Colorado Helps Advanced Manufacturing Program

Labor Market Expectations and Career Pathways: A Survey of CHAMP College Students

Alexander Ruder and Heather McKay

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RUTGERS
Education and Employment Research Center

School of Management and Labor Relations
Janice H. Levin Building
94 Rockafeller Road
Piscataway, New Jersey 08854
smlr.rutgers.edu/eerc

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Table of Contents

INTRODUCTION

The Colorado Helps Advanced Manufacturing Programs (CHAMP) is a United States Department of Labor (USDOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) funded grant intended to facilitate the redesign or creation of degree and certificate programs that respond effectively to the needs of the 21st-century manufacturing sector. Under the grant, academic institutions partner with manufacturing industries to develop and/or refine academic programs that can meet changing employer requirements and more quickly and efficiently prepare and credential displaced workers.[1] Strategies to be used include the involvement of industry and workforce partners, credit for prior learning, articulation to four-year institutions, and the establishment of campus navigators to support and assist students.

In this report, we examine to what extent career pathways information influences community college students' beliefs about labor market outcomes in their chosen field. Career Pathways were promoted by the USDOL as an important strategy for community colleges under the TAACCCT grant program. Beyond TAACCCT, policymakers are increasingly focused on career pathways, and there is a need to understand how students actually use the information presented to them about pathways. However, little is actually known about whether and how career pathways information influences the educational and career decisions students make.

Career pathways were an important part of the CHAMP grant work and emerged in a variety of ways. Colleges developed programs with stackable credentials where students could have multiple points for entry and exit. Each school hired a career advisor, a navigator, to help students navigate educational and career pathways. Additionally, a website was developed to provide information on career pathways to prospective and current students. This website, Colorado Career Action Tools, was developed to help students and educators better understand "the wide variety of occupations across the many segments of the advanced manufacturing spectrum, the many opportunities they represent, and the various education and training pathways to them."[2] Understanding how students use the information gathered on the website was important to the leadership of the CHAMP grant.

This paper developed by the CHAMP grant's third party evaluators, Rutgers Education and Employment Research Center (EERC), provides the results of an information provision study conducted with students in six community colleges and one university in Colorado under the Round 3 TAACCCT grant- the Colorado Helps Manufacturing Program (CHAMP). This

[1] The CHAMP consortium of nine Colorado colleges includes Aims Community College (Community College of Denver (CCD), Emily Griffith Technical College (EGTC), Front Range Community College (FRCC), Lamar Community College (LCC), Pikes Peak Community College (PPCC), Pueblo Community College (PCC), and Red Rock Community College (RRCC). Metro State University – Denver (MSU) is also participating and has been designated as the four-year university to which students can apply CHAMP credits toward earning a bachelor's degree in engineering.

[2] CHAMP grant statement of work.

analysis looks at the survey results for community college and university students separately. The community college information is presented first.

CONTEXT

Unlike simple college scorecards that provide wage and graduation information, a typical career pathway guide contains a variety of information about different careers over different time spans. With such extensive information contained in a career pathways guide, community colleges risk providing students with an "information dump" that overwhelms the student and ultimately has little effect on the students' decision-making (Grubb 2006; Karp, O'Gara, and Hughes 2008; Deil-Amen and Rosenbaum 2003). Research offers a variety of explanations why complex information hinders decision-making. For example, when presented with too much information, individuals tend to avoid expending the effort necessary to process it. Instead, they take the path of least resistance, often defaulting to the status-quo options (Agnew and Szykman 2005).

SURVEY STRUCTURE

EERC's survey examines two dimensions of labor market expectations: student beliefs about the typical graduates' labor market outcomes and student expectations for their own labor market outcomes. First, to assess whether or not students have accurate beliefs about the labor market outcomes of average graduates from their field of study, we ask respondents to estimate labor market outcomes for the average graduate from their program. Students base their own expectations, in part, on their estimates of how well past graduates have done in the labor market (Wiswall and Zafar 2015). They may also have uninformed opinions about earnings. If students believe past graduates earn more than they actually do, then they may themselves have unrealistic expectations about their earnings after graduation.

Second, we ask students about their own individual labor market expectations once they earn their degree. Community college students base their academic and career choices, in part, on their expectations of labor market outcomes (Baker et al. 2017). Thus, knowing how career pathways information provision affects student labor market expectations can help career counselors more effectively use limited time and resources to guide students into programs of study that lead to in-demand careers vital to the economic growth of the state.

The survey uses a before/after repeated measure design to assess whether or not the career pathways information influences students' beliefs and expectations about labor market outcomes. After we ask students about both past graduates' and their own expected labor market outcomes, we show all students a career pathway information guide for their chosen academic field. We then ask students again about both past graduates' and their own expected labor market outcomes.

CAREER PATHWAYS IN MANUFACTURING

Research Questions

Our research questions focus on three issues raised by career pathways counseling tools. First, career pathways ask students to consider the long-term career outcomes associated with a specific pathway. However, to what extent do community college students weigh long-term outcomes when choosing a career pathway?

Research question 1: Do students prioritize short-term or long-term economic outcomes when choosing an academic program?

To use labor market information when making an academic choice, students need to have reasonably accurate estimates of the labor market outcomes of graduates in their fields. We investigate to what extent do community college and university students' estimates of past graduates' labor market outcomes correspond to the actual labor market outcomes of past graduates:

Research question 2: Do students have accurate beliefs about the labor market outcomes of graduates from their chosen academic program?

Third, we assess to what extent the disclosure of career pathway information changes students' beliefs about labor market outcomes. Information provision is a central component of counseling at the community college level (Grubb 2006; Karp, O'Gara, and Hughes 2008). As stated previously, the assumption is that students are able to interpret and use the information when making their choices:

Research Question 3: Does the provision of career pathways information change students' expectations about labor market outcomes?

SURVEY

In the spring of 2017, we recruited approximately 245 Colorado college students to take a survey that asks about their beliefs and expectations of labor market outcomes in their chosen career pathway.[3] Surveys were fielded in person at eight of the nine CHAMP schools – Aims, CCD, FRCC, LCC, PPCC, PCC, RRCC, and MSU.[4] All CHAMP and CHAMP related courses being offered on the day that the research team visited the college were surveyed. Our final

[3] We remove several observations due to either significant data entry error by the student (e.g., entering dollar amounts in fields for percentages) or clear evidence the student did not take the survey seriously (using the same numerical response value for all answers).

[4] In the main analysis, we exclude MSU, as outcomes across community colleges and four-year universities are incomparable in many ways. We analyze MSU student responses in a supplementary section.

sample includes 78 students from MSU and 167 from Aims Community College and the CCCS colleges.

Three researchers visited the classrooms at the start of class time. Students were informed about their rights as research subjects and provided with a consent form. A brief introduction about the purpose of the survey was also provided. Students were asked to select the career that most fit their interests out of four choices: Engineering, Production and Assembly, Machining or Welding. These fields of interest were selected from the information provided on the CHAMP created website – Colorado Career Action Tools. This website is also where all of the above cited career pathways information provided in the survey (see below) was gathered. Students were also asked not to skip ahead, due to the structure of the survey. Students were expected to take about 15-20 minutes to complete the survey, but they were allowed to spend more or less time as needed. Some students completed the survey in 5 minutes; others took 30 minutes to complete.

DESCRIPTIVE STATISTICS: COMMUNITY COLLEGES

Descriptive statistics for the community college sample are presented in Table 1. A majority of survey respondents are White Non-Hispanic (71.2%) and male (90%). Respondents are distributed fairly evenly across the different academic programs of Machining, Production and Assembly, and Welding. Only 16.9% of respondents are in interested in the Engineering program.

Table 1. Descriptive statistics of CCCS sample

Race/Ethnicity	American Indian/Alaskan Native	3.8
	Asian or Pacific Islander	3.1
	Black Non-Hispanic	2.5
	Hispanic	14.4
	Unknown	3.1
	White Non-Hispanic	71.2
	Hispanic	1.9
Gender	Female	9.4
	Male	90.0
Pathway	Engineering	16.9
	Machining	36.9
	Production and Assembly	21.2
	Welding	25.0

RESULTS

Research Question 1

Do students prioritize short-term or long-term economic outcomes when choosing an academic program? We ask students about three different aspects of careers related to short- and long-term labor market outcomes. **Error! Reference source not found.** shows the students' average ratings, on a 0-100 scale, of the importance of each factor in their careers. The factor with the highest average rating is getting a job immediately after graduation. Students on average place less importance on getting a job that allows quick advancement and getting a job that allows late advancement. The estimated differences between these factors are statistically significant.

Table 2. Factors of employment that are important to students.

Question	Average Importance
1) Get job immediately after graduate	83
2) Get job that allows quick advancement	78*
3) Get job that allows late advancement	68***

*Note: We conduct two separate T-tests: one test comparing quantities in row 1 to row 2, and one test comparing row 1 to row 3. Statistical significance indicated by stars (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$).*

Research Question 2

Do students have accurate beliefs about the labor market earnings of graduates from their chosen academic program? Error! Reference source not found. shows students' estimates of the earnings for the population of college graduates (population) and of their own expected earnings (self). We ask this question for both immediate earnings after graduation and the long-term outcome of earnings ten years after graduation. We compare students' expected annual earnings to the annual earnings implied by the hourly wage given in the career pathways information.

The first two rows of **Error! Reference source not found.** show the median estimates for how much students' believe the typical graduate of the program earns. The last two rows of **Error! Reference source not found.** show students' own expectations for future earnings. Generally, students expect to earn equal to or above the typical graduate in the population. The only exception is the long-term outcome for Production and Assembly, where students expect to earn slightly less than their estimate of the typical graduate in the population.

Generally, median earnings estimates are close to the labor market data listed on the career pathways information. **Error! Reference source not found.** shows the average percentage error, or how far off, students' estimates are from the labor market information. There is no consistent pattern across majors; however, absolute short-term errors for Engineering and Machining are

larger than those for Production and Assembly and Welding; long-term errors for Production and Assembly and Welding are positive and larger than those for Engineering and Machining.

Table 3. Median estimated earnings of the average program graduate (population) and expected earnings for survey respondent (self), for job obtained right after graduation (immediate) and job held ten years from graduation (ten).

	Engineering	Machining	Production and Assembly	Welding
Population earnings (immediate)	37500.0	35000.0	39760.0	40000.0
Population earnings (ten)	69000.0	55000.0	67000.0	70000.0
Self-earnings (immediate)	40000.0	38000.0	39760.0	40000.0
Self-earnings (ten)	75000.0	60000.0	65000.0	70000.0

Table 4. Percent error of student estimate of population earnings and actual population earnings as identified by labor market data.

	Engineering	Machining	Production and Assembly	Welding
Population error (immediate)	− 9.9	12.2	6.2	−3.8
Population error (ten)	− 5.2	3.4	26.9	34.6

Note: Positive percent error indicates student overestimated population earnings.

Error! Reference source not found. and **Error! Reference source not found.** explore student expectations about the probability of finding a job, advancing in their career over time, and having job security in their chosen career. Students have generally high estimates of the employment probability, advancement opportunity, and job security of past graduates in all fields.[5] **Error! Reference source not found.** shows students' own expectations, which are equal to or greater than their estimates of past graduates' outcomes. Students are very confident that they will find a job within one year of graduation, they will advance to better jobs within the career pathway, and they will have job security.

[5] We do not compare this to population data, as we lack precise data on employment, advancement, and job security.

Table 5. Estimated employment probability, career advancement probability, and job security probability, for the average program graduate (population).

	Engineering	Machining	Production and Assembly	Welding
Population employment (immediate)	0.70	0.75	0.70	0.70
Population employment (one year)	0.88	0.90	0.90	0.90
Population advancement	0.70	0.80	0.75	0.80
Population security	0.81	0.80	0.80	0.80

Note: Employment probability asked for job obtained right after graduation (immediate) and job one year from graduation (one).

Table 6. Estimated employment probability, career advancement probability, and job security probability, for the survey respondent (self).

	Engineering	Machining	Production and Assembly	Welding
Self-employment (immediate)	0.82	0.85	0.80	0.82
Self-employment (one year)	1.00	1.00	1.00	1.00
Self-advancement	0.90	0.90	0.85	0.88
Self-security	0.85	0.82	0.80	0.80

Note: Employment probability asked for job obtained right after graduation (immediate) and job one year from graduation (one).

Research Question 3

Does the provision of career pathways information change students' expectations about labor market outcomes? Our final research question asks to what extent do student responses change after we provide them with career pathways information. We focus on earnings and employment probability, which are the two classes of labor market information directly presented in the career pathways information tool. **Error! Reference source not found.** shows the average percent change in student earnings expectation and population earnings estimates. Average changes range from over 7% to under -8%. In Machining, all the differences are negative and statistically significant, suggesting students in the Machining field expect to earn less after seeing the career pathways information.

Table 7. Post- minus pre-intervention changes in student earnings estimates.

	Engineering	Machining	Production and Assembly	Welding
Population (immediate) revision	7.53	-4.62^{**}	4.44	4.72^{*}
Population (ten) revision	3.18	-3.09^{**}	7.24^{*}	6.54
Self (immediate) revision	-0.44	-5.41^{**}	4.44	6.08
Self (ten) revision	-0.48	-8.05^{**}	1.55	1.32

*Note: Positive change indicates students revised earnings expectations upwards. Statistical significance indicated by stars (*** p < 0.01, ** p < 0.05, * p < 0.01).*

Error! Reference source not found. shows percent changes in employment estimates. Percent changes in Engineering are negative and particularly large, ranging from -22% to -11.8%. Three of the estimates are statistically significant. Similarly, we find negative and statistically significant changes for students in Machining. As with Engineering students, Machining students revise downward the expected probability of getting a job themselves and their estimates for the population of past graduates.

Table 8. Post- minus pre-intervention changes in student employment probability estimates.

	Engineering	Machining	Production and Assembly	Welding
Population employment change (immediate)	-22.0^{*}	-8.0^{**}	-10.9	3.7
Population employment change (one year)	-19.8^{***}	-5.5^{**}	-3.9	-1.1
Self-employment change (immediate)	-12.6	-5.0^{*}	5.5	-5.2
Self-employment change (one year)	-11.8^{**}	-5.2^{**}	-2.2	-3.9

*Note: Positive change indicates students revised employment expectations upwards. Statistical significance indicated by stars (*** p < 0.01, ** p < 0.05, * p < 0.01).*

DISCUSSION

Career pathways focus on long-term advancement opportunities for students. It is important to know to what degree students value long-term outcomes when making a career choice. We find some evidence that students value long-term outcomes, though they place more weight on short-term outcomes. Regarding factors important to their career choice, students rate getting a

job after graduation as more important than either getting a job that allows quick advancement or a job that allows late advancement.

The accuracy of students' estimates of the earnings of program graduates varies depending on the field of study and the time period under consideration. In addition, students mostly expect their own earnings to exceed their estimates of the average past graduates' earnings.

We find limited evidence to suggest that students revise their labor market expectations after seeing the career pathways labor market information. There were some exceptions to this. Students significantly revise downward their earnings expectations in Machining after seeing the career pathways information. The career pathways information had a more consistent negative effect on employment expectations. After seeing the labor market information, students significantly reduce their employment expectations in Engineering and Machining. They also reduce employment expectations in all but two estimates in Production and Assembly and Welding, though the changes are not statistically significant.

FUTURE WORK

This project provides evidence that career pathways information has a small impact on student employment expectations. A limitation of this project is that our analysis focuses on expectations and not actual program choice. The next steps of this project must examine how the labor market information provided in the career pathways information affects students' actual preferences over academic programs in college.

MSU SUBSAMPLE

We now provide descriptive results for the MSU subsample of students. On average, university students are likely to have different labor market expectations and career preferences than community college students. If university students are more informed about labor market outcomes, they may also react differently to the survey information we provide. For these reasons, we separate the university students from community colleges students. The main focus of this analysis is on students in the Engineering and Production and Assembly programs, since only 7 students combined took the survey in Machining or Welding.

Table 9. Descriptive statistics for MSU sample.

		Percent
Gender	Female	10
	Male	90
Program	Electrical Engineering	73
	Machining	4
	Production and Assembly	21
	Welding	3

Note: Ethnicity variable missing in too many observations to include.

Comparing the MSU results to the Aims/CCCS results, we find several notable differences. First, compared to Aims/CCCS students, MSU students are slightly less likely to value the importance of getting a job that allows quick advancement and getting a job that allows late advancement.

Table 10. : Factors of employment that are important to students.

Question	Average Importance
1) Get job immediately after graduate	83
2) Get job that allows quick advancement	73*
3) Get job that allows late advancement	64***

Note: We conduct two separate T-tests: one test comparing quantities in row 1 to row 2, and one test comparing row 1 to row 3. Statistical significance indicated by stars. MSU sample only.

Second, compared to Aims/CCCS students, MSU students generally estimate higher values for the annual earnings of program graduates and higher expectations for their own earnings post-graduation. The exception is Welding, but the small sample size precludes us from making any firm conclusions from these numbers.

Table 11. Estimated earnings of the average program graduate (population) and expected earnings for survey respondent (student), for job obtained right after graduation (immediate) and job held ten years from graduation (ten). MSU sample only.

	Electrical Engineering	Machining	Production and Assembly	Welding
Population earnings (immediate)	54500	60000	60000	33500
Population earnings (ten)	80000	90000	85000	45000
Self-earnings (immediate)	60000	60000	60000	32500
Self-earnings (ten)	90000	100000	85000	57500

Third, compared to Aims/CCCS students, we find that MSU students have slightly lower estimates of employment probability in all rows except the Population Advancement. Employment and advancement estimates in Production and Assembly are similar to Aims/CCCS students.

Table 12. Estimated employment probability, career advancement probability, and job security probability, for the population.

	Engineering	Production and Assembly
Population employment (immediate)	0.60	0.72
Population employment (one year)	0.80	0.88
Population advancement	0.80	0.72
Population security	0.80	0.80

Note: Employment probability asked for job obtained right after graduation (immediate) and job one year from graduation (one). MSU sample only.

Similar to Aims/CCCS students, MSU students place a high probability of finding employment after graduation, advancing in their careers, and having job security. We do find some small differences between the responses for students in the two school groups, but no pattern is apparent.

Table 13. Estimated employment probability, career advancement probability, and job security probability, for the student (self).

	Electrical Engineering	Production and Assembly
Self-employment (immediate)	0.80	0.90
Self-employment (one year)	0.95	0.90
Self-advancement	0.90	0.85
Self-security	0.85	0.88

Note: Employment probability asked for job obtained right after graduation (immediate) and job one year from graduation (one). MSU sample only.

Finally, we present the MSU student revisions in labor market expectations. Overall, the patterns are similar to the Aims/CCCS sample. All but one of the estimated changes in earnings estimates is substantively small. In addition, all but two estimated changes in employment probability are negative. Compared to the Aims/CCCS students, fewer of the employment probability estimates are statistically significant, but, as discussed above, the small sample size warrants caution when interpreting these statistical tests.

Table 14. : Post- minus pre-intervention changes in student earnings estimates.

	Engineering	Production and Assembly
Population (immediate) revision	-3.87	-12.82^{*}
Population (ten) revision	3.36	-3.52
Self (immediate) revision	-2.14^{*}	2.70
Self (ten) revision	-3.28^{*}	0.82

*Note: Positive change indicates students revised earnings expectations upwards. MSU sample only. Statistical significance indicated by stars (*** p < 0.01, ** p < 0.05, * p < 0.01).*

Table 15. Post- minus pre-intervention changes in student employment probability estimates.

	Engineering	Production and Assembly
Population employment change (immediate)	−4.30	−11.97**
Population employment change (one year)	−1.97	−9.42**
Self-employment change (immediate)	−5.10	2.33
Self-employment change (one year)	−3.46**	0.39

*Note: Positive change indicates students revised employment expectations upwards. MSU sample only. Statistical significance indicated by stars (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$).*

KEY FINDINGS

We briefly summarize the key findings from the study:

1. Compared to the midpoint or minimum of the salary range given in career pathways information, current students have reasonable estimates of the earnings of former students immediately after graduation (Tables 3 and 4).

2. Compared to the midpoint or minimum of the salary of the salary range given in the last job title in the career pathway, current students believe ex-graduates earn significantly more money than the data suggest in the fields of Production/Assembly and Welding (Tables 3 and 4).

3. Students themselves expect to earn significantly more than their estimates of the average, or typical, graduate of their program (Table 3).

4. A significant majority of students expect to find a job immediately after graduation (Table 6). Nearly all students expect to have a job in their field within one year after graduation.

5. More students consider finding a job immediately after graduation to be more important that finding a job that offers long-term advancement (Table 2).

6. The career pathways information has little effect on students' earnings expectations (Table 7), except in Machining, where we find statistically significant differences in reductions in earnings expectations.

7. The career pathways information has a mostly negative effect on students' employment expectations, particularly in Engineering and Machining (Table 8).

REFERENCES

Agnew, Julie R., and Lisa R. Szykman. 2005. "Asset Allocation and Information Overload: The Influence of Information Display, Asset Choice, and Investor Experience." Journal of Behavioral Finance 6 (2): 57–70.

Deil-Amen, Regina, and James E. Rosenbaum. 2003. "The Social Prerequisites of Success: Can College Structure Reduce the Need for Social Know-How?" The ANNALS of the American Academy of Political and Social Science 586 (1): 120–43.

Grubb, W. Norton. 2006. "'Like, What Do I Do Now?': The Dilemmas of Guidance Counseling." In Defending the Community College Equity Agenda, edited by Thomas R. Bailey and Vanessa Smith Morest. In Defending the Community College Equity Agenda. Baltimore: Johns Hopkins University Press.

Karp, Melinda Mechur, Lauren O'Gara, and Katherine L. Hughes. 2008. "Do Support Services at Community Colleges Encourage Success or Reproduce Disadvantage?" http://ccrc.tc.columbia.edu/publications/do-support-services-encourage-success.html.

Wiswall, Mathew, and Basit Zafar. 2015. "Determinants of College Major Choice: Identification Using an Information Experiment." Review of Economic Studies 82 (2): 791–824.