Title: Evaluation of a Multiple Measures Placement System Using Data Analytics: Final Impact Findings

Authors: Elisabeth Barnett, Peter Bergman, Elizabeth Kopko, Dan Cullinan and Clive Belfield

Presenter(s): Elizabeth Kopko

Contact email: emk2152@tc.columbia.edu

Abstract

Background/Context:

Two thirds of students who attend community colleges and two fifths of students who attend public four-year colleges enroll in one or more remedial courses (Chen, 2016). Remedial courses require students to invest time and money that could be applied to college-level coursework, and studies suggest that the effects of remedial courses on student outcomes are mixed for students on the cusp of needing additional academic support (Jaggars & Stacey, 2014). Further, students who start college in remediation are less likely to graduate (Attewell, Lavin, Domina, & Levey, 2006).

Most students who participate in remediation in math and/or English are referred to these programs based on scores they earn on standardized placement tests. Research shows that some students assigned to remediation would likely pass a college-level course in the same subject area if given that opportunity; it also suggests that using multiple measures of students' skills and performance, including high school GPA, may be useful in assessing college readiness (Belfield & Crosta, 2012; Scott-Clayton, 2012). An increasing number of colleges are exploring or beginning to use multiple measures to place incoming students (Rutschow & Mayer, 2018).

Purpose/Objective/Research Question:

To evaluate the impact of a multiple measures placement system on student outcomes, the researchers initiated an experimental study in partnership with the State University of New York (SUNY) system and seven community colleges. At each college, multiple measures algorithms were created to predict student success in college level courses in math and English.

This presentation has three aims: (i) to explain how multiple measurement algorithms were created and how the multiple measures placement system was implemented; (ii) to discuss the sample and study methodology including descriptions of the relevant characteristics of the participating community colleges as well as the students participating in the study; and (iii) to present final impact findings from a randomized control trial (RCT) comparing the effects on student outcomes of placing students into remedial or college-level courses with either a multiple measures placement system or a status quo system that uses just placement test scores.

Setting:

Research was conducted at seven participating SUNY community colleges (see Table 1).

Population/Participants/Subjects:

We will present final impact results for three cohorts of students who went through intake at a participating college between fall 2016 and fall 2017. Our analytic sample consists of 12,623 students who took a placement test, of which about 84% enrolled in at least one remedial or

college-level course of any kind during the study period. Table 2 shows baseline descriptive statistics for the full analytic sample.

Intervention/Program/Practice:

Researchers and college personnel collaborated to develop the algorithms and alternative system for placement. Given differences among participating colleges, algorithms were created for each college individually, using historical data from 2011–14. Data on multiple measures — including high school GPA, years since high school graduation, and placement test scores — as well on outcomes in college-level courses, were used to create algorithms that weight each measure in the appropriate way for predicting student performance in initial college-level math and English courses. Faculty at each college then created placement rules by choosing cut points to be used to place program group students into remedial or college-level math and English courses.

Random assignment was integrated into existing placement procedures at each college; control group students followed status quo placement procedures and program group students were placed using the alternative placement system.

Research Design:

To evaluate the impact of the multiple measures system, RCT procedures were selected to meet What Works Clearinghouse evidence standards without reservations. Entering first-year students were informed about the research, afforded the opportunity to seek additional information, and were able to opt out. Those who continued took placement tests and were randomly assigned to be placed by either the status quo method (control group students) or the multiple measures algorithm (program group students). After taking placement tests, students were notified of placement into remedial or college-level courses. Table 3 provides evidence that students are well-balanced across program and control groups, providing assurance that the random assignment was implemented as intended.

Data Collection/Analysis:

Our impact analyses were conducted using ordinary least squares regression, controlling for college fixed effects and various student characteristics. For both math and English, we consider three outcomes: the rate of college-level course placement (versus remedial course placement), the rate of college-level course enrollment, and the rate of college-level course completion with grade C or higher. We also evaluated the effects of using a multiple measures system on fall-to-fall completion and accumulation of college credits. To examine whether program assignment led to differential first-term impacts by race/ethnicity, gender, Pell status, and age, we conduct subgroup analyses and test the significance of interaction effects for each subgroup.

Findings/Results:

Early results, based on one semester of data, are positive. Initial impact analyses from the study's first cohort of students indicate that many program group students were placed differently than they would have been. In math, 14% of program group students placed higher than they would have under a test-only system, while 7% placed lower. In English, 41.5% placed higher, while 6.5% placed lower. Furthermore, assignment to the program group produced positive and statistically significant effects on all three outcomes in both subjects. For example, program group students were 3.1 and 12.5 percentage points more likely than control group students to both enroll in and complete a college-level math or English course in the first term (Barnett, Bergman, Kopko, Reddy, Belfield, & Roy, 2018).

Final impact analyses using the full sample will be conducted prior to the conference and results will presented in the proposed session. The presentation will also summarize results of sub-group analyses by race/ethnicity, gender, Pell status, and age.

Conclusions:

Early results suggest that the multiple measures placement system can result in better student outcomes than the use of a single placement test alone. Final impact analyses will look to substantiate these early findings using additional data to examine a range of outcomes up to five semesters after students' initial entry into college.

<div align="center">

Table 1

College Characteristics[a]

</div>

Characteristic	Institution						
	Cayuga	Jefferson	Niagara	Onondaga	Rockland	Schenectady	Westchester
General college information							
Student population	7,001	5,513	7,712	23,984	10,098	8,458	22,093
Full-Time faculty	69	80	151	194	122	79	215
Part-Time faculty	170	177	0	480	409	0	2
Student/faculty ratio	20	18	16	23	23	23	16
% receiving financial aid	92	91	92	92	56	92	70
Demographics							
Race/ethnicity (%)							
American Indian or Alaska Native	0	1	1	1	0	1	1
Asian	1	2	1	3	5	7	4
Black or African American	5	7	11	12	18	14	21
Hispanic/Latino	3	11	3	5	20	6	32
Native Hawaiian or Other	0	0	0	0	0	1	0
White	85	73	80	49	39	67	33
More than one race/ethnicity	2	3	2	3	2	2	2
Race/Ethnicity unknown	3	3	1	27	15	2	5
Non-Resident Alien	1	1	0	0	1	0	1
Gender (%)							
Female	60	58	59	52	54	53	53
Male	40	42	41	48	46	47	47
Age (%)							
Under 18	30	17	19	24	10	37	1
18-24	44	52	60	55	63	40	69
25-65	26	31	21	21	26	23	30
Age unknown	0	0	0	0	0	0	0
Retention/graduation rates (%)							
Full-Time students	56	55	63	57	68	56	64
Part-Time students	28	30	47	34	56	50	53
Three-Year graduation rate	24	27	28	20	29	20	15
Transfer out rate	18	19	18	22	19	22	18

[a]Based on fall 2015 Integrated Postsecondary Education Data System (IPEDS) data.

Table 2

Baseline Descriptive Student Characteristics by College (Among Enrolled Students)

	Overall		College 1		College 2		College 3		College 4		College 5		College 6		College 7	
Characteristic	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Female (%)	50.2		58.5		54.6		52.9		48.5		51.4		55.3		46.3	
Race/ethnicity (%)																
White	41.9		74.8		64.6		55.7		50.9		35.7		40.1		24.6	
American Indian/Native Alaskan	1.0		1.0		1.1		1.3		1.5		0.2		0.9		0.9	
Asian	6.1		3.5		4.6		1.4		6.9		12.4		12.4		5.5	
Black	19.2		8.8		14.8		19.5		22.8		21.0		30.3		18.5	
Hispanic	20.4		4.6		8.8		4.5		10.6		27.6		13.8		33.8	
Pacific Islander	0.4		5.6		0.4		0.0		0.1		0.2		0.0		0.2	
More than one race/ethnicity	2.8		0.9		3.1		4.3		5.2		2.8		2.6		2.8	
Non-Resident Alien	0.4		0.6		1.2		0.6		0.2		0.1		0.0		0.3	
Race/ethnicity unknown	7.3		0.2		1.5		12.7		1.9		0.0		0.0		13.6	
Race/ethnicity missing	20.9	0.5	20.8	0.5	22.9	0.5	22.0	0.5	20.2	0.5	21.5	0.5	23.0	0.5	20.0	0.5
Age at entry	0.2		0.2		0.0		0.0		1.0		0.0		0.0		0.0	
Age at entry missing (%)	49.4	50.0	56.8	49.6	54.6	49.8	57.5	49.4	47.4	49.9	35.4	47.8	66.7	47.2	49.1	50.0
Pell Grant recipient (%)	12.9		8.7		13.5		14.6		14.4		8.2		15.3		13.7	
Pell Grant status missing (%)	83.9		90.3		85.8		84.1		75.3		92.0		84.2		83.0	
Total	12,623		679		1,233		1,825		2,051		1,779		347		4,709	

Table 3

Post-Randomization Characteristics by Treatment Assignment

Characteristic	Control Mean	Program Mean	Treatment-Diff	*p*-value	Observations
Female	0.50	0.51	0.40%	0.76	3,865
Gender missing	0.05	0.05	0.90%	0.43	4,729
Race/ethnicity					
White	0.46	0.45	-0.01	0.22	11,696
American Indian/Native Alaskan	0.01	0.01	0.00	0.32	11,696
Asian	0.07	0.06	-0.01	0.19	11,696
Black	0.20	0.21	0.01	0.05	11,696
Hispanic	0.22	0.22	0.01	0.30	11,696
Pacific Islander	0.00	0.01	0.00	0.68	11,696
More than one race/ethnicity	0.04	0.03	0.00	0.20	11,696
Non-Resident Alien	0.00	0.00	0.00	0.86	11,696
Race/ethnicity missing	0.07	0.07	0.00	0.86	11,696
Age at entry	20.98	20.88	-0.10	0.36	12,602
Age at entry missing	0.00	0.00	0.00	0.06	12,623
Pell Grant recipient	0.49	0.50	0.01	0.30	10,994
Missing Pell Grant info	0.13	0.13	0.00	0.83	12,623
TAP Grant recipient	0.35	0.36	0.01	0.55	10,994
Missing TAP Grant info	0.13	0.13	0.00	0.83	12,623
GED recipient	0.07	0.07	0.00	0.60	12,602
Missing GED status	0.00	0.00	0.00	0.06	12,623
HS GPA (100 scale)	77.96	78.12	0.16	0.35	7,890
HS GPA (missing)	0.38	0.37	0.00	0.86	12,623
ACCUPLACER subtest scores					
Arithmetic	51.0	51.2	0.22	0.65	9,464
Algebra	45.7	46.4	0.73	0.21	7,284
College-level math	34.8	33.8	-0.97	0.31	881
Reading	72.4	72.1	-0.33	0.45	9,606
Sentence skills	76.1	75.7	-0.34	0.54	4,720
Writing	6.0	6.1	0.01	0.79	6,711
Total					12,623

References

Attewell, P. A., Lavin, D. E., Domina, T., & Levey, T. (2006). New evidence on college remediation. *Journal of Higher Education, 77*(5), 886–924.

Barnett, E., Bergman, P., Kopko, E., Reddy, V. Belfield, C., & Roy, S. (2018). *Evaluation of a multiple measures placement system using data analytics: Implementation and early impacts*. New York: Columbia University, Teachers College, Community College Research Center.

Belfield, C., & Crosta, P. M. (2012). *Predicting success in college: The importance of placement tests and high school transcripts* (CCRC Working Paper No. 42). New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/publications/predicting-success-placement-tests-transcripts.html

Chen, X. (2016). *Remedial coursetaking at U.S. public 2- and 4-year institutions: Scope, experiences, and outcomes* (NCES-2016-405). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2016/2016405.pdf

Jaggars, S. S., & Stacey, G. W. (2014). What we know about developmental education outcomes. New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from https://ccrc.tc.columbia.edu/media/k2/attachments/ what-we-know-about-developmental-education-outcomes.pdf

Rutschow, E. Z., & Mayer, A. K. (2018). *Early findings from a national survey of developmental education practices.* New York, NY: Center for the Analysis of Postsecondary Readiness. Retrieved from https://postsecondaryreadiness.org/early-findings-national-survey-developmental-education/

Scott-Clayton, J. (2012). *Do high-stakes placement exams predict college success?* (CCRC Working Paper No. 41). New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/ media/k2/attachments/high-stakes-predict-success.pdf