

# INSIGHTS

## ON EQUITY AND OUTCOMES



Office of Community College Research and Leadership

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### Examining Equitable Representation in Programs of Study

#### The Democratic Mission of Community Colleges

The American Association of Community Colleges (2013) describes community colleges as “centers of educational opportunity” that are “inclusive institutions that welcome all who desire to learn, regardless of wealth, heritage, or previous academic experience” (para. 1). Implicit in these statements is the long standing ideology of community colleges, sometimes described as the “democratic mission,” is to expand educational opportunities through open access and to contribute to a more equitable society (Dowd, 2013, p. 92). Increasingly the focus has moved from educational access to student outcomes, including degree completion (Baldwin, Bensimon, & Dowd, 2011; Bragg & Durham, 2012; Dowd, 2013). As highlighted by Bragg and Durham (2013), an unbalanced focus on completion could undermine access and equity if the “allure of raising completion rates by reducing access for students thought unprepared for college and incapable of finishing is too attractive to deny” (p. 106). This is particularly concerning in institutions where pre-college levels of coursework have been privatized and distanced from the community college setting (Deil-Amen, 2011).

The open access nature of most community colleges and the shift in public policy agenda to completion can lead to the erroneous assumption that access to college is no longer a concern when examining equity. However, the opposite is true: with the rising costs of tuition, increased privatization of educational institutions and resources, increasing demands on community colleges to meet a multiplicity of missions, and decreased state and federal funding for higher education, the role and responsibility of community colleges is growing to promote access as an essential component of an equitable educational system (Bensimon, 2004; Bragg & Durham, 2012; Dougherty & Townsend, 2006; Dowd, 2013). As community college officials strive to improve student outcomes, they need to continue to work toward promoting equitable access for all students (Bragg & Durham, 2012). To build an equitable educational system, funders, including governmental funders, and community colleges need tools that will help them recognize the student populations being served by their programs and to engage and support new student populations to access and progress through their programs of study. This study provides both a preliminary examination of equity in the context of a major federal investment and a methodology for extending current efforts of community colleges to identify and address issues of inequity in their programs, pathways, departments, and/or colleges.

#### Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant Program

The Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program provides the basis for examining whether federal policy is effectively contributing to the democratic mission of community colleges. As part of the Health Care and Education Reconciliation Act of 2010, a total of nearly \$2 billion was allocated for the TAACCCT grant program (Reconciliation Act, Public Law No. 111–152, 19 USC 2372–2372a). This investment is intended to promote innovative short-term (two years or less) educational programs at community colleges that result in high-wage, high-skilled jobs in advanced manufacturing, transportation, health care, and Science, Technology, Engineering, and Mathematics (STEM) occupations (U. S. Department of Labor, 2011). At the onset, the U.S. Department of Labor outlined four priorities: a) accelerate progress for low-skilled and other workers; b) improve retention and achievement

rates to reduce time to completion; c) build programs that meet industry needs, including developing career pathways; and d) strengthen online and technology-enabled learning (U.S. Department of Labor, 2011, p. 5). TAACCCT grants are administered by the U.S. Department of Labor in partnership with the U.S. Department of Education. A fourth and final round of awards is expected to be announced in October 2014.

The Office of Community College Research and Leadership (OCCRL) has taken a leadership role in engaging with a wide variety of stakeholders associated with TAACCCT grants to help build transformative change from the innovations developed and tested by colleges and consortia through TAACCCT funding (Bragg et al., 2014). Further, OCCRL is the third-party evaluator of two TAACCCT consortia that include community colleges located throughout the nation and co-leads the Transformative Change Initiative (TCI) in partnership with The Collaboratory, a consulting firm that specializes in community college and workforce development in Silver Spring, Maryland. OCCRL is focused on understanding transformative change through its research on community colleges that are working to scale-up innovations developed through TAACCCT to improve student outcomes, as well as program, institutional, and system performance (Bragg et al., 2014).

## Health Care Consortium

The Health Care Consortium is a round one TAACCCT recipient that received a federal grant of over \$19 million in federal funding. This Consortium of nine community colleges in seven states is focused on programs in the health care industry in which there is a well-documented labor market demand for high-skilled workers in a range of occupations. The grant was initiated on October 1, 2011, with a grant period of 36 months and a one-year no-cost extension<sup>1</sup>. During the initial 36 months of this grant, ending on September 30, 2014, 87 programs of study among the nine co-grantee colleges were impacted by TAACCCT funding. In the fall of 2012, the combined student enrollment of the community colleges included in the Consortium was 71,793. The Consortium's combined TAACCCT student participants was 4,144 from spring 2012 to fall 2013. The number of Consortium participants for each semester was:

- 1,990 students in the spring of 2012,
- 2,777 students in the fall of 2012,
- 2,992 students in the spring of 2013, and
- 2,797 students in the fall of 2013.

As third-party evaluator for the Consortium, OCCRL has access to student-level data on TAACCCT-impacted programs of study. These data were supplemented with college-reported data retrieved from the Integrated Postsecondary Education Data System (IPEDS). Ideally, the study would have utilized IPEDS data for fall 2012 and fall 2013. However, the timing of this preliminary study required use of fall 2012 data only, because fall 2013 data were unavailable.

## Examining Equitable Representation of Underserved Populations

The purpose of this study was to examine the enrollment of underserved student populations in the Health Care Consortium's TAACCCT programs longitudinally. Underserved populations, for the purposes of this study, are demographic groups that are underrepresented in health care careers. Underserved student populations included in this study are: a) African American, b) male, and c) non-traditional aged (25 years of age or older at enrollment). This preliminary study addresses the following research question:

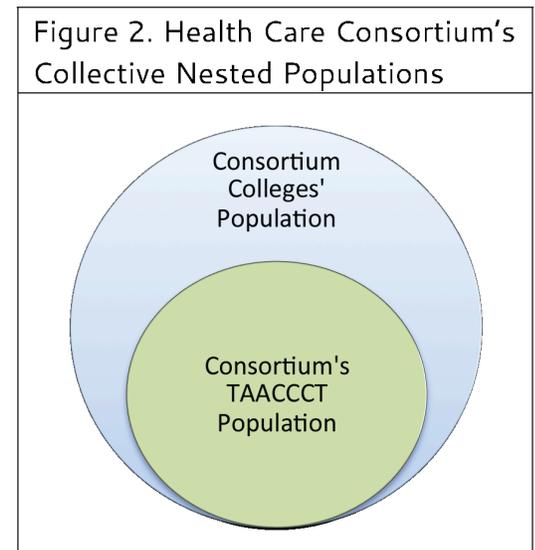
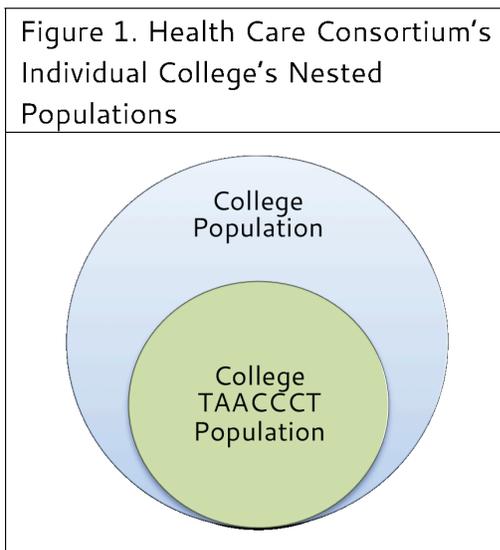
1. Have the Health Care Consortium's colleges individually and collectively increased the representation of underserved student populations (African American, male, non-traditional aged) relative to their college populations?

- a. Is the proportion of TAACCCT participants different from the overall student population?
- b. Are the TAACCCT participants different over time (i.e., does the difference hold longitudinally)?

<sup>1</sup> The Health Care Consortium applied for and was granted a one-year no-cost extension by the U.S. Department of Labor. This no-cost extension provides the consortium a fourth year in the grants performance period. This provides time for current participants to complete their programs.

## Student Populations

This study utilized two sets of nested populations. The first population, illustrated in Figure 1, was the students enrolled in TAACCCT-impacted programs of study at each individual college as compared to the college's overall student population. The second population, illustrated in Figure 2, was the students enrolled in all TAACCCT-impacted programs of study across the entire consortium compared to the total student population served by colleges in the consortium.



## Equity Index

The Equity Index is a test of proportions that can be used to compare enrollment or outcomes for two nested populations, where the smaller population is the test population and the larger population is a reference population (Bensimon, 2003; Hao, 2006). The Equity Index results in a share ratio that provides a standardized comparison between two nested populations (Hao, 2006). The Equity Index in this study is used to compare student enrollment in TAACCCT-impacted programs of study by a demographic characteristic against what would be expected for that same demographic characteristic in the total college student population. The equation for the Equity Index for this study is as follows:

$$\text{Equity Index} = \frac{\% \text{ TAACCCT Population with demographic } x}{\% \text{ College Population with demographic } x}$$

The Equity Index reads, during this time period, the outcome of students who are demographic  $x$  was  $xx\%$  of that expected relative to the total reference population. As an example: In the spring of 2012, enrollment of male students in TAACCCT-impacted programs at College A was 32% of that expected relative to the college's total male student population.

The Equity Index for African American, male, and non-traditional age students enrolled in TAACCCT programs was calculated, first individually at each college, and then collectively for the consortium, for the spring and fall semesters of 2012 and 2013.

## Comparing the Equity Index Longitudinally

For each college and the consortium, the Equity Index from their fall 2012 enrollment and fall 2013 enrollment was compared longitudinally. This comparison was made utilizing a modified two-sided test for significance comparing a nested sub-population relative to a larger population.

The following formula was used.

Null Hypothesis:  $\theta_i = \theta_j$       Alternative Hypothesis:  $\theta_i \neq \theta_j$

$x_i$  = number of students with demographic  $x$  enrolled in the subgroup in year  $i$

$n_i$  = total number enrolled in the subpopulation in year  $i$

$\hat{p}_i$  = proportion of students with demographic  $x$  in the subpopulation in year  $i$

$\pi_i$  = proportion of students with demographic  $x$  in the reference population in year  $i$

EI <sub>$i$</sub>  = Equity Index for year  $i$

Standard Error Calculation

Test Statistic

$$se = \sqrt{\frac{\hat{p}_i(1-\hat{p}_i)}{n_i(\pi_i^2)} + \frac{\hat{p}_j(1-\hat{p}_j)}{n_j(\pi_j^2)}}$$

$$z = (EI_i - EI_j)/se$$

A series of calculations was run comparing the demographic proportion enrolled in TAACCCT impacted programs of study relative to the demographic proportion enrolled in all programs of study at the college. This computation allowed for the comparison of demographic  $x$  for the TAACCCT- impacted population at each college over a longitudinal series while accounting for the relative demographics in which the programs of study was situated.

Three assumptions apply to this statistical test: a) a categorical variable shared by two populations, b) independent random samples, and c) a minimum enrollment of five students in both populations (Agresti & Franklin, 2007). The variables selected for this study are categorical variables shared by two populations meeting the first assumption. The second assumption, of an independent random sample is necessary in studies that use a sample of students. In this study we compared all students enrolled within the college and all students enrolled in TAACCCT programs within the college. Consistent with the third assumption, calculations were not run when the number of unknown or not reported (missing) data points for the demographic variable exceeded 10% of the student group population or when any subpopulation had fewer than 20 students in it.

## Enrollment of African Americans in TAACCCT Programs of Study

The enrollment of African Americans in TAACCCT-impacted programs of study at Health Care Consortium colleges (College A, C, E, H) ranged from 121–198% of what would be expected relative to the colleges' African American student population (Table 1). Despite the fact that the proportion of African American students in TAACCCT programs of study exceeded the proportion of African American students in the college population in these four cases, one college (College C) showed a significant decrease in the equity index from fall 2012 to fall of 2013, meaning the proportion of African Americans enrolled in TAACCCT-impacted programs fell relative to the college population. This does not mean that there was a decrease in the number of African Americans enrolled in TAACCCT-impacted programs at College C during this period. College C saw an increase of 35 more African American students enrolled in the fall of 2013 than in the fall of 2012.

Table 1. Equity Index and Test of Significance for Enrollment of African American Students in TAACCCT Programs of Study in the Health Care Consortium  
Spring 2012 – Fall 2013

College <sup>1,2</sup>	Equity Index				Standard Error <sup>3</sup>	z value	p value <sup>4</sup>
	Spring 2012	Fall 2012	Spring 2013	Fall 2013			
A	1.98	1.89	1.89	1.50	0.448	0.873	0.382
C	1.90	1.58	1.44	1.28	0.101	2.958	0.003**
E	1.28	1.35	1.35	1.32	0.192	0.137	0.891
H	1.43	1.21	1.41	1.28	0.194	-0.362	0.717
Health Care Consortium	0.94	1.22	1.31	1.17	0.058	1.067	0.286

Notes \*\*Significant to 0.01

1. Colleges D and F were not analyzed individually due to unknown values that met or exceeded 10%. College G was not analyzed as multiple subgroups had fewer than 20 students. Colleges D, F, and G were included in the consortium analysis.

2. Race unknown ranged from 2% to 6% of TAACCCT students at individual colleges, and between 8% and 9% as a consortium.

3. Values are calculated relative to fall 2012 IPED college population data.

4. p-values are two-tailed.

### Equity Index Reads:

In the spring of 2012, enrollment of **African American** students, in TAACCCT- impacted programs at College A, was 198% of that **expected** relative to the college's total African American student population.

## Preliminary Results on Enrollment of Males in TAACCCT Programs of Study

The enrollment of male students in TAACCCT-impacted programs of study at Health Care Consortium colleges ranged from 25–58% of what would be expected relative to each college’s male population (Table 2). None of the individual colleges showed a significant change in the representation of males from fall 2012 to fall of 2013 relative to the individual college’s male populations. Collectively, across the consortium, the proportion of enrollment of male students in TAACCCT programs has grown significantly (at the 0.05 level) relative to the male students enrolled in the combined college population. However, the practical significance of this finding is limited, as it is not supported by significant findings at any of the individual colleges.

Table 2. Equity Index and Test of Significance for Enrollment of Male Students in TAACCCT Programs of Study in the Health Care Consortium  
Spring 2012 – Fall 2013

College <sup>1, 2</sup>	Equity Index <sup>3</sup>				Standard Error <sup>3</sup>	z value	p value <sup>4</sup>
	Spring 2012	Fall 2012	Spring 2013	Fall 2013			
A	0.32	0.29	0.31	0.34	0.079	-0.661	0.508
B	-	0.33	0.40	0.42	0.086	-0.997	0.319
C	0.41	0.43	0.46	0.51	0.052	-1.468	0.142
D	0.58	0.53	0.51	0.55	0.056	-0.411	0.681
E	0.32	0.36	0.40	0.32	0.081	0.435	0.664
F	0.25	0.25	0.25	0.25	0.057	0.020	0.984
H	0.40	0.57	0.58	0.65	0.112	-0.689	0.491
Health Care Consortium	0.36	0.37	0.38	0.42	0.023	-1.989	0.046*

Notes: \*Significant to the 0.05 level

1. College G was not analyzed as multiple subgroups had fewer than 20 students. College G does contribute to the Consortium totals.
2. Unknown values were less than 1% for any college and less than 0.01% for the consortium.
3. Values are calculated relative to fall 2012 IPED college population data.
4. p-values are two-tailed.

### Equity Index Reads:

In the spring of 2012, enrollment of **male** students, in TAACCCT- impacted programs at College A, was 32% of that **expected** relative to the college’s total male student population.

## Enrollment of Non-traditional Aged Students in TAACCCT Programs of Study

The enrollment of non-traditional age students (age 25 years and older at enrollment) in TAACCCT-impacted programs of study at Health Care Consortium colleges (College B, C, D, E, F, H) ranged from 113-159% of what would be expected relative to the colleges' non-traditional age student population (Table 3). The proportion of students enrolled in TAACCCT-impacted programs who were more than 25 years of age grew significantly from the fall of 2012 to the fall of 2013 in Colleges D and E relative to the group of students who were of non-traditional age in the overall college populations in the consortium.

Table 3. Equity Index and Test of Significance for Enrollment of Students 25 Years of Age or Older in TAACCCT Programs of Study in Health Care Consortium/Colleges Spring 2012-Fall 2013

College <sup>1</sup>	Equity Index <sup>3</sup>				Standard Error <sup>3</sup>	z value	p value
	Spring 2012	Fall 2012	Spring 2013	Fall 2013			
B	1.17	1.19	1.39	1.39	0.132	-1.520	0.129
C	1.32	1.27	1.34	1.32	0.058	-0.791	0.429
D	1.13	1.21	1.25	1.31	0.048	-2.016	0.044*
E	1.42	1.30	1.40	1.49	0.101	-1.965	0.049*
F	1.25	1.13	1.17	1.29	0.091	-1.782	0.075
H	1.55	1.59	1.71	1.51	0.169	0.436	0.663
Health Care Consortium	1.26	1.25	1.33	1.36	0.032	-3.498	0.001**

Notes: \*Significant to 0.05, \*\*Significant to 0.01

1. College A and G did not report age data to IPED for fall 2012 and are not included in the analysis.
2. Unknown values represent less than 1% for any college and less than 0.01% for the consortium.
3. Values are calculated relative to fall 2012 IPED college population data.
4. p-values are two-tailed.

## Conclusion

The TAACCCT grant program represents an unprecedented level of federal investment in community colleges. TAACCCT builds upon evidence-based practices that have gained momentum and recognition as part of a larger movement to improve completion rates among all college students. This preliminary study shows that numerous colleges affiliated with the Health Care Consortium report higher proportions of African American students and older students enrolled in TAACCCT-impacted programs of study than would be expected based on their proportion in the overall college student enrollment. Although significant growth was not evident in the proportion of males enrolled in the TAACCCT-impacted programs relative to the proportion of males in the overall college student enrollment, the proportional representation of males did not decrease as the TAACCCT programs grew. This same conclusion can be drawn for the other demographic characteristics analyzed in this study.

Comparisons in this study were made to the proportion of students of the same demographic in the colleges' student populations. The use of a reference population, in this case the college student population, ensures that the findings are relevant to the college, based on its local, regional, or state context. Colleges could elect to use the same methods as demonstrated in this study but choose a different reference population for comparison to their program or college population. For example, a college might compare the demographics of their incoming freshman class to the region's high school population, or their Information Technology programs with the adult population in their service region. A standardized ratio, such as the Equity Index, allows for colleges to examine the change longitudinally and it also makes it possible to aggregate across multiple sites, such as the Consortium in this study.

Overall, these findings indicate that the federal investment through TAACCCT in community college may give greater access to underserved student groups, which is a positive finding for institutions that purport that educational access is central to their historic and current mission. Further examination of student populations is necessary to fully understand whether and how equity is evidenced in the outcomes of students enrolled in TAACCCT.

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**About the Author:** Heather L. Fox is a doctoral student in Human Resource Education at the University of Illinois at Urbana-Champaign and currently serves as project coordinator for the Pathways Resource Center and OCCRL. Special thanks to Cari Bishop, Debra Bragg, and Don Hackmann for their ongoing feedback and contribution to this brief.



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