2.18	0.03	0.74		
Protective Services	Yes	375	258	5.40	0.23	0.47	0.02	0.77	0.02	0.25	0.26	2.20	0.11	0.58		

Notes:

- (1) Pre-Comp Job means a job held in the second quarter of the completion year.
- (2) N is the total population in that category. Size is the number of observations used in the calculation of all columns.
- (3) R-trunc indicates the percentage of cases that are right-truncated in the calculation of the first post-school job length; i.e. they were still employed in the first job in 1992:4
- (4) First Post-School Job Length is the length in quarters of the first job after completion, or the pre job carried at least to the fourth quarter of the completion year (only the post-completion period is counted in the length).
- (5) % of Total Emp Length is the percentage of the first post-school job as a part of the total employment length after the graduation.
- (6) Churn-91 is the percentage who changed jobs in 1991; churn-92 is the percentage who changed jobs in 1992.
- (7) # Employers is the number of employers the individual had during the reference period.
- (8) Former students who have no recorded post-school employment are omitted.

\* Distinction omitted because it is affected by the wage-record anomaly.

Source: The Jacob France Center  
Marrick School of Business  
University of Baltimore  
1420 N. Charles Street  
Baltimore, MD 21201-5779

The *average number of employers* column appears to confirm what others have reported for earlier years -- a substantial amount of churning has occurred during the first 30 months after the former students left school in 1990:2. The final *no churning* column strengthens this conclusion; showing that Colorado program-specific percentage of graduates who had not changed employers at all during the 1991:1-1992:4 interval ranges from a low of 36 percent in allied health to a high of 47 percent in engineering technology programs.

## **1991-92 EARNINGS OF RECENT COMMUNITY COLLEGE ASSOCIATE DEGREE RECIPIENTS**

### **Introduction**

This section addresses the question:

**How are the combinations of concurrent and initial post-school employment related to the level and growth of former students earnings?**

In Colorado's earnings outcomes for 1989-90 (FY90) Associate Degree recipients are presented by sex and by vocational-nonvocational program classification. Two measures of earnings are utilized.

(1) **Earnings** -- This represents the average earnings in all four quarters of 1991 or 1992, for those former students who had any reported earnings in the reference year. The calculation of this average earnings number does not include those who had no reported earnings in any of the four quarters. No full-time/part-time, or year-round/seasonal, employment is considered in deriving this average earnings amount.

(2) **Full Earnings** -- This concept represents what many interested parties want to know: "What is the annual earnings level for a recent graduate who works full-time year round?" Step one in this calculation was to determine which of the former students have reported earnings records in each of the four quarters of the reference year (1991 or 1992). This is interpreted as a reliable indicator of year round employment. Next, the 1990 Census five-percent Public Use Micro Sample (PUMS) for Colorado was examined to derive a state-specific full-time/year-round (40 hours a week and at least 48 weeks a year of self-reported employment) earnings distribution for Census respondents who reported community college associate degree completion as the highest educational level achieved. Then, the fifth quantile



of this distribution was selected as a cut-off point, eliminating the lowest five percent of the self-reported earnings by those who said they had been employed year-round. The threshold dollar value refers to 1989 annual earnings, so the Gross Domestic Product Implicit Deflator series was used to inflate the earnings levels to reflect 1991 and 1992 values. These then became the dollar amount floors that were established to identify former students who could be said to have worked full-time/year-round. This procedure includes part-time and/or partial-year workers who earn enough to exceed this threshold earnings level; and it excludes those who have unusually low earnings, even though they have an earnings record in each of the four quarters.

As noted, Table 6 covers the community college class of 1989-90. The table does not take the former students' continuing education into account (This will be done soon in forthcoming refinements to this analysis). The Display exhibits the first reversal of a consistent pattern of average earnings advantage for vocational graduates over their non-vocational graduate classmates. Both the 1991 and 1992 measures of full earnings reveal an average earnings advantage for males who attained non-vocational Associate degrees (AA/AS/AGS) over their vocational graduate (AAS) classmates.

When 1991 and 1992 average annual earnings comparisons between vocational and nonvocational degree recipients are made including all of the former students who had any earnings in the reference year, a significant advantage for the former vocational students is found. No significant difference is observed when the population in each group is narrowed on the basis of the *full earnings* threshold value. Again, group-specific differences in the rate of members' continuing education is a likely reason for this disappearance of an immediate average earnings advantage for graduates of community college vocational programs.

#### **THE USE OF INDUSTRY-SPECIFIC ALL-WORKER EARNINGS INFORMATION**

Up to this point attention has been focused on populations of former students without placing this discussion in the broader context of the state's economy. In this section, the "former students only" boundary is removed, and one last example is provided of how a state's administrative records can be used to inform the decisions of educators, students, parents, and elected officials.

Table 21 identifies 10 vocational groupings, which are based on the U.S. Department of Education's Classification of Instructional Programs (CIP). Information is shown for male and female graduates separately, when this can be done without jeopardizing the anonymity

TABLE 6

**COLORADO  
COMMUNITY COLLEGE  
1989-90  
ASSOCIATE DEGREE RECIPIENTS, VOCATIONAL/NON-VOCATIONAL**

**EARNINGS OUTCOMES**

Program	Sex	Size	Earnings in 1991			Earnings* in 1992			Full Earnings in 1991			Full Earnings* in 1992		
			N	Mean	Stderr	N	Mean	Stderr	N	Mean	Stderr	N	Mean	Stderr
Vocational	F	1,122	911	\$16,384	\$328	865	\$18,463	\$369	573	\$20,933	\$355	624	\$22,620	\$357
	M	912	679	18,776	.542	647	20,675	518	430	25,308	803	469	25,904	514
	All	2,034	1,590	17,408	300	1,512	19,410	307	1,003	22,808	335	1,093	24,029	304
Academic	F	704	451	10,834	497	450	12,466	493	185	19,937	753	241	19,238	593
	M	613	331	16,681	891	331	18,143	879	162	28,291	1,225	193	27,735	1,028
	All	1,317	782	13,309	485	781	14,872	479	347	23,837	733	434	23,017	598
Adjusted Difference Of Voc. - Acad.			4,088 (559)	Significant		4,529 (559)	Significant		-862 (777)	Not Significant		1,064 (640)	Not Significant	

1. \*Full Earnings in 1991\* is defined as "Earnings in 1991" if earnings were reported for each of the four quarters, and if this earnings amount is equal to or greater than \$8687; which is the inflated 5% quantile of 1989 full time workers' earnings in the corresponding 1990 census group. The cut-off point for 1992 earnings is \$8887. Full time is defined as 40 hours or more per week, 48 weeks or more per year.

2. The significance tests are for the difference between mean earnings levels for the vocational and academic groups, adjusted for the different distributions of 'sex' in these groups. The tests are based on 5% significance level.

\* 1992 earnings are deflated to 1991 by factor 1.025.

Source:  
The Jacob France Center  
Merrick School of Business  
University of Baltimore  
1420 N. Charles Street  
Baltimore, MD 21201-5779

of these graduates and their employers. When anonymity cannot be assured an entire line, or population-specific segment of a line, has been deleted. The column that is titled *related* splits the former students' recorded employment into *related* and *not related* categories based on matching of Classification of Instructional Programs and Standard Industrial Classification (SIC) codes.

The column titled *weighted all workers earnings* is the important new facet in the Table 21. The universe of Colorado's earnings records for the January-March 1991 quarter was used to calculate the mean value of what all of the workers in each industry grouping earned during this three-month reference period. The weights that were used in this calculation are the percentages of two-digit SIC affiliations that were reported for each vocational program grouping's graduates in the same quarter (i.e., in the first quarter of 1991). For example, if 20 percent of the completers of a repairers and mechanics program were reported as being employed in SIC 75 (automotive repair, services, and parking) in this quarter, then a 20 percent weight was given to the earnings of all workers who were reported as employed in SIC 75 in the first quarter of 1991 in Colorado.

You should scan the column titled *weighted all workers earnings* in Table 21 for two reasons. First, notice that the same dollar amount is shown for both male and female completers within each *relatedness* category for a particular vocational program. This happens because the administrative records of industry affiliation and earnings do not include any demographic information. This means that the *all worker earnings* figures that appear in Table 21 are just that--all workers, without respect to the gender composition of the workforce within each two-digit SIC category. The second reason to scan this column is to become familiar with the range of average earnings levels that occurs within Colorado in a particular time interval, based solely on differences in the mix of industries that is represented in the table.

The columns titled *1991:1 earnings* and *full earnings* respectively use the same definitions that have been used throughout this paper. The two new features in Table 21 are the assignment of a *relatedness* designation to vocational program-industry pairings, and the use of the universe of Colorado's administrative records to calculate an all workers' average earnings amount.

Table 21 can also be used to explore how a particular population of vocational program graduates has fared after just a few months of work experience after leaving school, relative to the average worker in the same grouping of industries in the same state at the same time. The *1991:1 earnings* column includes all of the former students who had any reported earnings in the reference quarter. The *full earnings* column includes only those former students whose earnings exceed the 1990 Census-based threshold that was defined earlier. If you think that most workers in an industry grouping are employed full-time/year-round,

TABLE 21

COLORADO  
COMMUNITY COLLEGE  
1989-90  
VOCATIONAL PROGRAM COMPLETERS

## EARNINGS RELEVANCE ANALYSIS (THREE QUARTERS AFTER COMPLETION)

			Weighted All Workers Earnings	1991:1 Earnings			Full Earnings		
			MEAN	N	MEAN	STDERR	N	MEAN	STDERR
CIP Groupings	SEX	Related							
Agriculture	M	No	\$4,878	21	\$3,624	\$430	16	\$4,500	\$318
	F	No	4,878	19	2,289	344	8	3,603	456
		Yes	2,752	13	2,791	241	11	3,044	186
Health & Med. Sci.	M	No	2,463	132	5,189	342	111	6,008	356
		Yes	5,332	59	5,822	448	50	6,662	429
	F	No	2,463	296	4,073	157	205	5,433	144
		Yes	5,332	355	4,830	124	296	5,517	111
Protective Service	M	No	4,356	164	5,617	277	137	6,522	271
		Yes	4,787	24	5,312	492	23	5,466	489
	F	No	4,356	39	4,952	443	30	6,151	340
		Yes	4,787	7	4,087	1,027	6	4,552	1,084
Construction Trades	M	No	4,232	21	2,868	580	11	4,736	728
		Yes	4,259	5	2,960	871			
Business Manag./- Adm.	M	No	3,759	105	5,285	362	87	6,133	377
		Yes	5,021	36	4,687	742	27	5,866	877
	F	No	3,759	256	3,727	156	192	4,566	167
		Yes	5,021	224	3,351	153	166	4,133	166
Marketing Oper./Dist.	M	No	3,977	5	4,163	948	5	4,163	948
	F	No	3,977	25	2,860	307	17	3,618	304
		Yes	2,154	12	1,682	340			
Engineering Tech./Related	M	No	3,483	208	5,034	230	164	6,097	227
		Yes	6,915	92	5,944	294	87	6,210	285
	F	No	3,483	39	3,170	316	26	4,222	290
		Yes	6,915	18	5,529	561	17	5,738	552
Vocational Home Econ.	F	No	3,523	31	2,197	244	14	3,359	266
		Yes	2,648	28	2,075	271	14	3,262	244
Mechanics & Repairers	M	No	4,504	114	4,294	327	77	5,855	367
		Yes	3,928	71	3,032	219	47	4,014	211
Transportation	M	No	3,479	32	2,877	339	19	4,088	345
		Yes	7,488	10	3,451	571	10	3,451	571

## Note:

- (1) Training related employment: based on the researchers' Classification of Instruction Program Code -- Standard Industrial Classification Code "relatedness" match. Available upon request.
- (2) The category sample sizes are limited to be 5 or more for confidentiality reasons.
- (3) The full earnings figure is calculated for the full-time workers defined by the inflated 5% quantile of the corresponding 1990 Census Colorado Public Use Micro Sample full time group.

Source: The Jacob France Center  
Merrick School of Business  
University of Baltimore  
1420 N. Charles Street  
Baltimore, MD 21201-5779

then the full earnings figure might be chosen for comparative purposes. However, if you are unsure about the extent of the full-time/year-round employment that is represented in the weighted all workers earnings, then the 1991:1 earnings figure might be used for comparative purposes.

Any comparisons that are made using the data in Table 21 are dependent upon the first author's decisions about vocational program-industry relatedness, which is undocumented here. This display is presented mainly for illustrative purposes. The intent here is to alert readers to the practical uses that can be made of administrative information to place community college graduates' vocational education outcomes within the context of Colorado's overall economic activity.

## **FINDINGS, CONCLUSIONS, AND FUTURE DIRECTIONS**

### **A Synthesis of Findings**

Three questions were posed in the introduction to this presentation. Each question is restated here with a summary of the pertinent findings that have emerged in the preceding sections.

*What relationships exist among concurrent work and schooling, the ease of transition from school to work, and the stability of a former student's affiliation with her/his first employer after leaving school?*

The first important finding revealed is that a consistently high percentage of community college vocational degree completers sustain an uninterrupted affiliation with the same employer at least during their last months while in school and through the first few months after leaving school. Those graduates who continued with the same employer during this transition period were also found to have a longer average length of stay with their first employer after leaving school (considering only the post-schooling part of this affiliation), and they were less likely to have moved from one employer to another during the post-schooling reference months.

Vocational degree recipients exhibit a consistent advantage over their former non-vocational classmates with respect to each of these measures -- rate of persistence, length of first job held after leaving school, and churning rate.

The high rate of continued employer affiliation through what is usually called the period of *transition from school to work*, means that post-schooling employment and earnings outcomes are often a joint outcome of combined school-based and on-the-job development of competencies. In such cases, there will be a false attribution of enhanced productivity to vocational education when the on-the-job contribution while a former student was still enrolled in school is unobserved.

*What patterns of repeated employer-to-employer mobility are revealed?*

Substantial movement is observed between, and among, employers during the first years after the graduates leave college. No consistent difference in churning pattern is found between vocational degree recipients and their non-vocational degree recipient classmates. Those who are known to have held jobs while still in school, but did not stay in these jobs through the bridge year, are more likely to have moved between, or among, employers after leaving school. Observed differences in churning rates are also associated with vocational program categories, economic and demographic factors, and the timing of beginning work after leaving school.

*How are these combinations of concurrent and initial post-school employment related to the level and growth-path of a former student's earnings?*

Community college graduates who continued with the same employer through the bridge period were consistently found to have higher earnings than their classmates while they were still in school, shortly after leaving school, and at the end of the post-graduation reference period (October-December 1992). The interplay of continuing education, full-time versus part-time employment status, and gender clouds any attempt to offer a simple interpretation of the former students' earnings profiles. Similarly, the contributions of credit hours, program affiliation, and credential received to an explanation of observed earnings differences are complex, as Grubb (1993) and Kane and Rouse (1993) have already concluded.

*How important is knowledge of the relationship between a former student's vocational education program and subsequent occupational classification as a predictor of post-school earnings?*

Knowledge about a former student's occupational assignment within a place of employment is not needed to predict that employee's earnings; awareness of the person's industry affiliation is an acceptable substitute for this purpose, and this information is available in each state's administrative records without resorting to survey data collection procedures. However, as demonstrated in other states (e.g., Florida), surveys can be used to advantage for other reasons (e.g., maintaining contact with employers who hire former students).

**Stevens & Smith**  
**AHEAD, 3/11/94**

The new U.S. occupational classification taxonomy, which was announced by the U.S. Department of Labor's Bureau of Labor Statistics in early 1994, can be expected to reverberate through the vocational education community, which has adopted a number of proprietary software packages to conduct studies of *relatedness*.

## **Conclusions**

Vocational education in Colorado community colleges was performing its traditional role of preparing students to enter the workforce as the new era associated with the Carl D. Perkins Vocational and Applied Technology Act of 1990 began in October, 1991. The consistency of the findings reported herein reflects a pervasive strength in Colorado's community college vocational programs. Community college vocational program graduates find and keep jobs. The annual earnings levels associated with these jobs are often higher than the earnings of their classmates who completed a non-vocational degree.

Mobility is often touted as a fundamental strength of the U.S. economy. Mobility is seen as the key to advancement. Unsettling evidence about the accuracy of this cornerstone of national pride has been revealed here; at least so far as this privilege is assumed to be available to those who are graduating in the 1990s. Available evidence indicates a steeply rising earnings path for those who retain an employer affiliation and a level trajectory of earnings for those who exhibit a pattern of repeated movement between employers.

First, enough former students can be located in these files to make the analysis feasible. Second, the numbers and types of data elements contained in the combined data base are sufficient to address a number of important policy and accountability concerns. Third, for some accountability issues, more in depth data is needed. We are continuing with this analysis and expect to have much more detail for the AIR presentation. Overall, the results are highly encouraging.

**Stevens & Smith  
AHEAD, 3/11/94**

### **Future Directions**

For Colorado, the next new research initiative will build upon Anita Summers' (1993) documentation of how little can be said about the relationship of school inputs to labor market outcomes. In the near future we intend to collect more comprehensive information about the college environments that existed when the students in the consolidated data base were enrolled. Further, we need to explore the existence of, and reasons for, gender and ethnic differences in earnings and other labor market outcomes.

This paper presents some of the initial findings from a research program that began two year ago. Hopefully, these findings and the next stages of the research program will contribute to an accurate understanding of how colleges in the 1990s contribute to economic competitiveness.



**REFERENCES**

**Grubb, W. Norton. 1993. "The Varied Economic Returns to Postsecondary Education," The Journal of Human Resources, 28:2, pp. 365-382.**

**Kane, Thomas & Rouse, Cecilia Elena. 1993. Labor Market Returns to Two- and Four-year Colleges: Is a Credit a Credit and Do Degrees Matter? NBER Working Paper No. 4268, Cambridge, MA: National Bureau of Economic Research, Inc.**

**Pfeiffer, J.J., Arcangeli, S.M., Whitfield, D.L., McConnell, P.A., & Shaw, M.B. (1988, April 29). Occupational identifier project legislative report. State of Florida, Dept. of Education/Council on Vocational Education, Dept. of Labor and Employment Security, State Job Training Coordinating Council, Labor Market Information Coordinating Committee; Tallahassee, Florida.**

**Pfeiffer, J.J. (1988, November 1). Florida education and training placement information program: Status report. State of Florida, Dept. of Education/Council on Vocational Education, Dept. of Labor and Employment Security, State Job Training Coordinating Council, Labor Market Information Coordinating Committee; Tallahassee, Florida.**

**Pfeiffer, J.J. (1989, January). Florida education and training placement information program: Legislative report in response to specific appropriation 346 proviso requirements. State of Florida, Dept. of Education/Council on Vocational Education, Dept. of Labor and Employment Security, State Job Training Coordinating Council, Labor Market Information Coordinating Committee; Tallahassee, Florida.**

**Stevens, David W. 1993. The School to Work Transition of High School and Community College Vocational Program Completers: 1990-1992. Baltimore, MD: The Jacob France Center, Merrick School of Business, University of Baltimore.**

